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Analyzing the Challenges and the Opportunities for Women's Participation in the Construction Sector and STEM-based Career in Bangladesh

SELIM RAIHAN
SAYEMA HAQUE BIDISHA
ESHRAT SHARMIN
MOHAMMAD ASADUZZAMAN
DIPA DAS

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Authors

Selim Raihan
Professor of Economics, University of Dhaka, and Executive Director, SANEM

Sayema Haque Bidisha
Professor of Economics, University of Dhaka

Eshrat Sharmin
Senior Research Associate, SANEM

Mohammad Asaduzzaman
Research Associate, SANEM

Dipa Das
Research Associate, SANEM

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Email: sanemnet@yahoo.com
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Acronyms and Abbreviations:

WEE	Women's Economic Empowerment
TVET	Technical and Vocational Education and Training
CISC	Construction Industry Skills Council
LFS	Labor Force Survey
ASEAN	Association of Southeast Asian Nations
SDGs	Sustainable Development Goals
ILO	International Labour Organization
ESP	Education Sector Plan
BEP	Building Equality Policy
LGED	Local Government Engineering Department
WDI	World Development Indicator
OHSP	Occupational Health and Safety Policy
BSCO	Bangladesh Standard Classification of Occupation
STEM	Science, Technology, Engineering, and Mathematics
KII	Key Informant Interviews
FGD	Focused Group Discussion
BMT	Business Management and Technology
BANBEIS	Bangladesh Bureau of Educational Information and Statistics
RAC	Refrigeration & Air Conditioning
BIDS	Bangladesh Institute of Development Studies
PPR	Public Procurement Rule
UIS	UNESCO Institute for Statistics
GER	Gross Enrollment Rate
BLA	Bangladesh Labor Act
BLR	Bangladesh Labor Rules
NER	Net Enrollment Rate
FLFP	Female Labour Force Participation
GEAP	Gender Equality Action Plans
VCAL	Victorian Certificate of Applied Learning
NAWIC	National Association of Women in Construction
CWIT	Chicago Women in Trades
ERiCA	Equal Representation in Construction Apprenticeship
DIR	California Department of Industrial Relations
DAS	Division of Apprenticeship Standards
IIP	Industry Innovation Program
NSW	New South Wales
E&I	Equity & Inclusion
STI	Science, Technology, and Innovation
LGBTQ	Lesbian, gay, bisexual, transgender, and queer
NPSTI	National Policy on Science, Technology and Innovation
SAGE	Science in Australia Gender Equity
ARC	Australian Research Council
NHMRC	National Health and Medical Research Council
WISE	Women in STEM and Entrepreneurship
EPSRC	Engineering and Physical Sciences Research Council

EDI	Equality, diversity and inclusion
USAID	United States Agency for International Development
APEC	Australia Women in Research Fellowship
GWC	Girls Who Code
DST	Department of Science and Technology
IUSSTF	Indo-U.S. Science & Technology Forum
WISTEMM	Women in STEMM
STEMM	Science, Technology, Engineering, Mathematics, and Medicine
WDI	World Development Indicator
A2I	Aspire to Innovate
4IR	Fourth Industrial Revolution
SEIP	Skills for Employment Investment Program
RTI	Rehab Training Institute
NSDA	National Security De3velopment Authority
LFS	Labor Force Survey
ICT	Information and Communication Technology
HSC	Higher Secondary Certificate
ESP	Education Sector Plan
OSHA	The Occupational Safety and Health Act
BEP	The Building Equality Policy
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
NAWIC	National Association of Women in Construction
CWIT	Chicago Women in Trades
ERiCA	Equal Representation in Construction Apprenticeship
DIR	Department of Industrial Relations
IIP	Industry Innovation Program
STIP	Science, Technology, and Innovation Policy
NPSTI	National Policy on Science, Technology and Innovation
STI	Science, Technology, and Innovation
SAGE	Science in Australia Gender Equity
ARC	Australian Research Council
NHMRC	National Health and Medical Research Council
WISE	Women in STEM and Entrepreneurship
APEC	Asia-Pacific Economic Cooperation
IUSSTF	Indo-U.S. Science & Technology Forum

Executive Summary

Women's economic empowerment (WEE) works as a catalyst to achieve Sustainable Development Goals (SDGs) by promoting gender equality (SDG 5), eradicating poverty (SDG 1), and ensuring inclusive economic growth (SDG 8). In Bangladesh, despite recent progress with rise in female labor force participation challenges persist across various indicators of women's empowerment, notably in economic aspects measured by earnings potential in the labor market.

Additionally, traditional gender norms and a patriarchal culture limit women's engagement in paid labor, assigning them to domestic and care duties instead. Furthermore, female employment is concentrated heavily in relatively low-skilled, low paid and primarily informal agricultural activities rather than in manufacturing or service sector. In order to engage more women in income-generating activities, it is crucial to explore other potential sectors and to expand women's participation in such sectors. The rise of automation and fourth industrial revolution (4IR) technology underscores the importance of focusing on science-based occupations and education for high-skilled employment for women. Therefore, encouraging women to pursue STEM degrees and placing them in STEM-related careers may be a wise and practical move. The construction sector, benefiting from rapid infrastructural development, offers considerable employment opportunities for low-skilled workers, is a potential alternative in the growing construction sector.

STEM education and careers are moderately interlinked in terms of occupational mobility and career transition across various occupations in the construction industry. The top-tier and the mid-tier occupations of the construction industry are simply STEM-based careers associated with the industry, underscoring the importance of STEM-based education for women for sustainable career upgradation which are currently male dominated career. Furthermore, integrating women into STEM roles has the potential to address several prevalent issues in the construction sector, such as casual employment, unpredictable working hours, unsafe work environments, wage exploitation, and workplace harassment. Hence, to ensure occupational mobility and smooth career transition in the construction industry STEM-based education should be more accommodating for women and the inherent issues such as the casual nature of employment should be addressed by the relevant stakeholders.

This study focuses on accessing women's situation within construction sector and understating women's potential and barriers in STEM based carrier in Bangladesh. The study undertook a mixed-method approach where desk review was followed by a combination of quantitative and qualitative data analysis. Quantitative data analysis was based on secondary data from the national as well as international data sources. Qualitative data analysis included Key Informant Interviews (KII) and Focused Group Discussion (FGD) with the relevant government officials, experts, employers, and development partners.

This study highlights the grim reality of female representation in the construction sector globally and in Bangladesh, where occupations are predominantly male-centric across all tiers, underscoring gender bias and stigma. Analysis using the Labour Force Survey (LFS) 2016-17 for Bangladesh indicates a significant number of women in physically demanding, lower-tier jobs, with many in temporary roles, pointing to a high level of informality, which aligns

with the result from Key Informant Interviews (KII). Female workers in the construction field may be encountering workplace accidents at a higher rate than their male counterparts, which may further indicate that women are more vulnerable to occupational hazards/accidents. There is no policy regarding the employment of women in the construction sector. Despite lacking a specific policy for women's employment in construction, the government has launched initiatives to improve women's workforce participation, including maternity leave regulations, equal pay, respectful workplace practices, and enhanced occupational health and safety standards.

In Bangladesh, the construction sector sees low female participation due to various factors: lesser female participation in elementary and technical jobs, a significant skill gap addressed inadequately by existing training programs, and widespread informal employment practices. Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) highlight issues such as limited career growth opportunities and a subcontractor-led informal hiring process that disregards gender equality, further deterring women. Challenges including transportation difficulties, male-dominated workplaces, unpredictable hours, unsafe working conditions, and lack of proper facilities compound the issue. Additional burdens of caregiving responsibilities and societal biases towards women's productivity, alongside the industry's preference for male workers due to cost perceptions and informal record-keeping practices, significantly hinder women's full integration into the construction sector.

The participation of women in STEM is crucial for achieving gender equality and enriching these fields with diverse perspectives and innovations. However, in Bangladesh, women remain underrepresented in STEM education and careers. According to the ILO (2020), only 11.2% of all tertiary graduates in Bangladesh are from STEM fields, with women making up just 20.6% of these graduates. There has been a significant decline in women graduating from Natural Sciences, Mathematics, and Statistics, dropping to 12.99% in 2016-17 from earlier years, with a slight increase to 14.91% in 2018. This trend is mirrored in STEM fields overall, though the decline is less pronounced. The Labour Force Survey (LFS) 2016-17 further highlights the gender gap, showing a predominantly male workforce in STEM occupations, with women more often found in lower-paying STEM jobs and rarely in higher-wage segments or in fields like electrical and mechanical/civil sectors. Additionally, the public sector lags the private sector in creating STEM job opportunities for women. This disparity underscores the need for targeted efforts to enhance women's participation in STEM in Bangladesh and globally, to not only close the gender gap but also to leverage the full potential of diversity in driving innovation and growth in these critical fields.

This study examined Bangladesh’s education policies, including the National Education Policy 2010, the 8th Five-Year Plan, and the Education Sector Plan, revealing significant government efforts to boost women's participation in STEM education. These initiatives focus on creating equal opportunities for all genders in STEM and ICT fields, enhancing female enrollment in technical and vocational programs, setting up more polytechnics for women, incorporating gender issues into teacher training, and offering extra support and stipends to female students. Such measures indicate a pivotal shift towards empowering women through education, aiming to furnish them with essential skills for today's workforce. But there was a lack of proper evaluation and implementation of these policies.

The study identifies challenges hindering female participation in STEM in Bangladesh, including significant urban-rural disparities, socioeconomic and cultural barriers, economic constraints, and a shortage of skilled teachers. Also, misconceptions and a lack of guidance at crucial educational stages lead to confusion and restricted career opportunities for women, further compounded by the theoretical nature of the existing education system which fails to meet the practical demands of STEM. Additionally, inadequate education policies, curriculum updates, lack of secure housing for female students, and insufficient academia-industry collaboration exacerbate these issues. Addressing these challenges through comprehensive policy reforms, educational improvements, and fostering industry ties is critical for enhancing women's engagement in STEM fields.

The construction industry plays a dual role in climate change, being both a significant contributor and highly susceptible to its effects. Research indicates a gap in the industry's preparedness, highlighting a slow translation of awareness into concrete actions. The sector faces direct challenges from climate phenomena like flooding and overheating, with sustainable design practices and materials like autoclaved aerated concrete identified as key to reducing CO2 emissions. Worker safety and productivity are also affected, with extreme weather increasing health risks and reducing work capacity, especially under rising temperatures. Female construction workers face unique challenges, including increased migration to urban areas and higher susceptibility to heat stress, underscoring the need for inclusive mitigation efforts and the potential of women in green jobs. These issues point to an urgent need for the construction sector to adopt comprehensive strategies to address the multifaceted impacts of climate change on infrastructure, worker well-being, and the broader environment.

To enhance STEM education and female participation, strategies include organizing social awareness programs and science fairs, providing orientation programs at higher education levels with female role models to inspire students, and improving infrastructure and training facilities, especially in semi-urban and rural areas. Enhancing teacher quality through skill training, updating curriculums with practical applications, and fostering academia-industry collaboration are essential. Creating a supportive academic environment, establishing career guidance centers, introducing incentives like scholarships, integrating Technical and Vocational Education and Training (TVET) into mainstream education, and ensuring dedicated budget allocation for STEM are crucial steps. Additionally, effective planning and implementation of budgetary resources are needed for better STEM education outcomes and to address gender disparities.

To increase female participation in the construction industry, actions include establishing a comprehensive workforce database for targeted policy making, gradually formalizing the sector with structured recruitment, fair wages, standard hours, health standards, and gender-responsive practices. A coordinated public-private effort is crucial for creating a dignified work environment and ensuring women's inclusion in mega projects. Implementing a well-defined health, safety, and compensation policy, alongside a specific body for addressing workplace abuse and harassment, is essential. Promoting the sector through incentives for female participation in skill-training programs and creating a gender-responsive ecosystem with standard wages, safety measures, insurance, maternity benefits, and flexible working hours will support sustainable and dignified work conditions for women.

To boost women's involvement in the construction sector and STEM occupations, coordinated policy measures are essential for providing a safe working environment, competitive advantages, and promoting STEM education among women. Analyzing global best practices is key to identifying strategies that can be adapted to Bangladesh's policy landscape, underscoring the importance of strategic interventions for enhancing gender inclusivity and equality in these fields. This study reviewed international policies and initiatives to guide Bangladesh towards greater gender inclusiveness in construction and STEM careers, aiming to create an equitable and supportive atmosphere for women in these traditionally male-dominated sectors.

Chapter 1 : Introduction

1.1 Background

Investing in women's economic empowerment (WEE) is crucial for achieving several Sustainable Development Goals (SDGs), including gender equality (SDG 5), poverty eradication (SDG 1), and inclusive growth (SDG 8). Within the Bangladesh context, although there has been progress in various empowerment metrics, significant obstacles remain. Additionally, there are pockets of deprivations and underdevelopment and women belonging those pockets are found to be in a much worse state. Besides, women from lower-income backgrounds, those with limited educational opportunities, and members of ethnic minority groups are especially vulnerable. They are more susceptible to economic shocks and thus warrant a focused policy intervention to address their unique challenges and vulnerabilities. One of the important indicators of women's economic empowerment is that of their earning potential, which can be best captured through their participation and quality of engagement in labour market activities. Despite progress in recent years with an increase in female labour force participation (FLFP) from 36.3% in 2016/17 to 42.7% in 2022, there is still a substantial gender gap with the male participation rate being as high as 80% (LFS,2022). On the other hand, in addition to certain socio-economic factors, the conventional gender norms and patriarchal culture [1]are also restricting women's participation in the mainstream paid labour market activities.

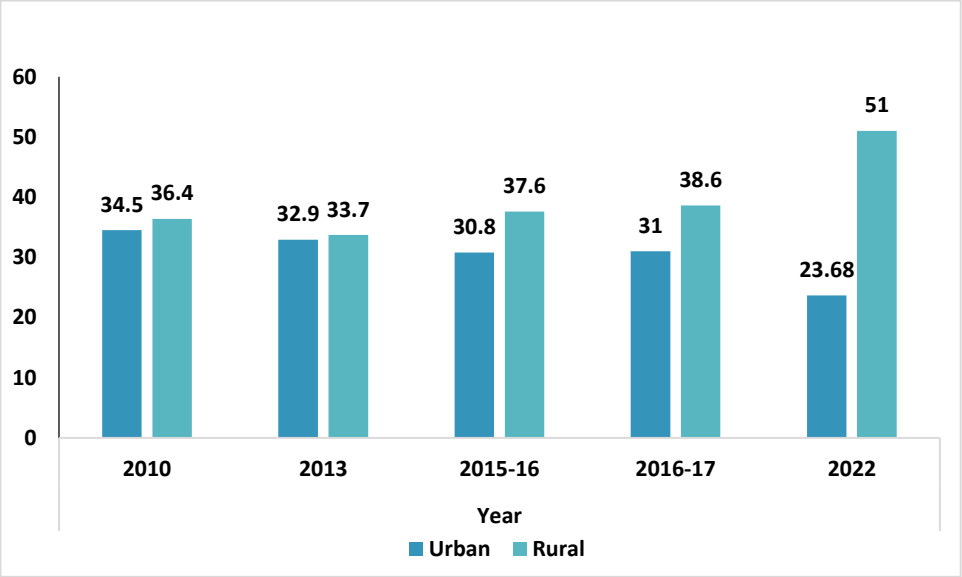
A closer examination of the LFS data reveals that, during 2016-17 to 2022 the participation rate in rural areas has risen considerably from 38.6% to 51%. However, in urban areas there has been declining trend over time from 34.5 % in 2010, 33 % in 2013 and 31% in 2016-17 to 23.68% in 2022 (Figure 1.1). The contrasting trends between urban and rural areas can be attributed to a mix of economic, social, and logistical factors. In urban areas, FLFP is declining due to a significant slowdown in employment opportunities, particularly in the Ready-Made Garments (RMG) and textile sectors, which traditionally employed many urban women (Farole & Cho, 2017). Additionally, urban women face sociocultural barriers to working outside the home, compounded by childcare challenges due to a lack of supportive family networks. Gender wage discrimination might further discourage urban women from entering the workforce (Ahmed & Pushkar,2008). Conversely, in rural areas, FLFP is on the rise, supported by the agricultural sector's relatively stable labor demand and the societal acceptance of women's work as an extension of their domestic roles. Rural women benefit from stronger community and family support networks that facilitate childcare, making it easier for them to engage in paid work. Moreover, economic necessity in rural households often requires women's participation in the labor force, and new opportunities outside the traditional agricultural sector are also contributing to the increase in rural FLFP (ILO,2013).

Female employment in this regard in concentrated heavily in relatively low skilled, low paid and primarily informal agricultural activities (74.1%). Moreover, around 12.5% of employed

[1] Patriarchal culture refers to a societal framework where men traditionally hold the dominant roles and privileges in key areas such as political leadership, economic control, and cultural norms. This system of male dominance permeates various facets of everyday life, leading to imbalances in access to education, job prospects, and financial earnings among different genders.
Source : https://www.populationmedia.org/the-latest/unmasking-the-patriarchy-its-origins-impact-and-the-path-to-equality

women are unpaid contributing family workers. While informality affects both genders, women are disproportionately impacted. Only 3.4% of employed women held formal jobs compared to 21.6% of men. This high informality rate exposes women to greater vulnerabilities in their employment.

Figure 1.1 : Labour force participation rate among females (%)



Source: Labour Force Survey, various years

Furthermore, employment quality presents a significant challenge within the Bangladeshi labour market, particularly when viewed through a gender lens. An analysis employing the most recent Labor Force Survey (LFS 2022) data reveals a stark gender disparity in high-skilled occupations, such as managerial or professional roles, where women's representation is notably low (7.3% of managerial positions). Conversely, women's employment is predominantly found in elementary occupations, making 21.9%, i.e. occupations with low level of income and high degree of informality. Alongside these challenges, there has been a decline in both the unemployment rate and the number of women not participating in the labor force over time. The unemployment rate has reduced to 3.59% in 2022, down from 6.7% in the 2016-17 period (LFS 2022). Similarly, the number of women not engaged in the labor force has decreased slightly to 34.50 million from 35 million, indicating a gradual but positive shift in labor market participation.

Therefore, despite the progresses over time, in terms of both participation as well as the quality of employment there remain a number of challenges regarding women's labour market experiences. In this connection, it is crucial to explore new sectors of employment to aid women's income-earning opportunities. Due to the heterogeneity of female labour force, sectors requiring both the low and medium skilled as well as the high skilled work force should be prioritized. In case of high skilled employment, with increased automation and Fourth Industrial Revolution (4IR), it is of paramount importance to shift the focus of employment towards more science-based education and related employment. In this regard, it is high time to educate women in STEM (Science, Technology, Engineering, and Mathematics) related subjects and occupations. Also, within the broader macroeconomic context, the pursuit of new employment opportunities for women, particularly in sectors like STEM and digital technology, aligns closely with the strategic goals associated with the graduation of Least

Developed Countries (LDCs) to higher economic statuses. Integrating women into the STEM and digital fields serves several macroeconomic objectives. Firstly, it contributes directly to gender equality by creating up high-quality, well-paid job opportunities for women. Secondly, it fosters productivity growth and innovation, both of which are vital for an economy to be competitive in the global arena. Empowering women with expertise in technology and STEM education are essential to generating a workforce capable of driving and sustaining innovation and technical progress, which are important for economic development and LDC graduation.

1.2 Unlocking Women's Potential in Construction Sector

A more granular analysis from sectoral perspective highlights that across 21 major industries, at least 10 of the industries have less than one percent of female employment. These industries include some of the labour-intensive industries such as Construction, Financial and Insurance Activities, Transportation and Storage, Professional, Scientific and Technical Activities, Mining and Quarrying, and Real Estate Activities (table 1.1). Therefore, despite ample scope of employment, the actual participation of women in these industries is quite low. In this connection, the present study will focus on the construction sector, which stands out as one of the leading and promising industries with a notably low female labour force participation.

Table 1.1 : Employed population aged 15 or above, by major industry (%)

Major sector	Male (%)	Female(%)
Agriculture, forestry and fishing	29.71	74.09
Manufacturing	12.89	8.28
Activities of households as employers	2.17	5.77
Arts, entertainment and recreation	1.62	3.49
Education	2.73	2.76
Wholesale and retail trade, repair of motor vehicles	18.91	1.83
Human health and social work activities	0.78	0.87
Accommodation and food service activities	3.15	0.68
Other service activities	1.6	0.48
Construction	**8.18**	**0.4**
Financial and insurance activities	1.02	0.35
Administrative and support service activities	1.02	0.28
Public administration and defence	1.72	0.23
Transportation and storage	12.48	0.2
Professional, scientific and technical activities	0.89	0.19
Information and communication	0.52	0.07
Electricity, gas, steam and air conditioning supply	0.26	0.02
Mining and quarrying	0.13	0.01
Water supply, sewerage, waste management	0.04	0.01
Real estate activities	0.17	0.01
Activities of extraterritorial organizations	0.01	0
Total	100	100

Source: Labour Force Survey 2022

Table 1.2 shows the employment trend in the construction sector over the period 1999-2017. This data reveals a gloomy picture from gender lenses. Of the total female workers, participation in the sector has remained well under 1.5% during this period.

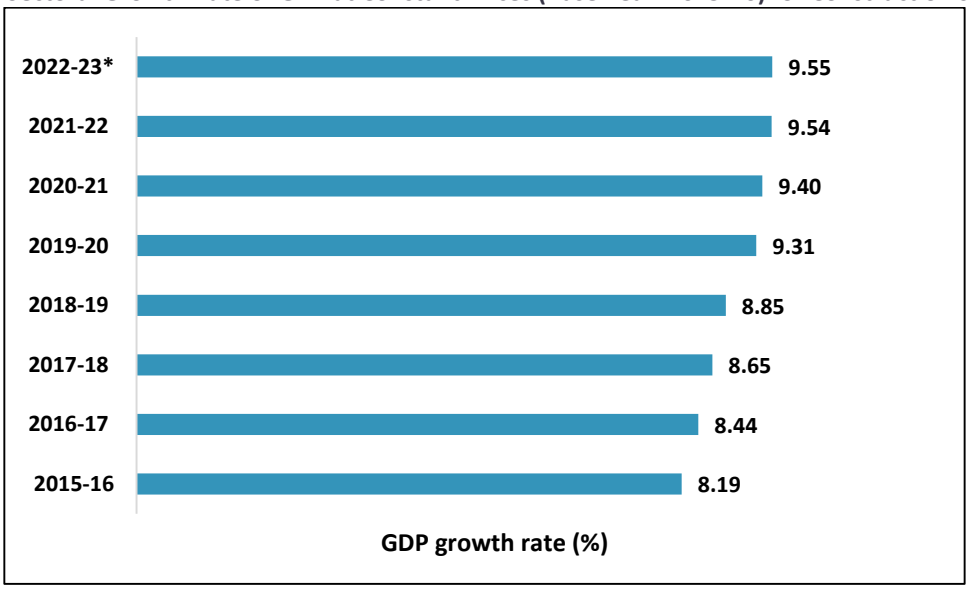
Table 1.2:The labour force engaged in the construction sector, 1999-2017

Year	Employed person (in thousand)				% of total employed person		
	Male	Female	Transgender	Total	Male	Female	Total
1999-2000	1045	91	-	1136	3.4	1.2	2.9
2002-2003	1445	97	-	1541	4.2	1.0	3.5
2005-2006	1421	104	-	1524	3.9	0.9	3.2
2010	2391	227	-	2617	6.3	1.4	4.8
2013	1975	168	-	2144	4.8	1.0	3.7
2016-17	2308	142	-	2451	7.5	1.4	5.6
2022*	2802	59	1	2862	8.18	0.4	5.44

Source: Labour Force Survey, various years, BBS.

The construction industry is one of the fastest-growing industries in Bangladesh in recent years and as mentioned in Bangladesh Economic Review 2021, the contribution of the construction industry to GDP follows an increasing trend over the years. Since the fiscal year 2015-16, starting at around 8.19%, the construction sector in Bangladesh has seen a consistent growth rate, reaching 9.55% in FY 2022-23* (Figure 1.3).

Table 1.3: Sectoral Growth Rate of GDP at Constant Prices (Base Year: 2015-16) for Construction sector



*Source: Bangladesh Economic Review 2023 (*Provisional)*

With the construction industry expanding, there is an escalating demand for labour. By 2030, the approximate total labour demand in the construction industry in Bangladesh will be around 9 million, of which skilled and unskilled workers will be around 1.4 million and 7.6 million, respectively (BIDS, 2017). The total labour demand in the construction sector will be approximately 8.18 million, 12.00 million, and 17.59 million in 2030, 2040, and 2050, respectively (BIDS, 2017). Although more than half of the population of Bangladesh is female (BBS,2022), in comparison to other growing industry, their representation and participation in construction industry has not been significant. The latest Labour Force Survey (LFS, 2022)

shows that the construction sector employs 5.44% of Bangladesh's total employed population. Of this figure, a mere 0.4% constitutes female workers, in contrast to the male contribution, which stands at 8.18%. The expanding construction sector in Bangladesh presents a substantial opportunity for the female workforce to participate and contribute accordingly.

1.3 Rational of the study

STEM education and jobs within STEM fields are deeply interconnected with the construction industry due to the integral role of technology in construction processes. In terms of occupational mobility and career transition, STEM education and careers possess a dynamic relation with various occupations the construction industry. From the viewpoint of STEM based employment opportunities, the construction sector's job market can be split into two segments: STEM-oriented and non-STEM-oriented roles. Non-STEM roles primarily encompass conventional trades and manual labor tasks like carpentry, plumbing, electrical work, and masonry. These are often classified as low to medium-skilled jobs. In contrast, STEM-oriented roles within construction are linked with the application of Science, Technology, Engineering, and Mathematics. These roles demand a more advanced educational background and specialized training, covering professions such as civil and construction engineering, architectural design, and surveying. With a fundamental reliance on science and mathematics, these positions are considered high-skilled jobs within the construction industry. Table 1.4 shows some of the occupations in the construction industry that requires STEM education, which are predominantly high-skilled and mid-skilled occupations.

Table 1.4: The construction industry occupations that necessitate STEM education

Four-Digit BSCO Code	Description
2142	Civil Engineers
2144	Mechanical Engineers
2151	Electrical Engineers
2152	Electronics Engineers
2161	Building Architects
2162	Landscape Architects
2164	Town and Traffic Planners
3112	Civil Engineering Technicians
3113	Electrical Engineering Technicians
3115	Mechanical Engineering Technicians[2]

Source: Bangladesh Standard Classification of Occupation (BSCO) 2020

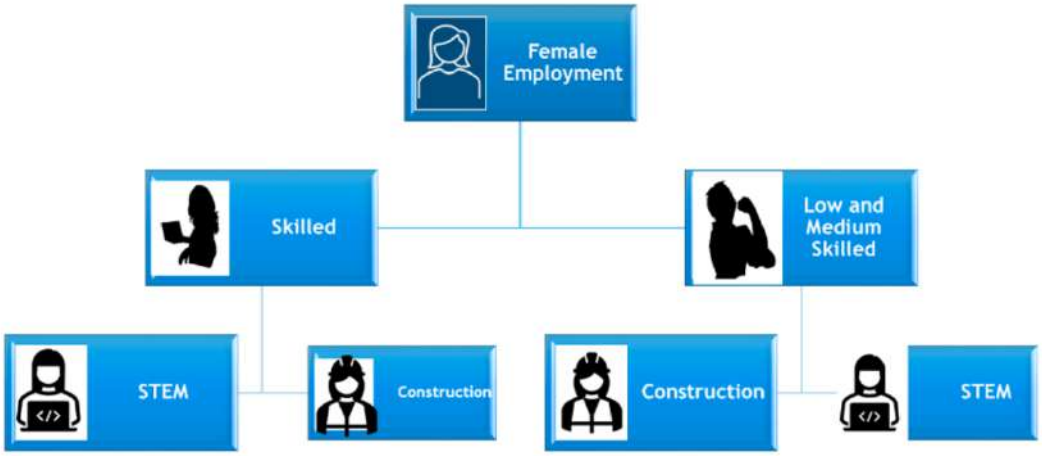
Figure 1.2 highlights contrasting patterns in skilled and low-to-medium skilled employment opportunities for women across STEM and construction sectors. In the skilled category, women have greater representation and access to highly skilled professions within STEM fields like science, technology, engineering, and mathematics. Conversely, construction sector presents fewer skilled employment avenues for women in this traditionally male-dominated industry, potentially due to socio-cultural barriers or limited educational pathways. STEM education provides women with the technical and analytical competencies sought after in the construction sector, promoting the development of a proficient workforce. This dynamic not only strengthens the industry's capacity and diversity but also accentuates the role of STEM

[2] Complete table can be found in Annex 1.6.

education in preparing women for important positions in a field where they are traditionally underrepresented. Furthermore, in the context of LDC graduation of Bangladesh, a notable structural shift in labor dynamics is anticipated, transitioning towards more capital-intensive production system instead of labour-intensive methods. This shift signifies a broader transformation in the economic landscape, characterized by increased reliance on technology and automation in production processes. Consequently, the inflow of new investments will expand the scope of employment opportunities, especially in sectors that are more technologically driven. This could lead to a greater employment prospect for women and also can contribute towards the growth prospect of the industry.

However, the scenario appears reversed in the low-to-medium skilled category. Here, a more significant presence of women in semi-skilled or labor-intensive construction roles appears compared to entry-level or medium-skilled STEM positions. This trend could be attributed to factors such as lower educational requirements, socio-economic circumstances, or cultural norms that may influence women's participation in manual or labor-intensive work. Overall, while STEM fields offer more skilled employment opportunities for women, the construction industry remains more accessible for women at lower skill levels. This highlights the complex interplay between gender dynamics, educational attainment, and socio-cultural factors that shape women's employment prospects and their ability to navigate different sectors across the skill spectrum.

Figure 1.2: Linkage between the Construction Sector and STEM-Oriented Employment



Source: Authors' illustration

As the literature suggests, in the construction sector, females' preferences lean more toward administrative, managerial, and engineering jobs rather than low paying and physically intensive jobs such as builder, mason, or rod binder (Ali et al. 2021). Furthermore, integrating women into STEM fields has the potential to address several prevalent issues in the construction sector, such as informal employment, unpredictable working hours, unsafe work environments, wage exploitation, and workplace harassment This assertion holds true even within the context of LDC graduation. Thus, the vulnerabilities and challenges associated with gender-based disparities in the workplace can be reduced as well. Moreover, integrating women into STEM education and STEM fields is expected to yield higher-paid job opportunities not only within the construction sector but also across other industries. As women gain proficiency in STEM-related skills and expertise, they become increasingly

competitive candidates for a wide range of high-paying positions in sectors such as technology, engineering, healthcare, finance, and research, among others. This diversification of employment prospects underscores the broader economic benefits of promoting women's empowerment and gender inclusion in STEM fields, extending beyond the construction sector.

1.4 Objective and Rationale

With this context in retrospect, this study aims to assess the current situation of women in the construction industry, their opportunities, and limitations across various types of occupations. It also aims to understand the potentials and barriers of female students and graduates in STEM-based careers with feasible policy implications and recommendations. The key objectives of this research are:

- Assessing the current situation of women in the construction sector (private companies and sites) in relation to job facilities, work environment, career upgradation opportunities, work-life balance, and support system for reducing the care burden of women at the workplace.
- Understanding the impact of climate change on the construction sector particularly infrastructure from a gender lens.
- Assessing the potentials and barriers for women and girls in STEM-based careers in Bangladesh with a key focus on higher-valued technical jobs.
- Identifying academic, vocational, and technical institutes which are providing vocational, and construction-related training/courses as well as job placements for women.
- Recommending a few strategic measures and recommendations for the government, private sector, and other key stakeholders' roles and responsibilities toward gender parity within the construction industry, and STEM-based jobs.

1.5 Methodology

The methodology followed a step-by-step framework to accomplish the objectives of this study. The study undertook a mixed-method approach where desk review was followed by a combination of quantitative and qualitative data analysis. Quantitative data analysis was based on secondary data from the national as well as international data sources. The major data source included Labour Force Survey 2016-17, ILOSTAT. Qualitative data analysis included Key Informant Interviews (KII) and Focused Group Discussion (FGD) with the relevant government officials, experts, employers, and development partners.

1.6 Key Informant Interview (KII)

Key Informant Interview (KII) is one of the significant qualitative research tools. As part of the primary data collection, the research team has conducted Key Informant Interviews (KIIs) with the relevant stakeholders. The stakeholders include government officials/ agencies, private sector, academician/ experts, STEM alumni, professional associations and development partners. The information gathered from the desk research and secondary data analysis has been complemented by the KIIs. The research team conducted 22 KIIs with the relevant

stakeholders (Annex 1.3). A detailed questionnaire was developed keeping in mind the objective of the study (Annex 1.4 & 1.5).

1.7 Focus Group Discussion (FGD)

To meet the objectives, the research team conducted two FGDs. The first was with the ongoing female students of STEM education to learn about their perspective on the challenges and potentials (Annex 1.2), and the other with the female workers at the elementary level in the construction sector to grasp their perspectives on the sector-specific working condition and challenges. The inputs derived from the FGDs have complemented the insights generated from the desk research and secondary data analysis adequately.

1.8 Limitations of the Study

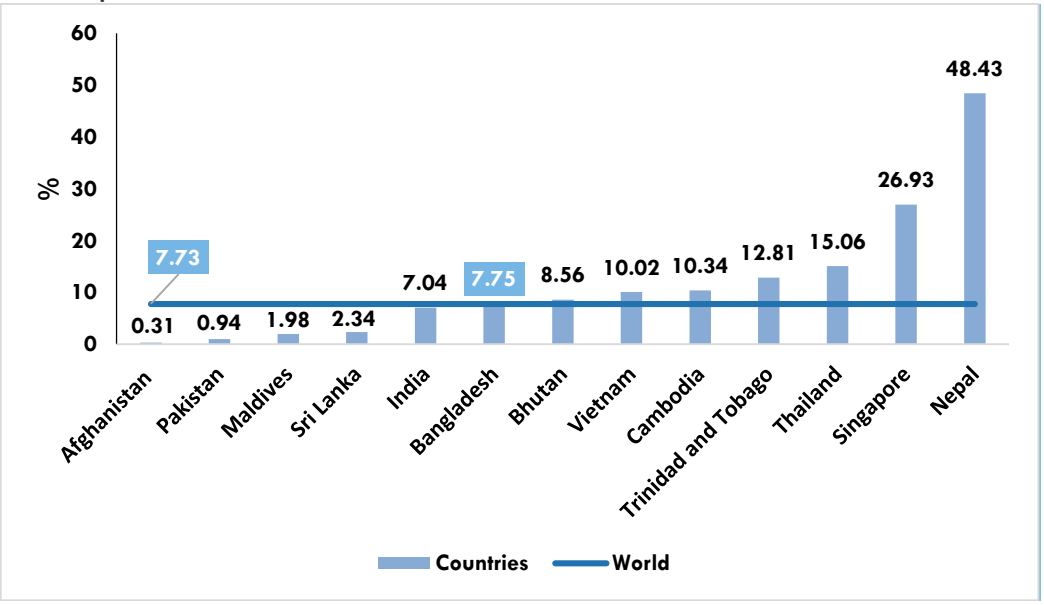
One of the most important limitations of the study is that there is a lack of data in the construction industry. Although few surveys have been conducted, their data are not readily available. Moreover, gender-segregated data is sparsely available. Additionally, while there is ample data available for secondary and higher secondary education levels, there is a noticeable scarcity of data for the tertiary level, which is essential for our analysis. To get a deeper insight into the real scenario of female participants in the construction sector and the STEM fields, large-scale surveys are needed.

Chapter 2 : Exploring Women's Roles and Opportunities in the Construction Industry

2.1 Occupational Distribution

Historically, the construction industry has long served as an area of discrimination against women, persistently exhibiting a lack of female representation across countries and regions (Dainty et al. 2001, 2007; Powell and Sang, 2013; Navarro-Astor et al. 2017). Studies by Galea et al. (2015), French and Strachan (2015), and Sang and Powell (2012) also underscore this under-representation, while Pickerill (2015) emphatically notes that "gender continues to be a significant source of division." Figure 2.1 depicts the scenario of female employed labour force compared to the total labour force in the construction sector in Bangladesh and in other (comparable) countries. The figure for Bangladesh (7.75%) is around world average (7.73%). Overall, the scenario is similarly gloomy in most of the countries because of a lack of training opportunities, implicit gender bias, and negative stereotypes regarding women in the construction industry.

Figure 2.1 : Proportion of female workforce and total workforce in construction sector in various countries



Source: ILO modelled estimate, 2022

Table 2.2 depicts the occupational distribution in the construction sector in Bangladesh in 2021 obtained from (Ali *et al., 2021*), where we see that up to 7.1% of the positions in senior management are held by female employed population. The scenario is not satisfactory is other occupations either.

Table 2.1 : Gender-disaggregated Occupational Distribution in the Construction Sector in Bangladesh

Occupation	Share in total employees	
	Male	Female
Senior Management	92.9	7.1
Engineering Employees	98.0	2.0
Administrative Employees	95.7	4.3
Support Staffs	100	0.0

Occupation	Share in total employees	
	Male	Female
Earth Worker, Piling and Foundation Worker	98.7	1.3
Pillar and Grade-beam Builder	99.6	0.4
Rod Binder	99.8	0.2
Mason	99.8	0.2
Sanitary Worker and Plumber	99.5	0.5
Painter	99.6	0.4
Electrician	100	0.0
Tiller and Aluminum Fitter	99.9	0.1
Others	100	0.0

Source: Ali et al. 2021

According to various studies male workers were preferred to be employed for almost all of the occupations from top-tier and mid to low-tier revealing the gendered bias and stigma (Koch, 2015; Feather, 1983; Isaac, 2009; Harvie, 1998). Construction sector is no exception. The stigma against women in the construction industry is rooted in longstanding stereotypes and gender roles questioning women's capability, leading to discrimination, sexual harassment, and the devaluation of femininity. This pervasive sexism creates a hostile work environment, discouraging women from entering or persisting in the sector. Table 2.2 shows the level of gender preference in the construction sector in Bangladesh in 2021, where at the senior management level, only 3.6% preference was given to female workers, which is even lower for other positions.

Table 2.2 : Percentage of Gender Preference for the Construction Employees in Bangladesh

Occupation	Male Preference	Female Preference	No preference
Senior Management	93.5	3.6	2.9
Engineering Employees	89.8	1.2	9.0
Administrative Employees	88.5	1.8	9.7
Support Staffs	100.0	0.0	0.0
Earth Worker, Piling and Foundation Worker	95.9	1.0	3.1
Pillar and Grade-beam Builder	98.0	1.0	1.0
Rod Binder	99.0	0.0	1.0
Mason	99.0	0.0	1.1
Sanitary Worker and Plumber	97.9	2.1	0.0
Painter	95.8	3.2	1.1
Electrician	96.9	1.0	2.0
Tiller and Aluminum Fitter	97.9	1.0	1.0
Others	98.9	0.0	1.1

Source: Ali et al. 2021

Research in the construction industry has consistently highlighted the gender disparities in skill development and employment opportunities (Naoum et al., 2020; Dainty et al., 2001 and Shah et al., 2020). The CISC[3] Employer Survey 2017[4] (CISC, 2018) lends a more detailed assessment of the disparities existing in the sector in Bangladesh. Table 2.3shows that across all occupations, the majority of female workers are either unskilled (53%) or semi-skilled (17%). Female workers are more likely to be employed in occupations like Water Proofer, Tile Fixer, Concrete Pump Operator, and Water Pump Technician whereas their presence is rather

[3] Construction Industry Skills Council (CISC), BD

[4] Based on data obtained from Subcontractors and Site Engineers at 40 building sites

non-existent in occupations such as Building Painter, Welder (Grill Maker), House Wiring Electrician, Finishing Carpenter/Drywall, Scaffolder, RAC Technician, and Lift Technician. The scenario is similarly concerning across the world. For instance, women and ethnic minorities remain considerably underrepresented in skilled construction occupations despite European Union policy to overcome labor market segregation and despite their increasing participation in the economy-wide labor market (Byrne et al., 2005).

Table 2.3 : Distribution of construction workers on housing projects by occupation, gender, and skill level

Occupations	Women					Men				
	Unskilled	Semi-skilled	Skilled	Advanced skilled	Total (N)	Unskilled	Semi-skilled	Skilled	Advanced skilled	Total (N)
Mason/Plasterer	48.1	19.2	32.7	0	**100**	32.1	25.6	27.2	15.1	**100**
Rod Binder	0	76.9	23.1	0	**100**	30.1	30.7	32.7	6.5	**100**
Shuttering carpenter	0	100	0	0	**100**	24.1	22.7	39	14.2	**100**
Tiller	37.3	7.8	45.1	9.8	**100**	16.9	27.8	43.4	11.9	**100**
Building Painter	-	-	-	-	**0**	17.2	30.1	42.5	10.3	**100**
Welder (grill maker)	-	-	-	-	**0**	17.9	31.1	37.8	13.2	**100**
House wiring electrician	-	-	-	-	**0**	12.9	29.1	44	13.9	**100**
Plumber	0	0	100	0	**100**	12.7	30.5	44.5	12.3	**100**
Aluminum Fitter	62.5	0	37.5	0	**100**	15.3	20.8	48.6	15.3	**100**
Finishing Carpenter/drywall	-	-	-	-	**0**	22.5	27.2	37.1	13.2	**100**
Scaffolder	-	-	-	-	**0**	16.4	19.3	52.1	12.2	**100**
False Ceiling Carpenter	0	0	0	100	**100**	18.7	26.2	39.6	15.5	**100**
RAC Technician	-	-	-	-	**100**	22.7	22.7	36.2	18.4	**100**
Water Proofer	93.8	0	4.2	2.1	**100**	31.3	25.8	33.5	9.4	**100**
Pile Driver	62.5	20.8	12.5	4.2	**100**	17.3	28.5	41.1	13.1	**100**
Concrete Pump Operator	79.2	8.3	8.3	4.2	**100**	23.4	26.6	34.9	15.1	**100**
Soil Tester	50	25	25	0	**100**	18.9	22	42.1	17	**100**
Generator and Water Pump Technician	25	12.5	62.5	0	**100**	14.6	18	47.2	20.2	**100**
Lift Technician	-	0	-	-	**0**	21.6	23.2	37.6	17.6	**100**
Fire Sprinkler Technician	100	-	0	0	**100**	14.9	22.8	38.6	23.8	**100**
Total	**53**	**17**	**26.5**	**3.6**	100	**22.4**	**26.7**	**38**	**12.9**	100

Source: CISC Employer Survey 2017 (CISC, 2018)

It is noteworthy that, in this sector, people consider women as unskilled and unfit workers, even though most of the workers in this industry are appointed with very little or no skill. Female workers are not "as productive" as their male counterpart according to the respondents. They also mentioned, female workers are "not very keen to learn about operating machine equipment" (CISC, 2023). However, studies disprove this notion repeatedly. For instance, female managers are as competent as male managers in the Swedish construction industry (Arditi et al. 2013). This is supported by the application of liberal feminist theory, which emphasizes the equal capability of women in construction project management in the Malaysian construction industry (Jaafar, 2013). However, women face significant barriers to entry and retention in the industry, including the need to fit into the accepted behavior of the workplace and balance career and family responsibilities (Aulin, 2011). Despite these challenges, female managers in the UK construction industry have been found to exhibit diverse leadership styles, which could contribute to industry development (Thayaparan, 2009).

Similarly, according to the Construction Enterprise Survey 2016 only 1.3% of the workers in the surveyed project sites are female, as shown in Table 2.4, and the majority of them are either unskilled or semi-skilled. At various stages of production, all the female workers are employed as helpers or labourers (BIDS, 2017).

Table 2.4 : Female share by skill category

Skill Category	% of Female Workers
Skilled	0.26
Semi-Skilled	0.47
Unskilled	0.57
Total	**1.3**

Source: Construction Enterprise Survey (BIDS, 2016)

2.2 Salary and Other Benefits

The common practice in the private sector of the construction industry in terms of worker recruitment is that the companies delegate the process to third parties, namely, the subcontractor, Sardar (Middleman), Thikadar, etc., and the recruitment job is conducted by them. At the subcontractor level, while hiring the workers hardly any standard guideline is followed and no special provision or guidelines for gender equality are administered.

In the case of employee recruitment, the process is formal, however, it varies from company to company. Usually, the type of employment is on a contractual basis rather than permanent contract. Most companies, cannot afford to have in-house technical teams such as architects, structural engineers, electrical engineers, etc. Therefore, they hire those experts as temporary consultants as per the project needs. For the elementary workers, there are no other benefits except their wages. The formally recruited employees are included under the benefits as per the individual company guidelines.

According to several studies, overall, a significant gender wage gap exists in Bangladesh, with women earning 12.2% to 21.2% less than men (Rahman and Al-Hasan 2019, Siddiquee and Hossain 2018, Menzel 2021). But the largest gender wage gap is observed in the construction industry (40%) (Siddiquee and Hossain, 2018).

As reported by sub-contractors, the daily wage of the housing construction workers by skill category and gender is presented in Table 2.5. The observed trend is that average daily wages increase with an increase in skill level. However, the average wages for female workers in all categories are considerably lower than those of male workers. The wage gap between women and men is 17.8% in the unskilled category and 35.4% in the advanced skilled category (SUDOKKHO, 2017). Also, advancement in skill level is accompanied by wage increases. For male workers, the transition from unskilled to semi-skilled results in a wage increase of approximately 24.6%, from semi-skilled to skilled it rises by 34.7%, and from skilled to advanced skilled it goes up by 28.8%. For female workers, wages increase by 8.9% when moving from unskilled to semi-skilled, by 37.6% from semi-skilled to skilled, and by about 25.5% from skilled to advanced skilled.

Table 2.5 : Average minimum and maximum daily wage (BDT) of the construction workers of different skills and gender as mentioned by Sub-contractors

Skill level	Male worker				Female worker				Gaps (%)
	Min.	Max.	Average	% Increase	Min.	Max.	Average	% Increase	
Unskilled (N=100)	329	384	356	-	275	384	302	-	17.8
Semi-skilled (N=100)	410	477	443	24.6	300	477	329	8.9	34.7
Skilled (N=100)	547	648	597	34.7	409	648	453	37.6	31.9
Advanced skilled (N=100)	702	836	769	28.8	530	836	568	25.5	35.4

Source: Survey for Housing Construction Sector (SUDOKKHO, 2017)

Evidently, male employees in senior management, engineering, administration, support, and other mid to low-tier jobs have higher salaries and benefits than female employees with equivalent job titles It is also worth noting that all of the companies grant maternity leave with salary on paper. Similarly, 99.1% of the companies provide sick leave, while 95.2% of companies provide sick leave with salary (Ali et al., 2021).

2.3 Companies' Willingness to Hire Women in the Industry

Employers' attitudes in answering the questions about their willingness to hire women for construction-related jobs were evenly divided, with half indicating willingness.

Table 2.6 : Reasons cited by developers willing to offer employment to women in construction work

Reasons for willing to employ women	Number of response	Percent
Increasing income opportunities for women-headed houses	38	76.0
Shortage of male workers due to migration	27	54.0
Equity and fairness	13	26.0
Removing discriminatory practice	9	18.0
Do not know	5	10.0
Total (N=50)	**72**	-

Source: Survey for Housing Construction Sector (SUDOKKHO, 2017)

Table 2.6 and Table 2.7 represent the reasons cited by developers in the case of both willing and not willing to offer employment to women in construction work. Female workers are considered to be less productive compared to their male counterpart and also female workers are also not very keen to learn about operating machine equipment which is also a disadvantage for the companies (CISC,2022).

Table 2.7 : Reasons cited by developers not willing to offer employment to women in construction work

Reasons for not willing to employ women	No. of responses	Percentage (%)
Cultural/social restrictions	37	74
Lack of personal safety measures to protect women workers at construction sites	28	56
Women are not reliable employees—they often get sick/pregnant, take off too much	23	46
Women are not strong enough to do physical work	13	26
Do not know	4	8
Total	**105**	-

Source: Survey for Housing Construction Sector (SUDOKKHO, 2017)

However, while asked which construction jobs might be more suited for women, employers generally believed that most jobs are "not suitable" for women, with two notable exceptions: (i) Mason/Plasterer and (ii) Tile Fixer. It seems that employers in the housing building industry have not yet acknowledged women as potential employees (SUDOKKHO, 2017).

Furthermore, when asked if they would be willing to train women for careers in the construction sector, more than half (55%) were negative about providing training opportunities for women. Compared to smaller developers, large and medium-sized businesses are more willing to offer training. Moreover, as per subcontractors' experience, around 62% of clients do not prefer to employ female workers in the team. In Tables 2.8 and Table 2.9, factors in cases where employers are willing and not willing to are listed.

Table 2.8: Factors influencing employers' willingness to get women trained in housing construction work

Factors for willingness to train more women	No. of responses	Percentage (%)
Skills Development	40	89.9
Shortage of male workers due to migration	7	15.6
Equity and fairness	20	44.4
Increasing income opportunities for women-headed houses	23	51.1
Removing discriminatory barriers	24	53.3
Total (N=45)	**114**	-

Source: Survey for Housing Construction Sector (SUDOKKHO, 2017)

Nevertheless, it is still encouraging to observe that around 90% of developers surveyed stated that they wanted to have women as 'skilled' workers in the housing construction sector. Finally, the reasons they highlighted behind their willingness indicate that the bottlenecks in the way of female workers' participation can still be tackled if appropriate measures can be taken (SUDOKKHO, 2017).

Table 2.9: Factors disfavour employers' willingness to get women trained in housing construction work

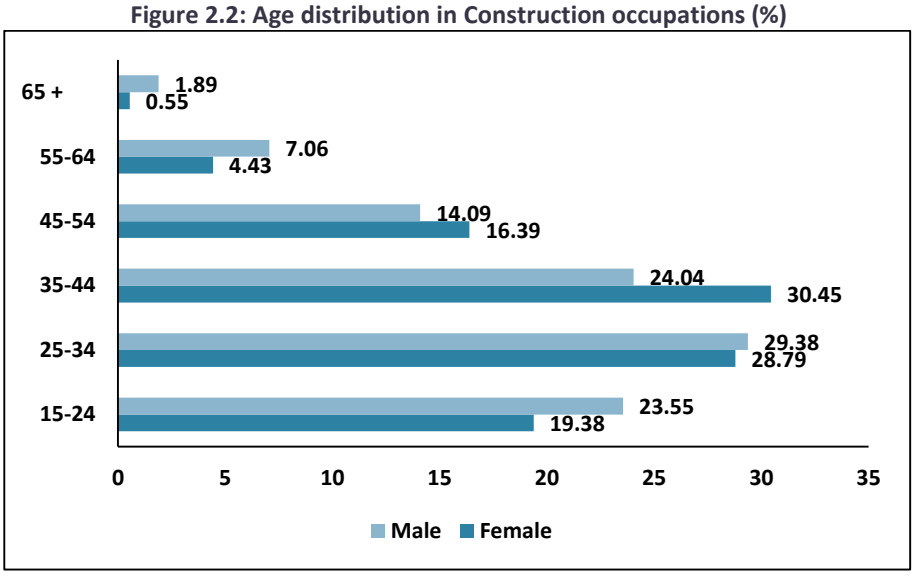
Factors for not willing to train more women	No. of responses	Percentage (%)
There is a lack of personal safety measures to protect Women workers at construction sites	43	78.2
Women are not strong enough. Can't do physical work.	33	60
Women are not reliable employees. They often get sick/pregnant and want to take off too much time	14	25.5
Cultural/social restrictions	11	20
Don't know	3	5.5
Total (N=55)	-	-

Source: Survey for Housing Construction Sector (SUDOKKHO, 2017)

2.4 Women's Participation in Construction Occupations in Bangladesh

The participation of young females in the construction sector is relatively lower than that of males. Construction sector comprises of a relatively young workforce, with a noticeable presence of females in the younger age brackets, particularly in the 25-34 and 35-44 age groups (Figure 2.2). Furthermore, a significant portion (44.96%) comes from families whose primary source of income is the service sector.

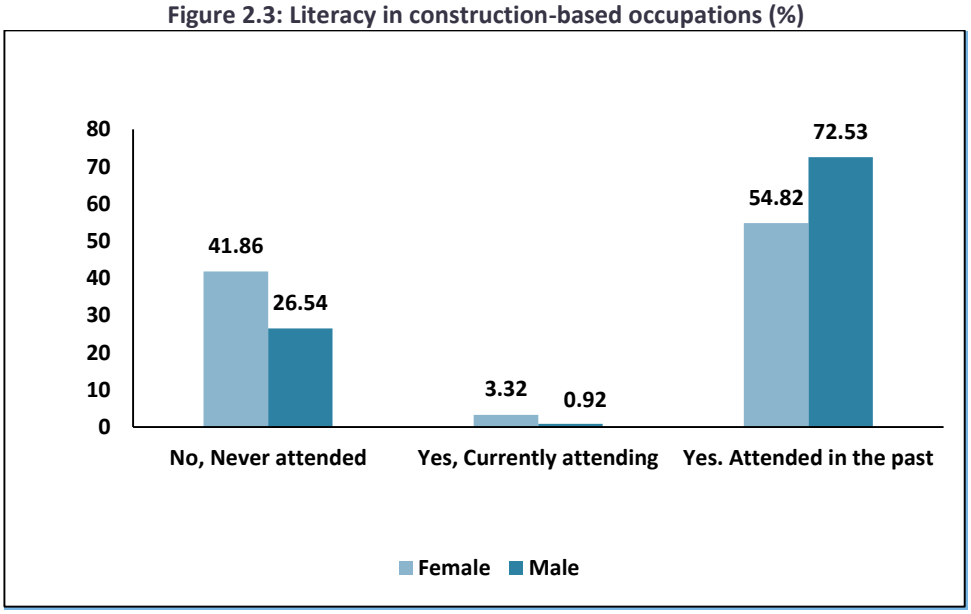
Figure 2.2: Age distribution in Construction occupations (%)



Source: Authors' calculation based on LFS 2016-17

Among female construction workers, a substantial 41.86% have never attended school, which contrasts with the lower percentage of 26.54% for male workers who have not received any formal education. On the other hand, a majority of male workers in the construction sector, 72.53%, have some level of schooling, while this is true for only 54.82% of female workers (Figure 2.3).

Figure 2.3: Literacy in construction-based occupations (%)

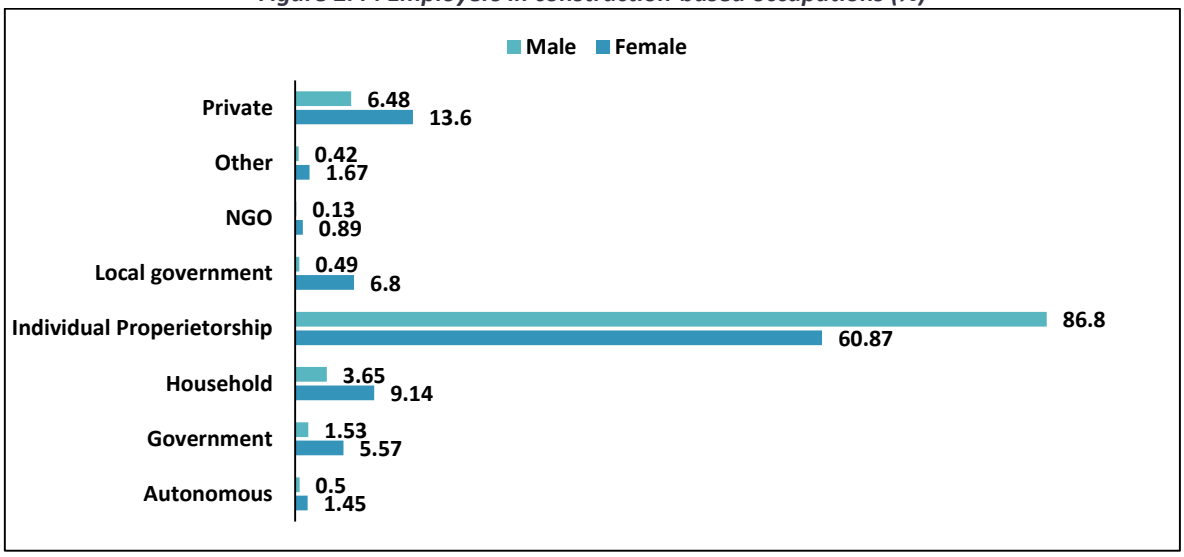


Source: Authors' calculation based on LFS 2016-17

In the employment landscape, about 61% of females in the construction sector are employed under individual proprietorship[5]. Furthermore, a smaller percentage of 5.57% work in government organizations (Figure 2.4).

[5] An individual proprietorship in the construction sector is a business structure where an individual owns and operates a construction-related business, such as contracting, renovation, or building services, personally managing all aspects of the business and assuming full liability for its debts and obligations.

Figure 2.4 : Employers in construction-based occupations (%)



Source: Authors' calculation based on LFS 2016-17

Table (2.10) reflects that within the construction sector a large number of females are working in lower-tier jobs. Almost 31.23% of the females work as civil engineering labourers, 22.15% work as building construction workers and 18.27% in in bricklayers and related work. Only in occupations like building architects, electronics engineers, and construction managers, women's participation is comparatively more than males.

Table 2.10 : Occupation-wise gender distribution in construction sector (%)

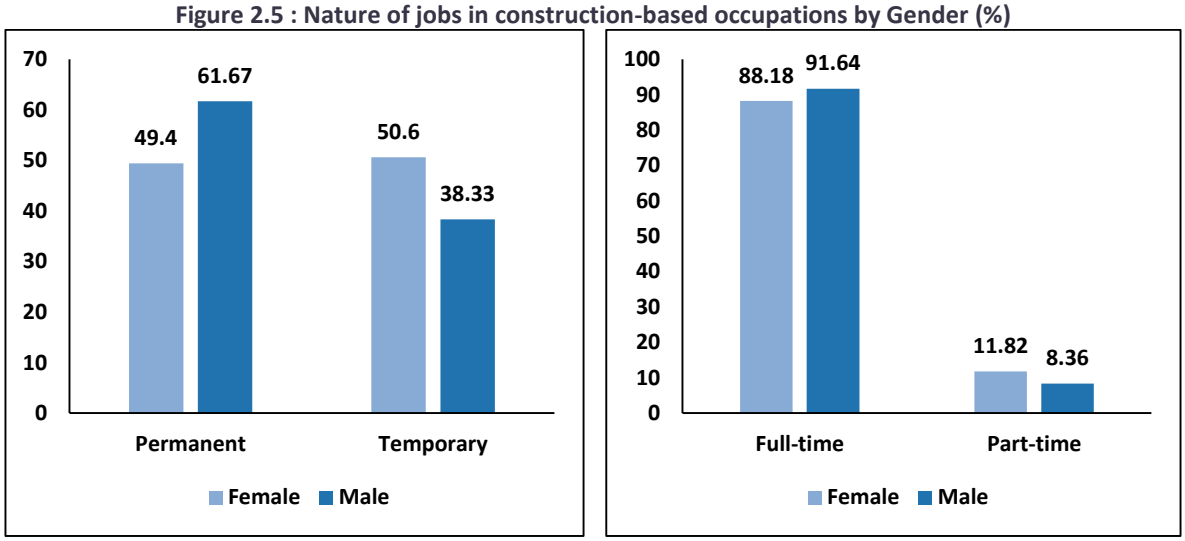
Occupations	BSCO Code	Female(%)	Male (%)
Construction Managers	1323	**0.33**	**0.14**
Civil Engineers	2142	0	0.87
Mechanical Engineers	2144	0.11	0.2
Electrical Engineers	2151	0.22	0.38
Electronics Engineers	2152	**0.66**	**0.3**
Building Architects	2161	**0.33**	**0.21**
Town and Traffic Planners	2164	0.11	0.04
Civil Engineering Technicians	3112	0	0.06
Electrical Engineering	3113	0	0.02
Mechanical Engineering Technicians	3115	0	0.11
Construction Supervisor	3123	0.22	0.52
Real Estate Agents and Property Man	3334	0.11	0.85
Interior Designers and Decorates	3432	0.44	0.71
House Builders	7111	1.77	2.58
Bricklayers and Related work	7112	**18.27**	**29.92**
Stonemasons, Stone Cutters	7113	1.11	0.52
Concrete Placers, Concrete Finisher and Related Workers	7114	0.78	0.32
Carpenters and Joiner	7115	8.19	18.59
Building Frame and Related Trades Workers not elsewhere classified	7119	0	0.09
Roofers	7121	0.11	0.38
Floor Layers and Tile Setters	7122	**1.88**	**1.41**
Plasterers	7123	0.11	0.02
Insulation Workers	7124	0.78	0.52
Glaziers	7125	0.22	0.24
Plumbers and Pipe Fitters	7126	3.77	4.08
Air Conditioning and Refrigeration Mechanics	7127	0.11	0.75

Occupations	BSCO Code	Female(%)	Male (%)
Painters and Related Workers	7131	3.54	5.37
Spray Painters and Varnishers	7132	0.44	0.78
Building and Related Electricians	7411	2.99	4.61
Civil Engineering Labourers	9312	**31.23**	**8.6**
Building Construction Labourers	9313	**22.15**	**16.8**
Total		100	100

Source: Authors' calculation based on LFS 2016-17

Figure (2.5) presents the employment nature within construction occupations, indicating a lower percentage of females in permanent positions (49.4%) compared to males (61.67%). Half of the female workers in construction occupations are in temporary positions. It also shows that 11.82% of females are employed in part-time jobs, as opposed to 8.36% of males. Nearly 92% of males in this field are full-time workers, while the figure is lower for females, at 88.18%.

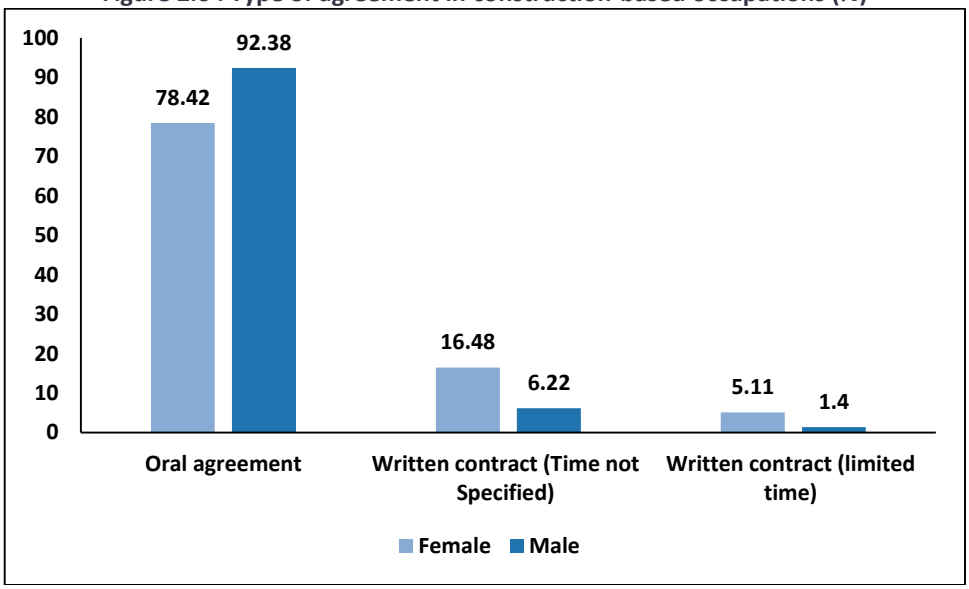
Figure 2.5 : Nature of jobs in construction-based occupations by Gender (%)



Source: Authors' calculation based on LFS 2016-17

The construction sector is characterized by a high degree of informality. Many of our Key Informants Interviewees have noted that informality is one of the primary factors contributing to the low participation of females in the sector. A substantial 78.42% of female workers holding occupations in construction are engaged under through oral agreements. Conversely, only a small fraction of female workers, 16.48%, have the security of a written contract, which is still notably higher than the mere 6.22% of male workers with written formal employment contracts (Figure 2.6).

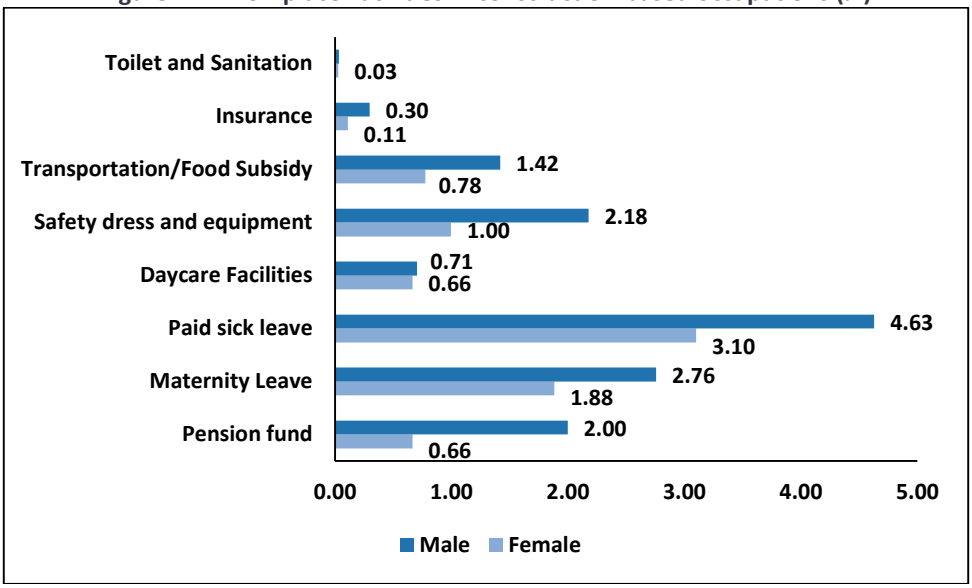
Figure 2.6 : Type of agreement in construction-based occupations (%)



Source: Authors' calculation based on LFS 2016-17

When it comes to facilities at the workplace, males get more workplace benefits/services than females. Merely 0.3% of female employees have access to toilets and sanitation facilities, and 1.88% are in positions that include maternity leave benefits. Access to safety gear and equipment is reported by only 1% of female workers.

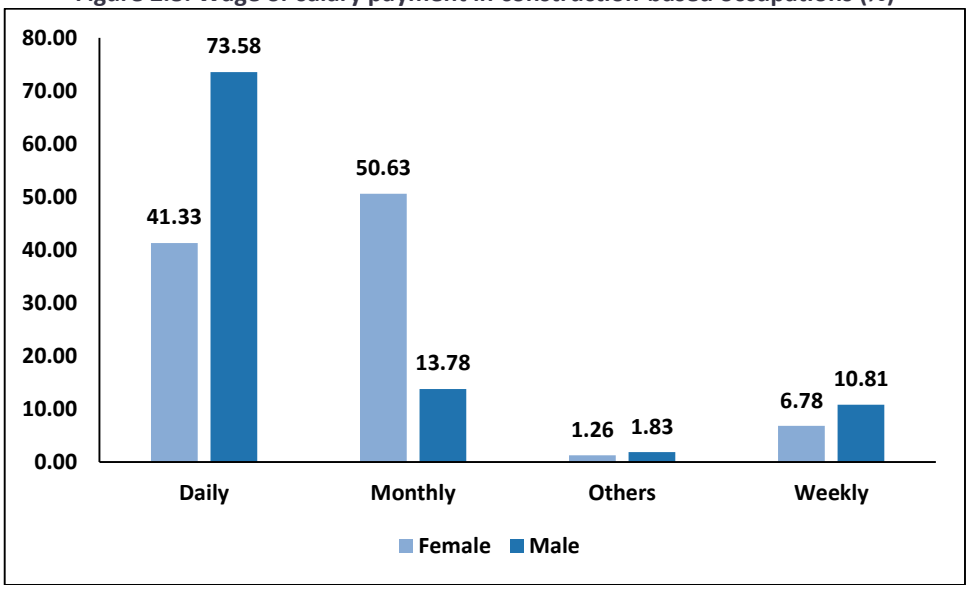
Figure 2.7: Workplace Facilities in construction-based occupations (%)



Source: Authors' calculation based on LFS 2016-17

Furthermore, just 0.78% receive transportation and food subsidies, and 0.66% benefit from daycare facilities. Additionally, a limited 3.10% of female workers have the advantage of a paid sick leave system at their place of employment, which is less than the 4.63% of their male counterparts who receive such benefits (Figure 2.7).

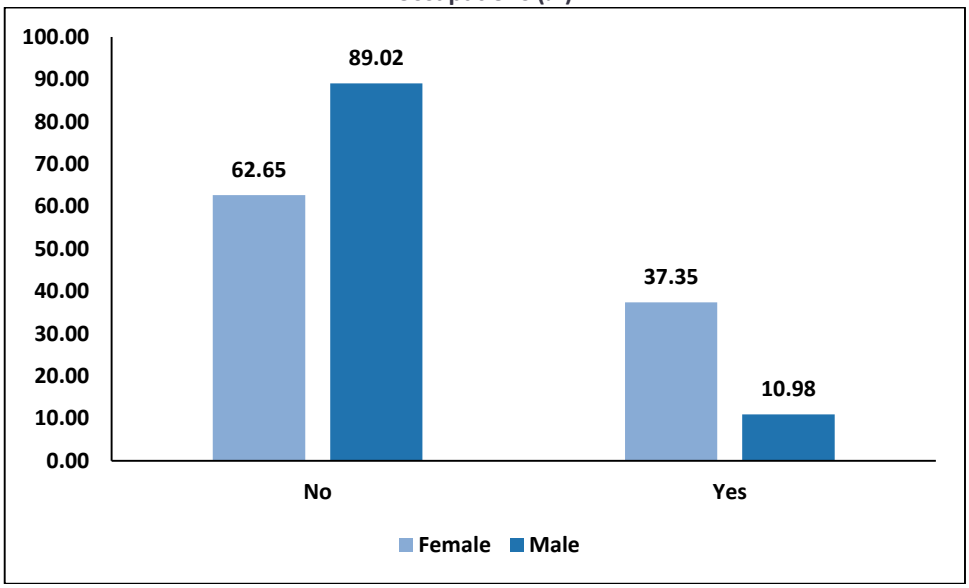
Figure 2.8: Wage or salary payment in construction-based occupations (%)



Source: Authors' calculation based on LFS 2016-17

In the construction sector, 41.33% of female workers are paid on a daily basis, while a higher percentage, 50.63%, receive their wages on a monthly basis, which is less common among male workers (Figure 2.8). Conversely, a significant majority of male workers, 73.58%, receive their wages daily, and a smaller portion of 10.81% are paid on a weekly basis.

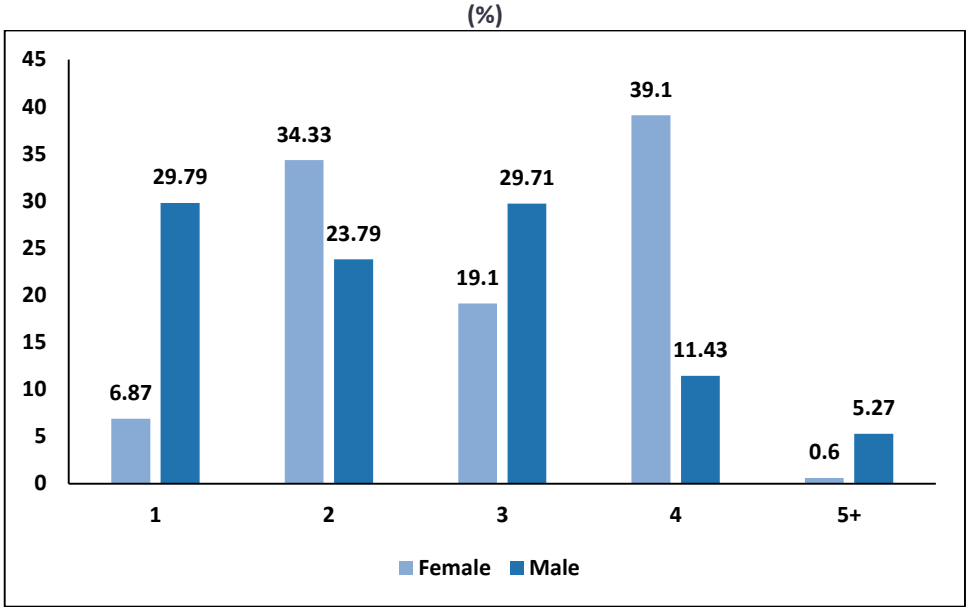
Figure 2.9: Gender wise response towards occupational injuries and illness in construction-based occupations (%)



Source: Authors' calculation based on LFS 2016-17

The construction sector is inherently hazardous due to the nature of its work. About 37% of female workers in construction occupations have reported experiencing accidents that resulted in injuries or illness in the workplace over the past 12 months. In comparison, a considerably smaller percentage of male workers, 10.98%, reported having similar incidents. This can be interpreted as female workers in the construction field may be encountering workplace accidents at a higher rate than their male counterparts, which may further indicate that women are more vulnerable to occupational hazards/accidents.

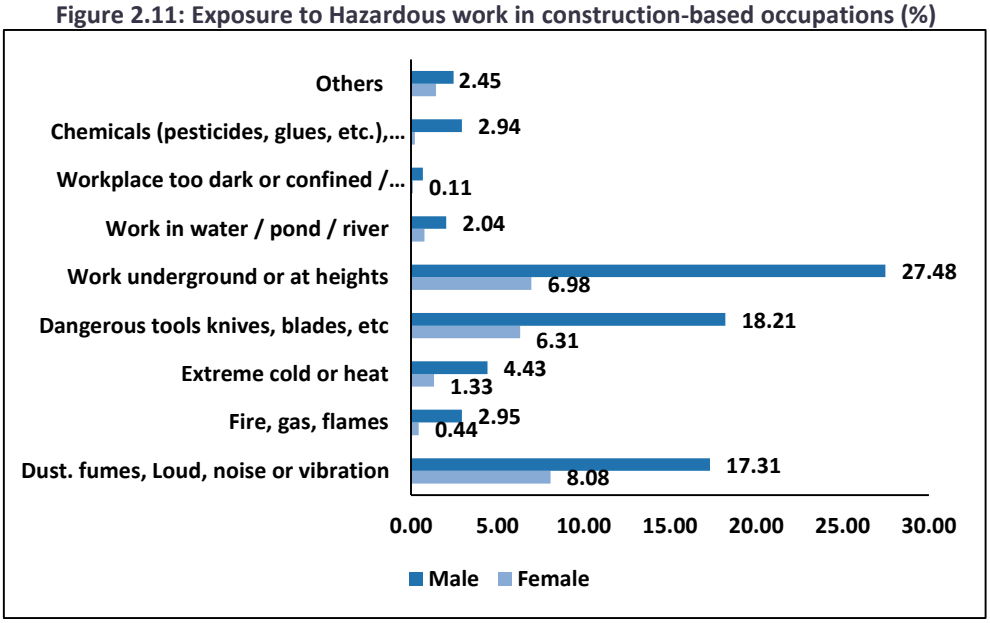
Figure 2.10: Frequency of injuries faced in workplace in last 12 months in construction-based occupations (%)



Source: Authors' calculation based on LFS 2016-17

Among the respondents, 39% of females reported that they had encountered accidents four times in the span of the last 12 months, and 34.33% acknowledged experiencing accidents twice within the same timeframe. This indicates a considerable frequency of workplace accidents among female workers in the construction sector during the year (Figure 2.9 and 2.10).

Figure 2.11: Exposure to Hazardous work in construction-based occupations (%)

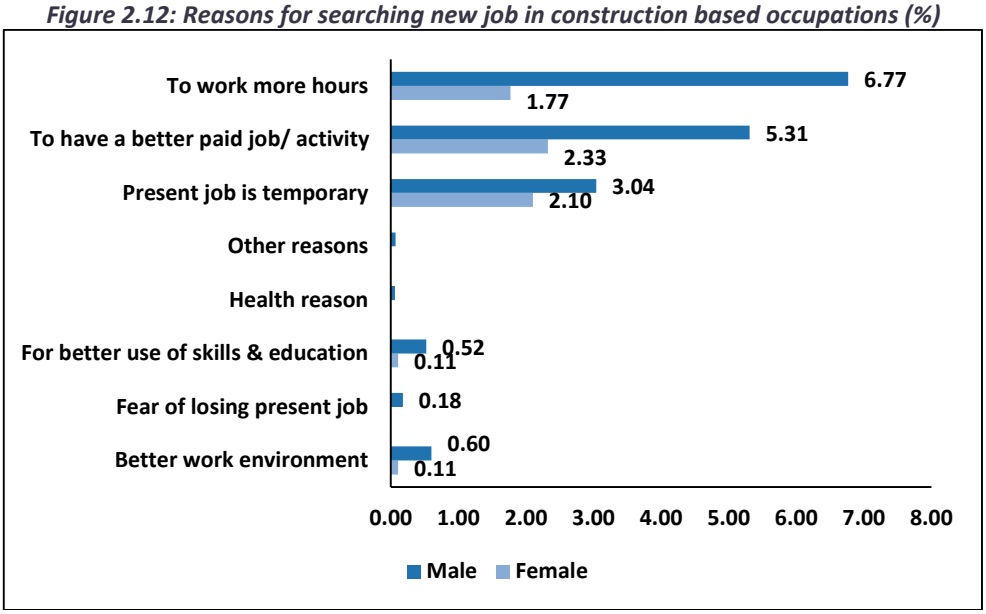


Source: Authors' calculation based on LFS 2016-17

Figure (2.11) showcase various work environment hazards faced by female and male workers in the construction sector. Around 8.08% of female workers reported exposure to dust, fumes, loud noise, or vibration compared to 17.31% of male workers. Working with dangerous tools such as knives and blades are a concern for 6.31% of females and significantly

more for males at 18.21%. About 27.48% of males have worked in underground or at heights compared to 6.98% of females.

Figure 2.12: Reasons for searching new job in construction based occupations (%)



Source: Authors' calculation based on LFS 2016-17

While Figure (2.12) shows that, 2.10% of female employees mention the transitory nature of their current position as the basis for their wish to move, 2.33% of female employees are looking for new employment chances with greater income. Furthermore, 1.77% of women say they would want to work longer hours, which could mean that the scope and pay of their existing jobs are constrained.

2.5 Understanding the policies regarding women in Construction

In Bangladesh, there is no explicit policy regarding the employment of women in the construction sector. The following policies have been reviewed to comprehend the labour laws and regulations pertaining to the constructing industry:

- National Housing Policy: 2016
- Eighth Five-year Plan (2020–2025)
- Dhaka Structure Plan (2016–2035) Strategic Direction
- Bangladesh Labor Act 2006 (BLA 2006)
- Bangladesh Labour Law 2018 (Amendment)
- Public Procurement Rule 2008 (PPR 2008)
- Occupational Health and Safety Policy 2013 (OHSP 2013)
- Bangladesh Labor Rules 2015 (BLR 2015)
- National Skills Development Policy, 2020
- Bangladesh National Building code 2020
- Bangladesh Labour Act of 2006

Despite the absence of an explicit policy regarding the employment of women in this sector, it's evident that the government has implemented a range of initiatives aimed at enhancing women's participation in the workforce. These initiatives include regulations on maternity

leave, ensuring equal pay, promoting respectful workplace behavior, and emphasizing occupational health and safety, as well as hygiene standards. The combination of these regulations not only aims to protect and empower women in the workforce but also seeks to create a more inclusive and equitable working environment. The findings from the policies we studied are listed in Table 2.11.

Table 2.11 : Existing Policies and Highlights

Policy	Highlight
8th Five-Year Plan	• Synchronize Resources: Align construction facilities with necessary equipment and human resources. • Enhance Health Facility Usage: Boost the utilization of health facilities and ensure their professional management. • Boost Women's Employment: Enhance women's labor force participation through short and long-term job opportunities. • Private Sector Role: Incentivize the private sector to support women in non-traditional jobs. • Equal Pay Enforcement: Strengthen monitoring to ensure equal wages and benefits for women and men under labor laws. • Sustainable Employment Transition: Design safety net programs for transitioning both women and men into sustainable jobs. • Construction and Development Jobs: Set targets for women's short-term employment in these sectors with equal pay guarantees.
Bangladesh Labor Act 2006 (BLA 2006)	• Working Hours: Limit to a maximum of 8 hours per day, 48 hours per week, with exceptions for special cases. • Rest Hours: Mandate a 1-hour rest for more than 6 hours of work. • Overtime Work: Allow for overtime beyond 8 hours at twice the normal wage rate. • Women's Working Hours: Restrict women from working between 10 PM to 6 AM without their consent. • Workplace Conduct Towards Women: Mandate respectful and decent behavior towards all employed women in any establishment, regardless of their rank or status, ensuring actions are not indecent, unmannerly, or disrespectful to their modesty and honor. • Maternity Leave Policy: Female workers are entitled **to 8 weeks of paid maternity leave,** with benefits available within three days of document submission.
Bangladesh Labour Law 2018 (Amendment)	• If any female worker delivers child before providing notice to the employer, then she will get the maternity welfare advantages for the whole period and will get the leave for 8 months of post-delivery advantage within 3 (Three) working days after submission of the evidence of deliver the child.
Public Procurement Rule 2008 (PPR 2008)	• Worker Health and Safety: Mandate contractors to ensure the health and safety of all on-site workers and authorized individuals. • Maintain Order at Site: Require contractors to keep the construction site orderly. • Environmental Protection: Obligate contractors to protect the environment on and around the site, preventing public nuisance or damage due to pollution, noise, or operational methods.
Occupational Health and Safety Policy 2013 (OHSP 2013)	• Enforce OSH Policies: Mandate adherence to Occupational Safety and Health (OSH) policies in government construction projects. • Safety in Factory Construction: Ensure maximum safety standards are met during factory construction. • Implement Safety Regulations: Require full implementation of all standards and regulations pertaining to the internal safety environment.

Bangladesh Labor Rules 2015 (BLR 2015)	• Working Hours: Women cannot be scheduled to work between 10 PM and 6 AM without their consent. • Safety: Developers and contractors are required to ensure safety in construction by installing secure safety nets, providing quality safety belts and lifelines, and maintaining essential safety equipment like gloves, helmets, and goggles. Along with adequate training for equipment use and construct stages and other components safely and robustly. • Pregnant workers: Employers must protect pregnant workers from harmful tasks, ensure respectful treatment, provide risk-free roles and breastfeeding facilities, and offer maternity leave including coordinated annual and sick leave, with options for additional unpaid leave. • Weight and Wage: Workplace rules set weight lifting limits at 50 kg for male and 30 kg for female workers, requiring clear transport paths and reduced weight limits for upward carrying. Adolescents and pregnant women are exempt from heavy lifting, with equal pay mandated for weight-related tasks across genders. • Health Center: Large establishments with 5,000 or more workers are required to establish a health center, staffed with qualified medical personnel, and aim to include at least one female medical doctor when appointing multiple physicians. • Hygiene: Workplaces must offer adequate bathing facilities for health-related full-body washing, with separate provisions for male and female employees. They should also provide one toilet for every 25 female workers up to 100, then one for each additional 50, each equipped with a regularly cleaned covered waste box.
NATIONAL SKILLS DEVELOPMENT POLICY, 2020	• Diverse Training Programs: Expand offerings to include both traditional and non-traditional skills training to enhance women's employability. • Gender-Friendly Program Review: Tailor program content and delivery to be more inclusive for women. • Proactive Enrollment Strategies: Increase female enrollment with hostel facilities, stipends for students from low-income families, relaxed admission criteria, and a gender-friendly learning environment. • Separate Washrooms: Provide distinct restroom facilities for male and female trainees. • Female Instructors: Where possible, hire female instructors to encourage a supportive learning atmosphere. • Harassment Prevention Policy: Establish and enforce a policy against workplace harassment in training institutions. • Gender Awareness Training: Ensure all instructors and managers receive training in gender awareness, harassment prevention, and equal employment opportunities. • Counseling Services: Offer accessible counseling services to all trainees for additional support.

Source: Authors' compilation

Policy Gaps:

- **8th Five-Year Plan:** The plan addresses several pressing issues such as increasing women's employment, incentivizing the private sector to employ women in non-traditional roles, ensuring equal wages and benefits, designing safety net programs to transition women into sustainable jobs, and setting targets for women's employment in construction and development. However, it lacks a detailed outline and implementation strategy for these targets. Although various institutions and

ministries are mentioned as part of a strong institutional mechanism, their specific roles are not clearly defined.

- **Bangladesh Labor Act 2006 (BLA 2006) and Bangladesh Labour Law 2018 (Amendment):** These laws comprehensively detail all applicable rules, yet there is no effective monitoring mechanism to ensure compliance at the ground level. The laws mandate paid maternity leave, which many private sector companies do not adhere to, and women are often unaware of these laws and unable to address their grievances.
- **Public Procurement Rule 2008 (PPR 2008) and Occupational Health and Safety Policy 2013 (OHSP 2013):** These policies ensure workplace safety concerning environmental and occupational health and safety (OSH) standards. However, they lack specific policies that address gender differences in safety and health needs.
- **Bangladesh Labor Rules 2015 (BLR 2015):** This regulation addresses several critical issues affecting women in the workplace, including hygiene, maternity leave, medical facilities, and working hours. Despite these provisions, there is no effective system to track compliance or to penalize violations, leading many employers to disregard these rules without consequence.
- **National Skills Development Policy, 2020:** While this policy includes several genders-friendly initiatives to encourage women's participation in skill development programs, female participation remains low. Greater emphasis and family-level incentives are necessary to attract more female participants and garner family support.

2.6 Challenges in women's participation in construction sector in Bangladesh

The study has explored the challenges women face in occupations in the construction sector in Bangladesh. In this regard, the study team has conducted KIIs with industry stakeholders, representatives of government agencies, and female employees in the sector. Based on the interviews and FGD, the study has identified following key challenges for women in the sector.

Quantity and quality of employed labour force: In recent years, according to the private sector stakeholders, female participation across various elementary and technical occupations in the construction sector has been sharply declining. Although they are relying on their experience in this regard, no concrete data could be derived from the relevant stakeholders. Moreover, female workers in elementary occupations are concentrated in a very small range of jobs.

According to a KII participant, "For low tier job most female work as unskilled labor, for example breaking bricks, excavation, but there is no skilled labor working as construction worker. In the technical department for both sophisticated and non-sophisticated kind, female participation is low. For my project 100% female workers as unskilled labor in the construction site."

There is significant shortage of skilled workers in the construction sector in general. However, the skill gap of the female participants in the elementary occupations is larger than that of the male participants. The female workers interviewed don't have any sort of skill training for required jobs in the sector. This lack of skill training is the main reason for their lack of specialized jobs. One of the most striking findings from our FGD is that the female workers

don’t even know of any such skill training of which their male counterparts are regular beneficiaries. As they are not adequately informed about the training facilities and programs together with the lack of proper exposure to those skill-intensive jobs, their occupational mobility often is at a halt and their empowerment does not see any leap forward. The stakeholders from all sectors agreed that with appropriate training programs through the TVET system, their skills can be enhanced and be better accommodated in the employment schemes. Finally, However, it is highly imperative to ensure that the existing policies need to be translated into implementation and proper monitoring.

***High level of informality*:** Since the nature of business such as the recruitment process, work hours, payment method, minimum wage/salary, termination of jobs, and compensation in case of injury on-site, etc., are still informal, job facilities and career upgradation opportunities are not yet well defined. Eventually, female participants of various tiers find this sector less desirable compared to other sectors such as the consumer product market or RMG. For women from engineering backgrounds willing to work in the top two tiers, the initial years in terms of salary are quite challenging.

According to one KII participant, the subcontractor handles the continuous flow of laborers. It’s not that we don’t hire laborers daily at all; we sometimes do hire laborers on a daily basis. Generally, floating workers arrive at the site when we go to villages. They mostly perform unskilled jobs such as digging. Today, they are digging at the site; tomorrow, they might go to a farm to cut crops. Another participant added, the government should intervene with policies requiring every company to allocate 5% to female workers. Otherwise, they will be fined. The construction sector is vast but needs to be formalized as soon as possible.

***Mobility and transportation issues*:** Since construction sites are situated everywhere in the country, it involves repeated migration for workers in elementary occupations. Furthermore, construction projects require a lot of site visits. Due to a range of factors, including inadequate on-site infrastructure, the absence of appropriate company-provided vehicles, and security concerns, commuting between sites can be particularly challenging for female professionals.

According to one KII participant, “Female labourers do more physical jobs, such as digging, cleaning, etc., than technical ones. One of the main reasons is that the vendors we hire through our previous connections take only the skilled laborers to the project sites, but the females don’t want to commit to this movement because they are not comfortable with this mobility. Female laborers, thus, don’t want to make any long-term commitments. Hence, the vendors hire them as non-skilled laborers only locally. “

***Abusive work environment*:** There are concerns from every stakeholder regarding the frequent violation of code of conduct at the sites. Another alarming concern is the unwillingness to take orders from a female superior and unwelcoming behavior, sometimes even aggressive ones toward the female co-workers. Furthermore, female workers are engaged mainly as laborers. Helpers (Jogali) of skilled workers, washing floors, putting and chipping, breaking bricks, carrying, etc. are their dominant occupations. As they express their intention to the skilled male workers to be trained, they get ridiculed and discouraged that those jobs are not meant for females.

***Uncertain working hours*:** The nature of work in this sector is intensive. In order to meet the deadline, the projects need to be running continuously. Various personnel such as the project engineers, supervisors, safety managers, etc. have to be on duty or be prepared all the time. It is quite difficult for a female worker to be continuously present on-site, specifically on the night shift without proper accommodation and safety measures. Furthermore, the female workers interviewed have no fixed job. They have to do whatever comes their way.

According to one KII participant, "females having their house close to construction site can work in the nightshift, though the number is very less. But, if the job was just about working during the day and staying overnight was not required, many more women would have come." Another participant added, "Mentally our society is not ready to accept female working in the midnight. If change does come, it will be very insignificant. Vast change is impossible."

***Unsafe working conditions*:** At most of the construction sites, occupational safety and health measures are not being properly followed and the working conditions need significant improvements. According to one KII participant, "Cost consideration actually doesn't matter that much. Ensuring safety and security of a female is the main. After giving everything, we can't be sure whether we are being able to provide safety for them. Cost is a matter, but the question of safety and security is a must. Environment in the sites is not satisfactory."

***Lack of adequate accommodation*:** Female workers lack necessary privacy on-site. They need separate bathrooms, resting areas, breastfeeding outlets, and secured residences in case of a night stay. If someone is fatigued or feels sick, there is no place to rest for any laborer. There are no separate washrooms for women on-site. The female laborers have to use the same washroom as men do even during their menstruation. There are no first-aid facilities on-site. As for mothers, they can't take kids with them, no zone for breastfeeding. They have to leave their kids at home alone or often with the trust of other people. When they can't find any alternative to look after the kids, they can't go to work and thus don't get paid.

According to one KII participant, "For construction sector, on the field overnight staying is required. Safety issues are a common concern. The engineer supervisor stays in the construction site to monitor works done during night shifts, but for female that can be a matter of concern."

***Gender based violence*:** There are frequent reports by female workers about on-site sexual abuse, physical assault, and harassment which implies that gender-based violence is a significant issue to be immediately dealt with. The occurrence of physical, mental, and sexual abuse is a commonplace event that we have already found out in our KIIs. However, what is striking as unearthed in the FGD is the staggering degree of regularity and severity of such abusive incidents. To quote them, "We often get harassed on the site; they tease us and if we protest, we will have to lose our job or have to be denied that day's wage on some lame excuse. The Sardars/ foreman beat us, call us bad words, slap us, etc. It's beyond speech." The feeling and insecurity and intimidation is constant among them. Sexual harassment is a common incident, however, they have hardly anyone to complain to. In case of any such complaints, the matter is arbitrarily resolved with interference from the subcontractor level. No formal legal procedure is followed.

According to one KII participant, “The marginal women, who worked on-site to dig soil, sometimes complained about being sexually harassed, financially exploited and fake promises of marriage by the Sardars. In this case, social security, education, motivation, remuneration ensuring, moral training especially for the men on-site- these things must be ensured as well.”

Recruitment process and job facilities**:** The recruitment process of workers in the construction site is largely informal and gender-biased. The workers' recruitment process is completely informal in the construction sector. Workers are recruited on the spot situated at a variety of marketplaces and other hotspots such as bus stations etc. The construction company deals with the subcontractor on labor recruiting. Oftentimes the workers are hired on the spot by the foreman working under the subcontractors. Sometimes the small-scale subcontractors themselves come to the spots to hire the workers. Therefore, the subcontractors, and not the construction companies, are the employers of the wage workers and are solely responsible for any matter related to wage workers.

The elementary workers are remunerated by the subcontractors as wages without any monetary receipt. The process is arbitrary and the subcontractors set the rules of the game. Although the formally recruited employees are remunerated by the employers as salaries, the scope of bargaining is narrow. Usually, one of the laborers who can negotiate regarded as Sardar starts negotiating on behalf of the whole group with the foreman or the subcontractor by calling an initial rate. The daily wage of a female laborer could range from 500 BDT to 700 BDT in general. However, when there is a shortage of work, female laborers might agree to work for even 400 BDT. The foreman deals in the market and negotiates the payment for the day and he takes a cut from the laborers’ pay as a commission taking advantage of bringing all the laborers together. Interestingly, some contractors prefer females as laborers to males because they are easy options to exploit and exert power upon. They don’t hire weak, old, or young laborers. They aim to spend less as female laborers are cheaper and they can be forced to do any of the tasks on-site.

According to one KII participant, “Construction scene, environmental, and sanitary/hygienic issues at present are not favorable for women anymore. Toilet, Recreation, privacy, security & safety add up to a new cost, and the THIKADAR company doesn’t want to pay those costs and instead prefers to hire more available and ‘cheaper’ male workers.” According to one KII participant, “Women’s participation as laborers is entirely voluntary. There is a disparity in daily wage; female laborers get 100-150/- BDT less than male laborers.”

Wage exploitation**:** Although there is seemingly no wage gap between male and female workers at the contractor levels as per the contractors’ narrative, the wage gap becomes visible at the subcontractor level. Since female workers have less bargaining power, the subcontractor utilizes this weakness and exploits them. In a week, female laborers usually can afford to work for four days and 15 days at best in a month. On average, the female laborers get 500-600 BDT per day on an average. On the other hand, those who work as skilled workers (Mistiry) such as tiles-layers, and brick-layers get what ranges from 800 to 1500 BDT. The female workers strongly feel that their wages are insufficient in relation to the amount of labor they provide. The males are paid more with a margin of 100 to 300 BDT, and the skilled ones are paid more with a margin of 300 to 600 BDT compared to the females’ share.

When asked about the wage expectation, considering the current situation, inflationary pressure, and the underpaid status, they said that a wage ranging from 700-900 BDT per day on average, would be okay to maintain the subsistence. According to one KII participant, “Wage gap does not exist in top tire, especially in government projects. But the issue is in low tier job. Often the contractors pay the women lower amount for the same job to keep profit for themselves. If they pay the female labour 500 takas, they will pay the man 700 taka. Patriarch thought is there in the back of mind. Female workers cannot protest as then they won’t get the job for the next day.”

Marriage and pregnancy**:** Under the current socioeconomic circumstances, being married and being pregnant lag behind their counterparts competing. According to one KII participant, “The situation is worse in the private sector compared to public sector. For example, government employees do get 6 months maternity leave. In the private firm’s things are different. Even if they get the leave most often, they don’t get paid leave, maybe 4 months leave without salary. In the labor law, these are included, but there is no implementation. On the construction site, the contractor does not even take pregnant women for work, so there is no facility of paid leave, although in the labour law, it is mentioned that they should be employed.”

According to one KII participant, “In a few private companies, maternity laws are maintained and welcomed. However, many women are fired from their jobs as if pregnancy is a crime. If construction is formalized under industry, women will benefit more, and the policies can be realized much better. Women's participation will be easier.” According to one KII participant, “If someone becomes pregnant, she must be given leave for a couple of months. Many employers consider this fact before employing a female employee. Maternity leave is one of the barriers. From the point of cost effectiveness, we also discourage. There are entry side barriers. The females don't participate eagerly and it's a comfortable situation for the employers.” According to one KII participant, “When a woman goes for maternity leave, she will have to be paid constantly. But the payments we get from the projects doesn't include this payment. There are unforeseen costs.”

Burden of care work**:** Females with care burden find it difficult to enter the workforce in the construction sector since there is no support mechanism such as flexible work hours, remote work, maternity benefits, and childcare facilities present for them. According to one KII participant, “The female needs their family’s support so that they can stay in some other place away from home, without having concern of care work.”

Social stigma**:** Female workers working in construction sites are rather stigmatized. The stakeholders themselves are not yet completely convinced. On one hand, females are discouraged due to the socioeconomic norms, and on the other hand, the employers' indifferent mindset, if not unwilling altogether, deriving from the profit-maximizing tendency makes it more difficult for females to enter in the sector.

According to one KII participant, “In Bangladesh, the moral, religious, familial, and social barriers are keeping the girls away from getting into technical education. A boy can easily choose to work in the engineering and construction field, but a girl cannot. Construction work

is already labor-inducive work, and women also need to do care work at home, so they might find working dual jobs. Morally, hence, women choose less hazardous work. According to one KII participant, “If socially it is published that female workers can work in this sector and safety is ensured more women will join.”

***Gender bias*:** A dominant perception among the industry stakeholders is that women workers have lower productivity. Furthermore, industry stakeholders believe that women workers entail certain extra costs associated with protocols including safety and security standards. In a bid to minimize costs, the industry stakeholders thus prefer to hire male workers.

According to one KII participant, “50% employers do not prefer women. Having women in the construction site, creates more need for having more facilities on site which results in having more expense. Women also have household activities and care works. She might not be able to stay till night or do overtime. So, primarily people might not want women on-site.If a company hires a female engineer, it has to bear the responsibility of her safety and security. But for a male engineer, the company doesn't have to bother that much about safety and security on the site.”

***Data gap*:** In the construction industry in Bangladesh, there is absence of practice of tracking workers. This is widespread at various levels of occupations and stakeholders. One of the main reasons is the informal nature of work in the industry. At the worker level, since the hiring is done at the sub-contractor level, standard database maintenance is often not prioritized. Most of the time the workers gather around a common marketplace where they get hired arbitrarily. Moreover, construction is not the primary occupation for many of the workers, and some of them are seasonal workers. Furthermore, data keeping can also incur additional costs to a profit-maximizing subcontractor discouraging them. Some engineering departments of the government, such as, LGED, are working on creating database. In some sites in developed areas, their names are kept in a register, which, however, is only for security purposes.

According to one KII participant, “We tried finding real sources, however we could not. We do not have any enriched dataset. We have plans to align with government, however the complication that we face is that our official resource is not robust yet as our 4000 members have their separate businesses. We could not create a strong platform yet. According to one KII participant, “The sub-contractors work under the contractors, and the contractors operate under the developers. We need to streamline the contractors and sub-contractors. If the construction sector is formalized, everything will fall into place. If police order to make a list of workers with their NIDs, the developer has no way out. A dataset will be automatically created. The dataset can help identify the wage gap the women labor faces. The policy implication has to start from the sub-contractor level, and the mental barriers that the women face must be publicized.”

Lack of role models: When asked if they ever worked with any skilled female workers, the answer was negative. They said that they had heard of some female electricians but never saw them in person. If there were already skilled female workers across various occupations as role models, it would be easier for other female workers to get the information and get accommodated in the training programs.

According to one KII participant, “Women's contribution to the construction must be highlighted publicly. During COVID-19, we saw many small online businesses, and everyone thought that if she could, why couldn't I? The same rule must be applied here. Women do not back down due to the challenges; it's the mental barrier that is stopping them. To break that, the women in construction should be highlighted more.”

Lack of adequate representation in the construction workers’ union: A significant finding from the FGD (from KII, too) is that there is almost no representation of female workers in the construction workers’ union. Since the workers' unions are dominated by male workers, the plights of female counterparts are often not heard. As a result, female workers’ stakes, and bargaining power in the industry are always on the decline.

Stringent Exploitation: Since they are clustered as the most underprivileged class of society, and as a result, their bargaining power is considerably low, hence, according to them, they face exploitation to an extreme degree. They frequently get injuries while carrying objects, breaking bricks, and so forth, but they are not provided with any medical attention; in fact, they are not even permitted to relax for a time after being injured. Although they are expected to have an hour-long lunch break, the time is rarely found. Thus, they are often fatigued. One of the participants said that she was not even allowed to go outside for 10 minutes to buy medicine even though she had a severe headache. The contractors and foremen ridicule them saying they weren't employed to sit idly. To quote one of the female workers, “We are always under inhumane pressure to produce results at all times. We are abused. Often no snack is offered. Despite being required to carry our lunch; we hardly have the opportunity to eat properly.” “Sometimes, says another worker, we work for the whole day and then they tell us that they won’t give us a single penny, then we have to negotiate and be happy with whatever we get, even at BDT 300. If there is any small mistake from our side, they cut that from our daily pay. They don’t even give us any transportation fee. Often, they hire us for one work and when we arrive at the site, they force us to do other tasks.”

Compensation and Legal Support in Case of On-site Injuries: The female workers seldom get any compensation, or medical support in case of injuries or accidents regardless of their degree of severity. They don’t even know if any legal provision or support system exists. In most cases, the workers themselves have to bear all the costs, both short-term and long-term. They are the sufferers of the informality of the sector. “They won’t even call any transport to take the injured laborer to the hospital”, says one participant, “When we get severely injured, such as breaking our arms, or legs, etc., we don’t know where to seek legal help that forces them to be accountable. When we directly work under the owner in household buildings, we usually get some support but when there is a big construction site where we work under a subcontractor, in rare cases, they provide us with very little support only when they are pressurized. The most we can do is complain to the person known as Sardar (Foreman) getting things done for the subcontractor, and if he can solve the issue, he solves it, but only when the issue gets out of his hands, the subcontractor gets involved and in the extreme cases the company might be informed. No formal procedure is there. Often some subcontractors just give us a lumpsum money and bury the issue.” According to one KII participant, “We do not have any policy regarding the specific accidents happening on-site. We do not have any

guideline if an incident what are the benefits the victim might get or the punishment the offender would get. We do need these guidelines, to reduce the accidents."

Hazards in Family and Social Life: Their family life is severely hampered due to excessive stress, fatigue, and deprivation. They cannot properly look after their offspring and provide them with quality time and, therefore, the development and socialization of their offspring get hampered. Their children are deprived of education, and childcare.

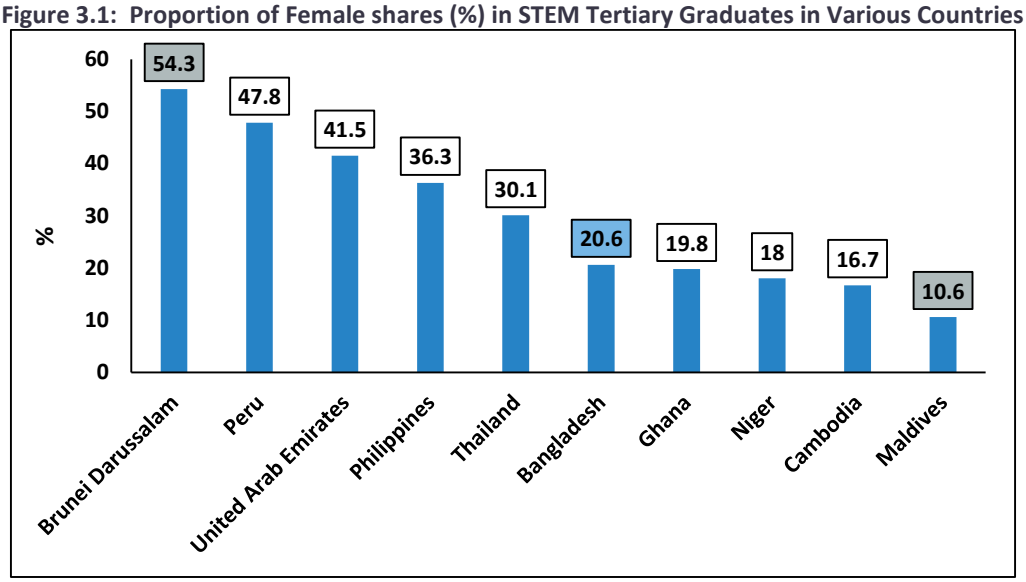
Expected Behavior from the Employers: The female workers expect male coworkers and employers to treat them with respect, as equals in terms of effort and labor, to preserve their rights, and to pay them what they deserve. They demand a work environment where their life is at a balance. To inquire about the overall experience, when asked about the alternative opportunities, they unanimously said, "If we had an opportunity to work elsewhere, we would have never worked in this sector." According to one KII participant, "In construction and marketing, women are thriving. In developer companies, managerial posts in branding are occupied mainly by women. Many women are designer heads in several construction companies. These women should be highlighted more to inspire female students to join the construction sector. At the field level, however, women's participation is none. One of my acquaintances, who is an electrical engineer by profession, was denied her responsibilities just because of gender bias at the workplace."

Chapter 3 : An Insight into the Potentials and Barriers for Women in STEM-based careers

3.1 Women in STEM Education

The inclusion of women in STEM fields is essential for gender equality. Actions to increase the number of women in STEM fields both in Bangladesh and around the world are vital. Among researchers globally, only one-third is female, and only 35% of all students in STEM-related fields of study are women[6]. Despite girls performing on par with boys in science and mathematics, harmful stereotypes limit their ambitions and choices in STEM education and careers. Even in countries with equal numbers of male and female researchers, women are vastly underrepresented in leadership roles and prestigious awards. Women occupy a small minority of top-level positions despite an improvement in recent years, and only 22 women have been awarded a Nobel prize in a scientific discipline to date. This disparity is alarming considering the skills shortage in the Fourth Industrial Revolution; women make up only 28% of engineering graduates and 40% of computer science graduates, as UNESCO reports. Figure 3.1 presents the scenario of STEM graduates for the selected countries among the ones whose data are available from various regions.

Figure 3.1: Proportion of Female shares (%) in STEM Tertiary Graduates in Various Countries



Source: International Labour Organization (ILO), 2020

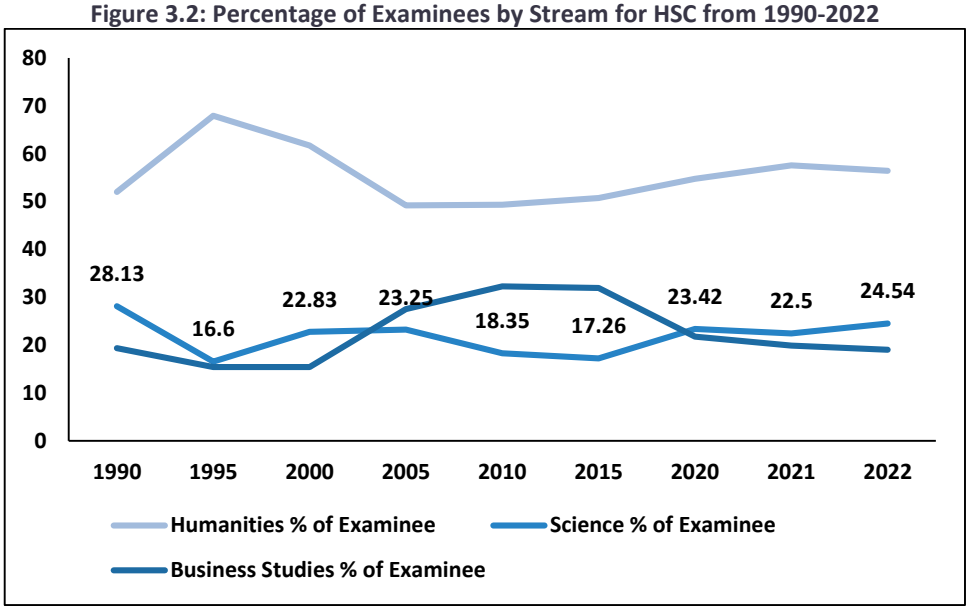
In Bangladesh, the share of STEM graduates is 11.2% of total tertiary graduates, and the females' share of the STEM graduates is 20.6% (ILO, 2020). Now we want to delve into the situation at more disaggregated level, the secondary and higher secondary level of education in Bangladesh, to see how female students are participating in STEM. According to Bangladesh Education Statistics, the total number of enrolments in HSC across various types of colleges in 2022 was around 4.98 million students of which the females' share was around 2.4 million students (48.5%), (BANBEIS, 2022). the total number of students enrolled in STEM in Class IX & X was around 9.79 million and 8.70 million respectively in 2022. The STEM subjects that had

[6] https://www.unesco.org/en/days/women-girls-science

the most enrollments were Mathematics, Information and Communication Technology (ICT), and Science.[7]

Figure 3.2 shows the historical percentages of total examinees in the Humanities, Business Studies, and Science streams at the HSC level from 1990-2022. The percentage of examinees in the Science stream across all the years was significantly lower than that of the Humanities stream (BANBEIS, 2022).

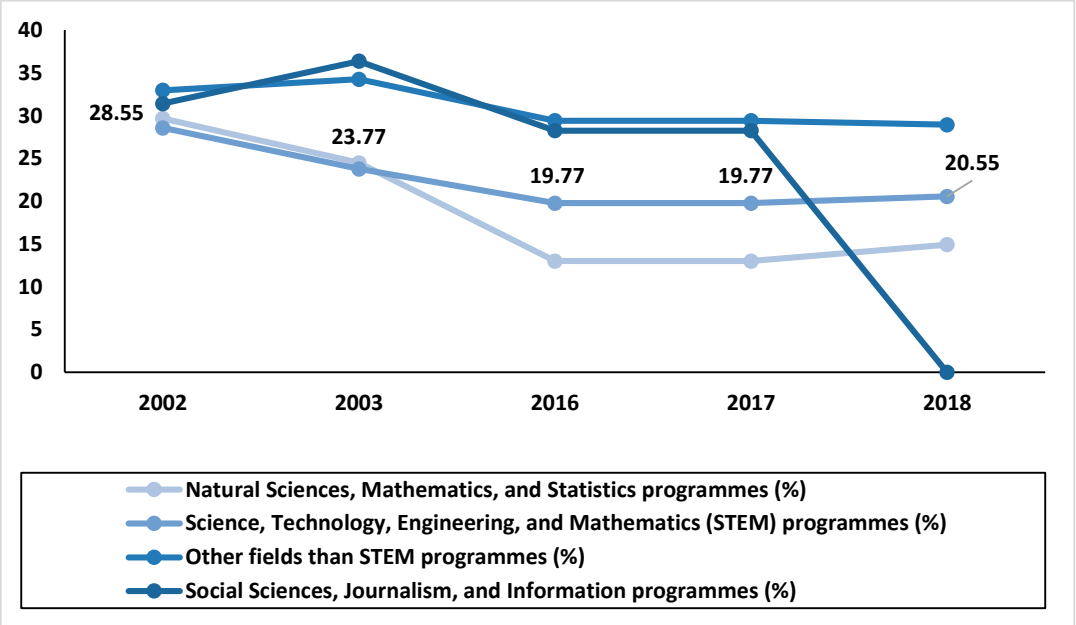
Figure 3.2: Percentage of Examinees by Stream for HSC from 1990-2022



Source: Bangladesh Education Statistics 2022, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education

The females' share (%) of tertiary graduates in STEM programmes (%) shows a declining trend (Figure 3.3).

Figure 3.3: Females' Share (%) of Graduates in Various Tertiary Academic Programmes in Bangladesh

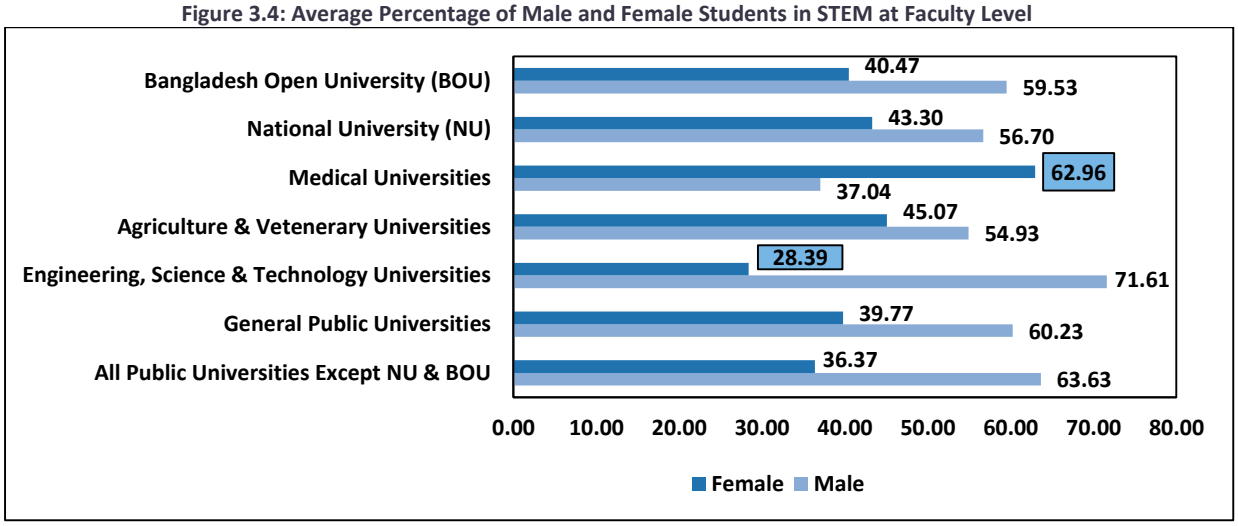


Source: World Development Indicator (WDI), Gender Statistics Database

[7] See Table 3.4 at the Annex

In Bangladesh, females accounted for approximately 38 % of enrollments in tertiary education institutions (TEIs), a figure significantly lower than in other South Asian countries such as India (46%) and Sri Lanka (60%) (The World Bank, 2019). The Gross Enrolment Rate (GER) in primary education was 118.46% in 2022, compared to 103.16% for males. However, as females transition from primary to secondary education, there is a noticeable drop in GER to 83.20%. This declining trend continues in higher educational levels, with GER for females further decreasing to 48.71% at the higher secondary level and reaching only 17.19% at the tertiary level (BANBEIS,2022). This higher dropout rate in higher secondary level is mainly because of early marriage, gender stereotypes, social norms, inability to afford etc. (KII findings).

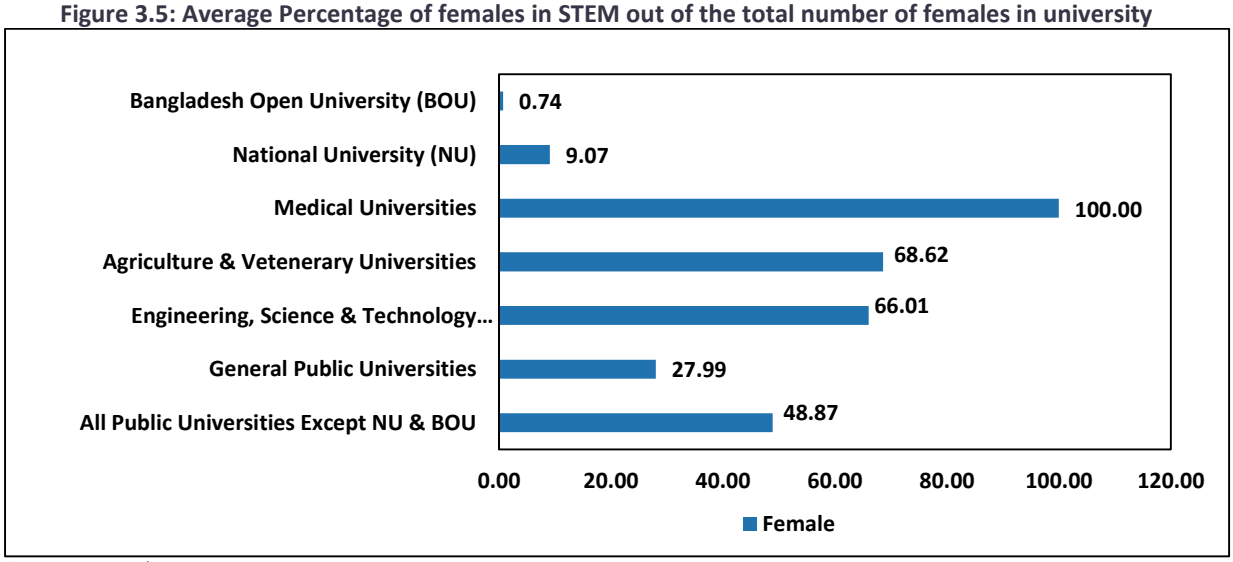
Figure 3.4: Average Percentage of Male and Female Students in STEM at Faculty Level



[8] *Source: 49th Annual Report 2022, University Grant Commission*

Exploring further into the tertiary education sector, particularly in STEM fields, a stark gender disparity in all the public universities of Bangladesh has been observed. Female participation in all STEM subjects, except medical fields, significantly trails behind that of their male counterparts (Figure 3.4 and 3.5).

Figure 3.5: Average Percentage of females in STEM out of the total number of females in university

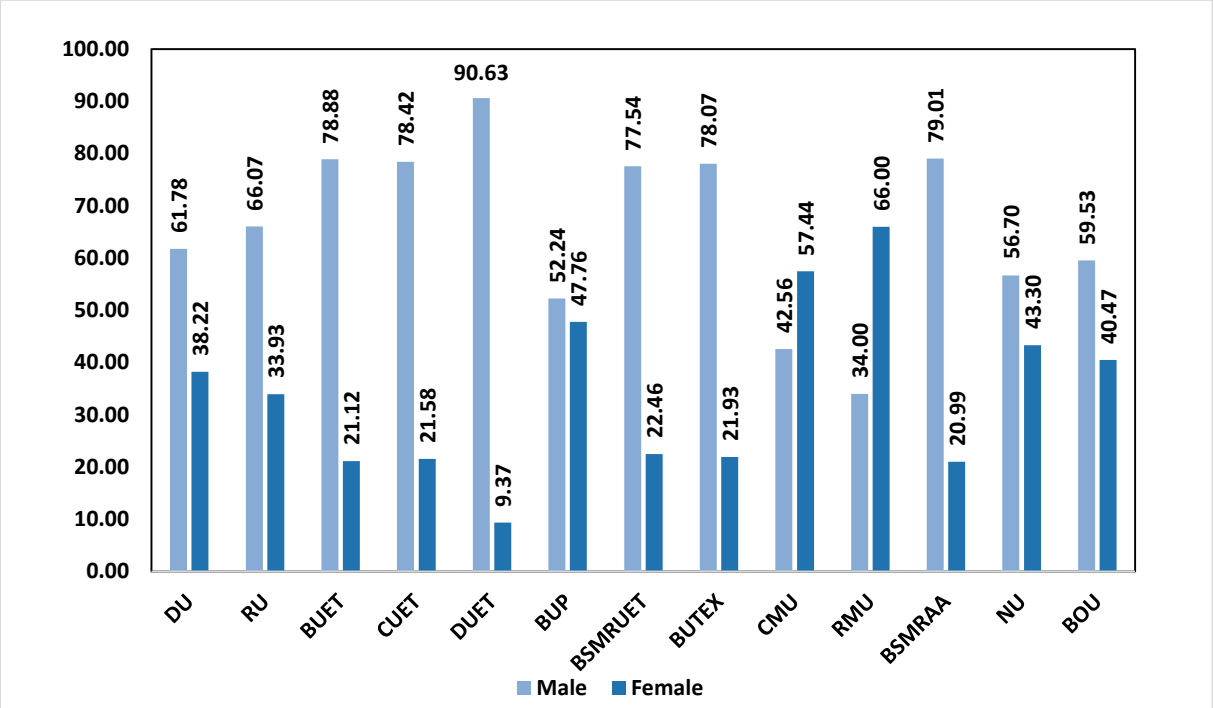


[9] *Source: 49th Annual Report 2022, University Grant Commission*

[8] Full table can be found in Annex 1.9
[9] Full table can be found in Annex 1.9

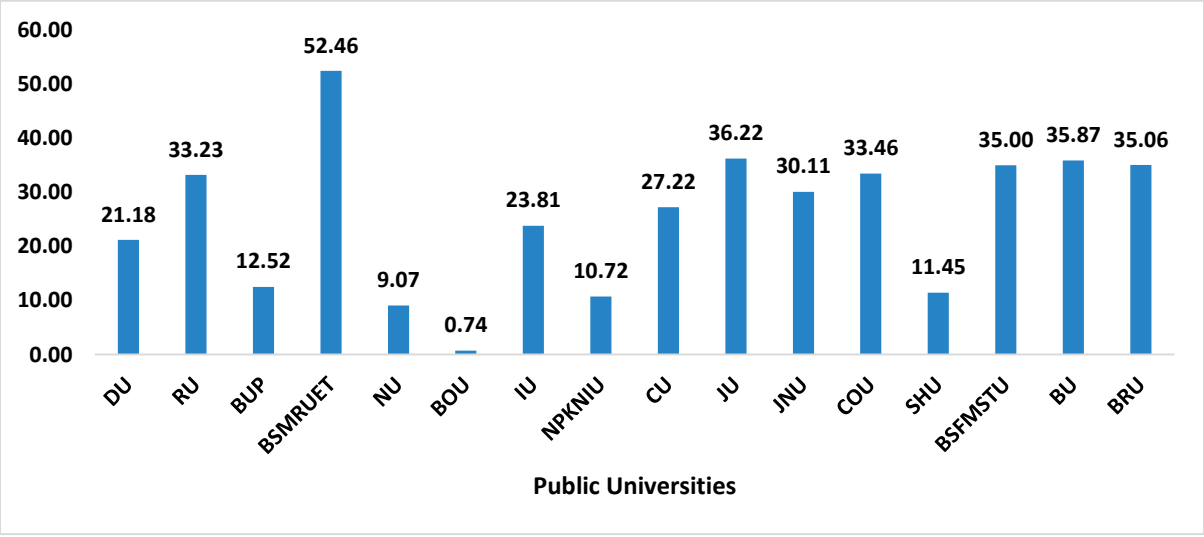
In most technical and engineering institutions, female participation is lower than that of males. In public universities like Dhaka University (DU) and Rajshahi University (RU), although female participation overall is lower compared to males, an even smaller proportion of these female students choose to pursue STEM-based subjects. For instance, National University reports that while 43.30% of its students are female, only 9.07% of these female students are enrolled in STEM subjects. The exception to this trend is found in medical institutions, where female participation exceeds that of males (Figure 3.6 and 3.7).

Figure 3.6 : Percentage Share Male and Female Students at STEM-based Faculty-level in the Public Universities



[10] *Source: 49th Annual Report 2022, University Grant Commission*

Figure 3.7: Percentage of Female Students in STEM Subjects out of the Total Number of Female Students



[11] *Source: 49th Annual Report 2022, University Grant Commission*

[10] Full table in Annex 1.9
[11] Full table in Annex 1.9

Evidently, the disparity against girls exists in all levels except the Secondary level (6-10) (Table 3.1) (BANBEIS, 2022).

Table 3.1 : Gender Parity Index in Post-Primary Education 2022

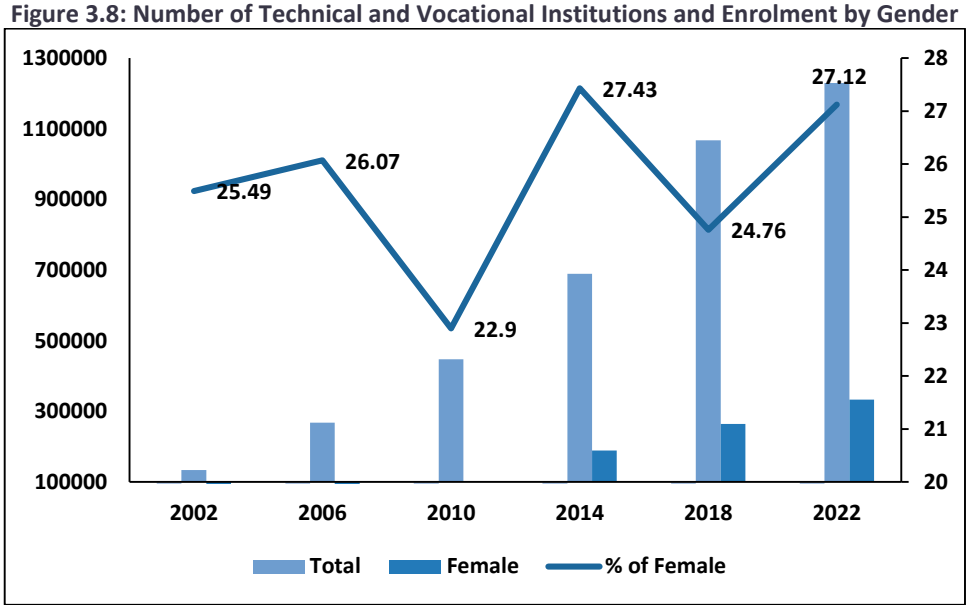
Sl. No.	Level of Education	Gender Parity Index (Girls to Boys)	Comments
1.	Secondary level (6-10)	1.18	Disparity against boys
2.	Higher secondary level (11-12)	0.94	Disparity against girls
3.	Post-secondary non-tertiary	0.23	Disparity against girls
4.	Tertiary	0.82	Disparity against girls

*(Parity exists when; 0.97<=PI<=1.03)

Source: Bangladesh Education Statistics 2022, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education

Figure 3.8 represents the total enrolments and females' share in Technical and Vocational Institutions historically from 2002-2022. The percentage share of females' enrolments roughly remains stagnant at around 27% (BANBEIS, 2022).

Figure 3.8: Number of Technical and Vocational Institutions and Enrolment by Gender



Source: Bangladesh Education Statistics 2022, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education

Table 3.2 shows the females' participation across the existing technical and vocational institutions in 2022 where the average females' share in all institutions is 27.12%. Separately, the most females' participation was seen in Medical Technology with 42.82% followed by Medical Assistant Training School and Technical Training Centre with 37.48% and 34.27% respectively (BANBEIS, 2022).

Table 3.2: Number of Students in Various Technical and Vocational Institutions by Gender in 2022

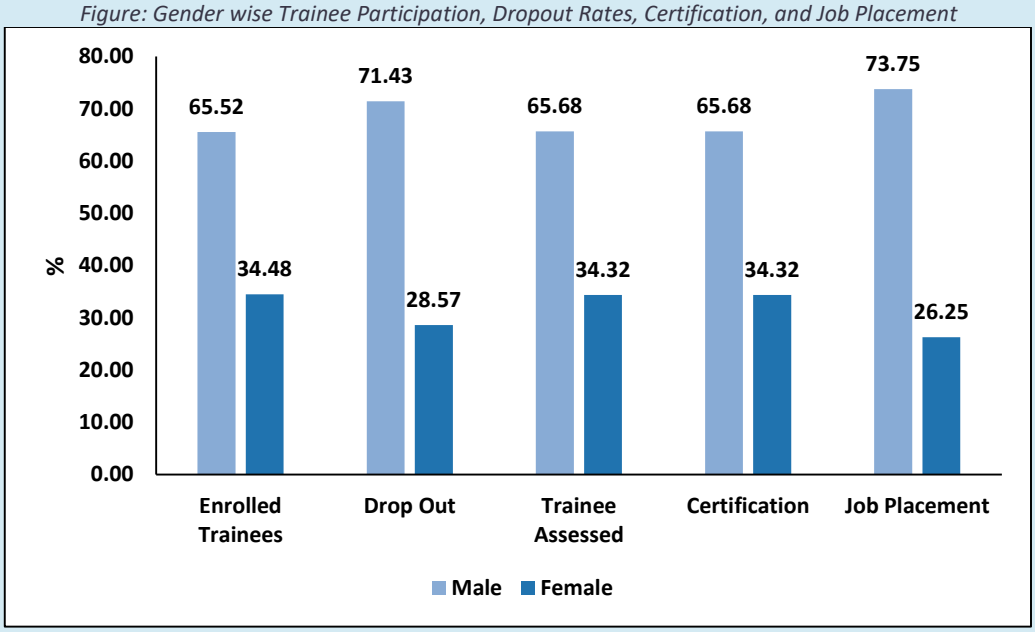
Type of Institute	% of female
Polytechnic Institute	16.71
Technical School & College	19.98
Glass & Ceramic Institute	3.17
Graphic Arts Institute	13.39
Survey Institute	7.73
Technical Training Centre	34.27
Textile Institute	8.72
Textile Vocational	23.37
Agriculture Training Institute	26.77
Marine Technology	10.28
S.S.C Vocational (Independent)	28.91
HSC Vocational/BMT (Independent)	31.09
Medical Technology	37.48
Medical Assistant Training School	42.82
S.S.C Vocational (Attached)	33.39
HSC Vocational/BMT (Attached)	29.62
Total (Technical Education)	**27.12**

Source: Bangladesh Education Statistics 2022, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education

Box 1: Training facility in construction sector

The REHAB Training Institute (RTI), authorized by the Bangladesh Technical Education Board (BTEB) and the National Skills Development Authority (NSDA), plays a pivotal role in the Skills for Employment Investment Programme (SEIP). SEIP aims to supply 8 lakhs skilled labor by 2024, aligning with market demand. RTI not only offers comprehensive training but also facilitates job placements for at least 60% of trainees, with a focus on ensuring 30% female participation. The program offers fully funded training, including stipends, transportation, and educational equipment. Since 2018, RTI has been actively involved in the construction sector, implementing a three-month training program across five trades: Electrical Installation and Maintenance, Plumbing and Pipe Fittings, Masonry, Steel Binding and Fabrication, and Tiles and Marble Works.

Figure: Gender wise Trainee Participation, Dropout Rates, Certification, and Job Placement



This Figure provides an overview of the participation, dropout rates, assessment, certification, and job placement percentages for both male and female trainees at the REHAB Training Institute., which reveals significant gender disparities across the five training programs. Despite comprising only 34.48% of total

enrollment, female trainees exhibit a dropout rate of 28.57%, which, although lower than the male dropout rate of 71.43%, still represents a considerable loss of female participants. Furthermore, while 34.32% of female trainees receive assessment and certification, indicating active participation, their representation in job placements is disproportionately low. Only 26.25% of job placements are allocated to females, compared to 73.75% for males. It's evident that while male trainees have higher rates across most categories, efforts are needed to improve female participation in the training programmes and job placement rates.

The Gross Enrollment Ratio (GER) and Net Enrollment Ratio (NER) are critical indicators used to assess the level of participation and efficiency within different levels of education. Increasing the GER in Vocational and Business Management and Technology (BMT) education among females holds significant implications for boosting their participation in STEM fields.

By fostering increased enrollment in these technical and technological fields, females gain access to practical skills and knowledge relevant to STEM disciplines. As per Table 3.3, the GER in the Vocational and BMT at the Secondary and Higher Secondary Levels in 2022 and 2021 depicts an increasing trend for both boys and girls although the girls' GER is significantly lower than that of the boys (BANBEIS, 2022).

Table 3.3: GER and NER in Secondary School, College, Vocational, Business Management and Technology, and Diploma Education in 2022 & 2021

Type of Education	Gross Enrollment Rate (GER)					
	2022			2021		
	Total	Male	Female	Total	Male	Female
Secondary Level (School, Madrasah, Vocational: Grade 6-10)	76.10	69.10	83.20	75.52	66.40	83.15
Vocational (IX and X)	**5.07**	**6.70**	**3.37**	**4.61**	**6.10**	**3.06**
Higher Secondary Level (College, Madrasah and BMT: Grade 11-12)	47.70	46.79	48.71	48.79	48.50	49.88
BMT	**7.77**	**10.51**	**4.73**	**7.53**	**9.89**	**4.76**
Diploma Level	2.48	3.83	0.99	2.49	3.75	1.03

Source: Bangladesh Education Statistics 2022, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education

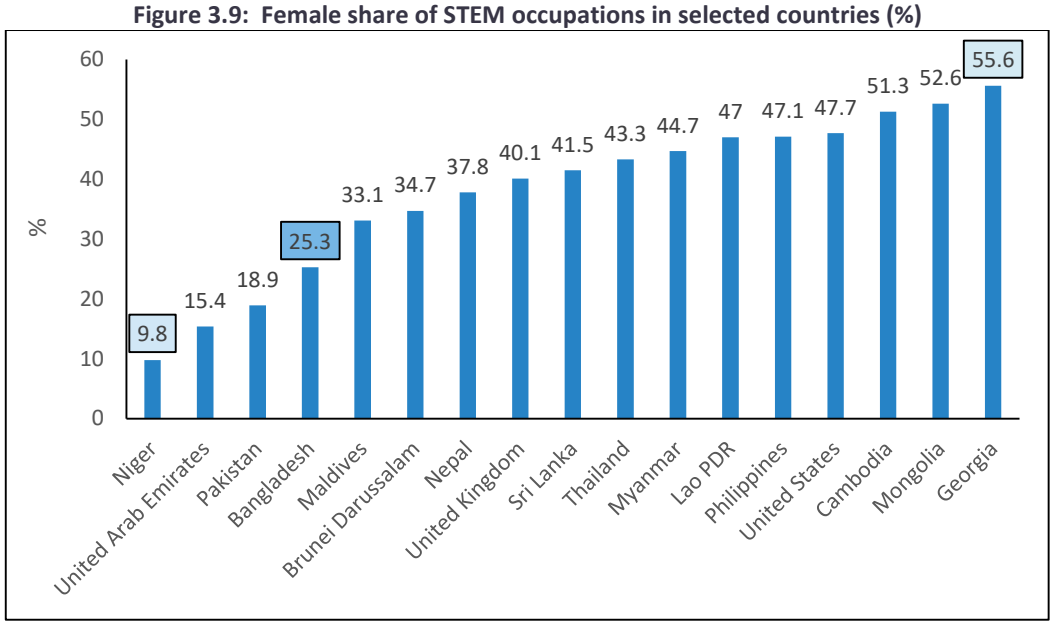
3.2 Women in STEM-based Occupations

According to the data[12] obtained from ILO, the number of workers in STEM occupations in Bangladesh is 1.1 million which is 1.8% of total workers in STEM occupations, and the females' share of the STEM occupations is 25.3%. In South Asia[13], the highest share of females' participation in STEM occupations belongs to Sri Lanka with 41.5% followed by Nepal, and Maldives. Figure 3.9 presents the scenario of stem graduates for the selected countries from various regions whose data are available. The figure depicts two of the lowest performers, two of the highest performers, South Asian countries and ASEAN countries.

[12] The International Labour Organization (ILO) processed, computed and assembled an "experimental series" from microdata supplied by the UNESCO Institute for Statistics (UIS) which was eventually collected from the national household surveys conducted in various countries. These surveys, which serve as this data source, focus on individuals with tertiary-level STEM degrees.

[13] Although the data for the South Asian and the ASEAN countries is not plentiful since data for some important countries such as India, Indonesia, Laos, Malaysia, Singapore, and Vietnam are missing.

Figure 3.9: Female share of STEM occupations in selected countries (%)



Source: International Labour Organization (ILO)

Table 3.4 Represents the number of teachers in service by designations across different subjects and the percentage share of females in those subjects. In terms of STEM and other science-based subjects, the share of female participation ranges from 11.36% in mathematics to 35.12% in biology. The highest share of female participation is present in Social Sciences with 47.69% followed by Geography with 42.71% (BANBEIS, 2022).

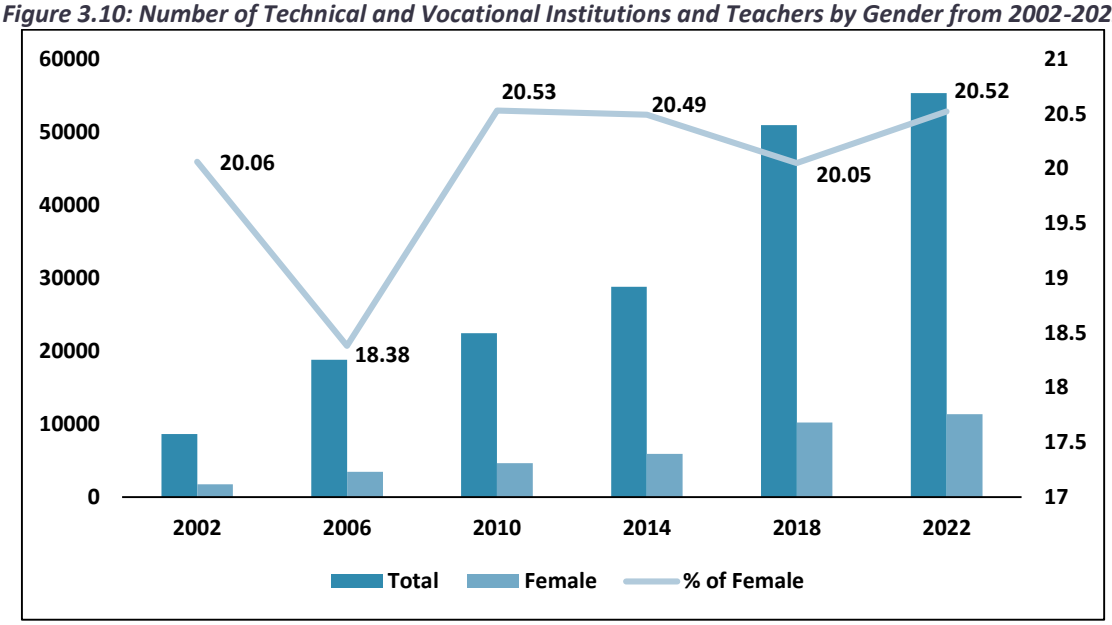
Table 3.4: Number of Teachers by Designation 2022

Designation	% of Female
Assistant Teacher (Physical Science)	25.22
Assistant Teacher (Biology)	35.12
Assistant Teacher (Agriculture)	27.16
Assistant Teacher (ICT)	36.96
Assistant Teacher (Home Science)	94.79
Total	**30.66**

Source: Bangladesh Education Statistics 2022, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education

Figure 3.10 depicts the percentage share of female participation teachers in Technical and Vocational Institutions. From 2013 onwards this percentage has roughly stuck at around 20% Which indicates that the inclusion of female women in Technical and Vocational institutions has been facing bottlenecks (BANBEIS, 2022).

Figure 3.10: Number of Technical and Vocational Institutions and Teachers by Gender from 2002-2022



Source: Bangladesh Education Statistics 2022, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education

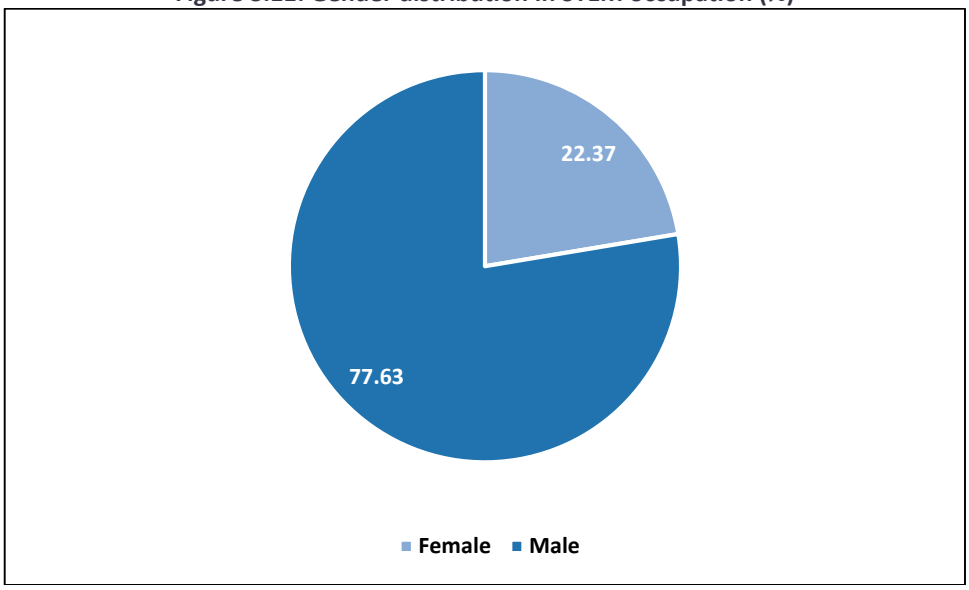
Table 3.5 shows the females' participation as teachers across the existing technical and vocational institutions in 2022. Separately, the most females' participation was seen in Medical Assistant Training School at 32.09% followed by Technical School & College at 24.3%, and Graphic Arts Institute at 23.81% (BANBEIS, 2022).

Table 3.5: Number of Teachers in Various Technical and Vocational Institutions by Gender in 2022

Type of Institute	Teachers		
	Total	Female	% of female
Polytechnic Institute	12142	2226	18.33
Technical School & College	4572	1111	24.3
Glass & Ceramic Institute	39	4	10.26
Graphic Arts Institute	42	10	23.81
Survey Institute	70	13	18.57
Technical Training Centre	2117	366	17.29
Textile Institute	590	110	18.64
Textile Vocational	552	109	19.75
Agriculture Training Institute	1554	299	19.24
Marine Technology	121	13	10.74
S.S.C Vocational (Independent)	2721	558	20.51
HSC Vocational/BMT (Independent)	11819	2170	18.36
Medical Technology	252	56	22.22
Medical Assistant Training School	508	163	32.09
S.S.C Vocational (Attached)	9263	2065	22.29
HSC Vocational/BMT (Attached)	8942	2073	23.18
Total (Technical Education)	**55304**	**11346**	**20.52**

Source: Bangladesh Education Statistics 2022, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education

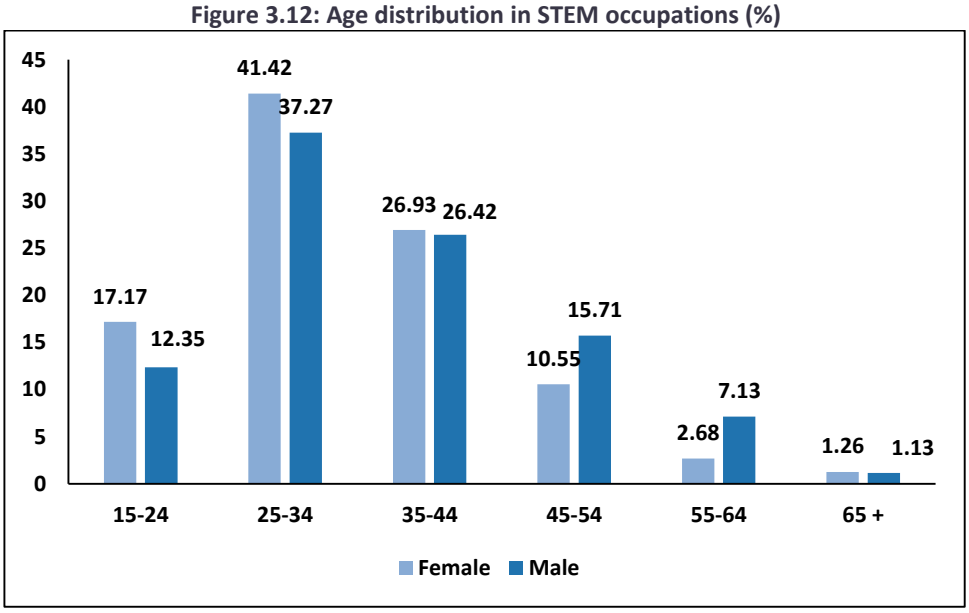
Figure 3.11: Gender distribution in STEM occupation (%)



Source: Authors' calculation based on LFS 2016-17

The figure (3.11) displays findings from the 2016-17 Labour Force Survey (LFS) concerning STEM occupations, indicating that the workforce was predominantly male, with females constituting only 22.37% and males making up 77.63%.

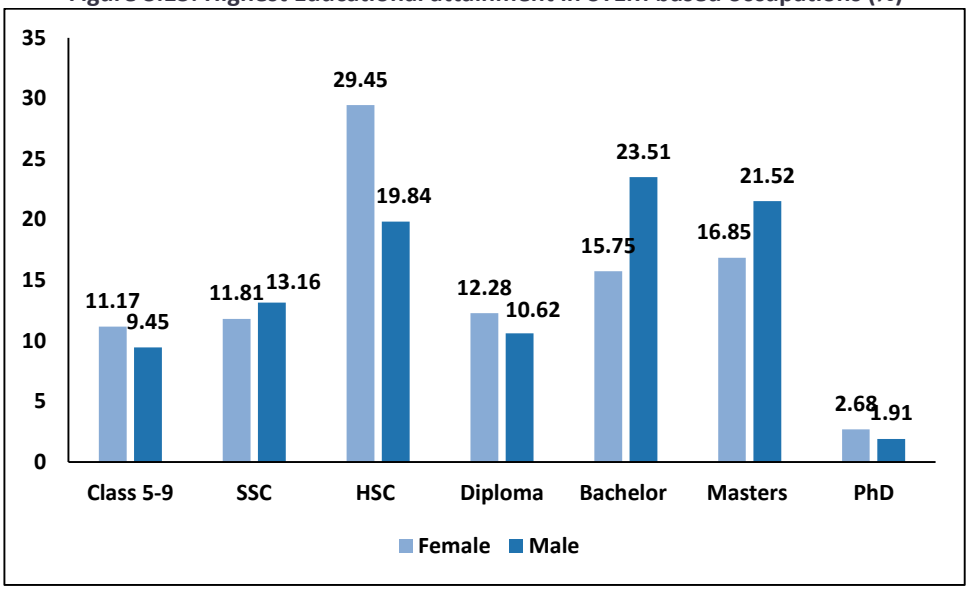
Figure 3.12: Age distribution in STEM occupations (%)



Source: Authors' calculation based on LFS 2016-17

The figure (3.12) displays the age and gender distribution in STEM fields, showing 41.42% of women in the 25-34 age group and about 27% in the 35-44 range. Men have lower representation than women in the 15-24 and 25-34 brackets but are nearly equal in the 35-44 category. Notably, men surpass women in the 45-54 and 55-64 age groups. This pattern reveals a gender disparity that evolves with age, suggesting variations in career paths or retention within STEM professions across genders.

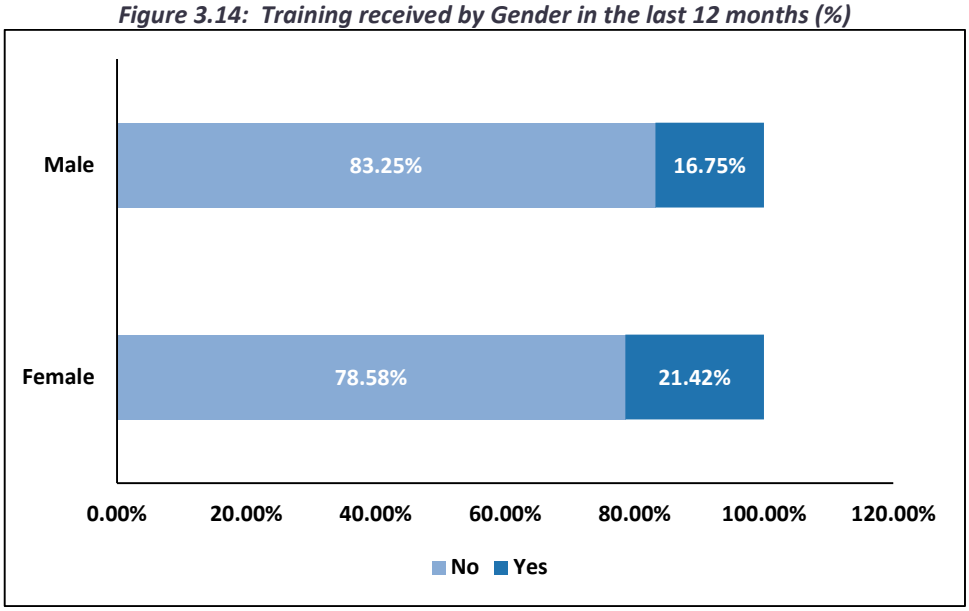
Figure 3.13: Highest Educational attainment in STEM based occupations (%)



Source: Authors' calculation based on LFS 2016-17

This figure (3.13) illustrates the highest educational levels attained by gender, revealing a disparity in tertiary education, particularly in STEM fields. While females surpass males in educational attainment up to the Higher Secondary Certificate (HSC) level, the scenario changes at the bachelor's degree level and above. In comparison, a larger percentage of males have higher degrees. This data suggests that women are lagging behind men in pursuing STEM-based tertiary education.

Figure 3.14: Training received by Gender in the last 12 months (%)



Source: Authors' calculation based on LFS 2016-17

In terms of receiving training, females have received more trainings compared to males in the last 12 months (figure 3.11).

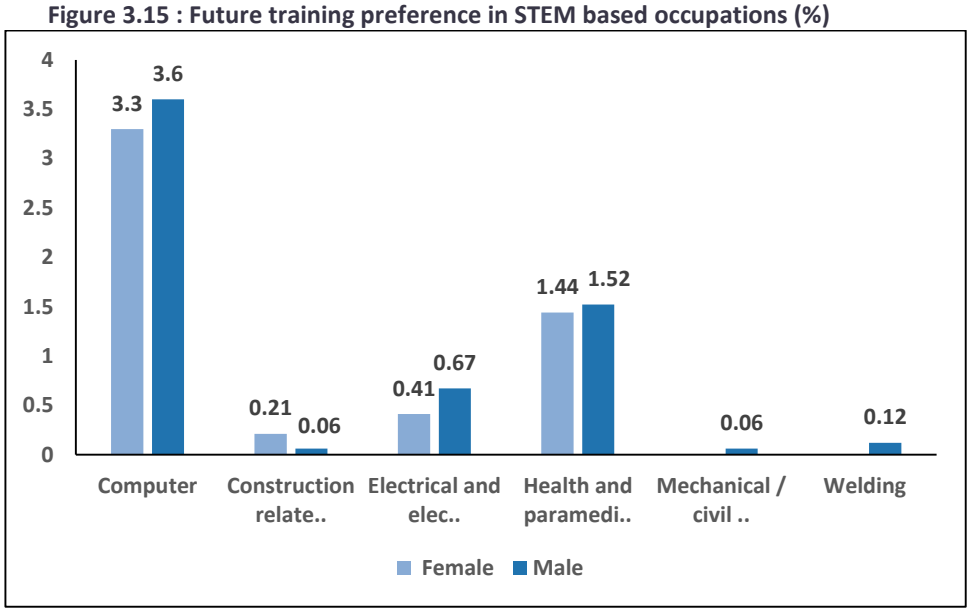
Table 3.6: Skill Trainings by gender (%)

Type of Skill Training	Share of women who participated in the last 12 months (%)	Share of men who participated in the last 12 months (%)
Agriculture crop production and preservation	0.00	0.54
Catering, hotel and restaurant	1.47	0.00
Computer	16.91	29.27
Craftsman / handicraft and cottage work	0.00	0.27
Creative arts / artists / photography	0.00	0.27
Driving and motor mechanic	0.00	0.27
Electrical and electronic engineering	**0.74**	0.00
Health and paramedical services	31.62	12.20
Journalism, mass communication	0.00	0.54
Leather and Textile	0.74	0.81
Mechanical / civil engineering	0.74	0.00
Non-crop agricultural activities	0.00	0.27
Office management	47.79	50.14
Other	0.00	0.54
RMG	0.00	4.88
Total	**100**	**100**

Source: Authors' calculation based on LFS 2016-17

The table (3.6) presents a breakdown of the types of training that workers in STEM-related jobs have undergone, with a noticeable gender imbalance. Despite the critical role of computer skills in STEM fields, only 16.91% of females have been trained in this area, which is substantially lower than their male counterparts. Males outpace females in almost all other training categories, except for health and paramedics.

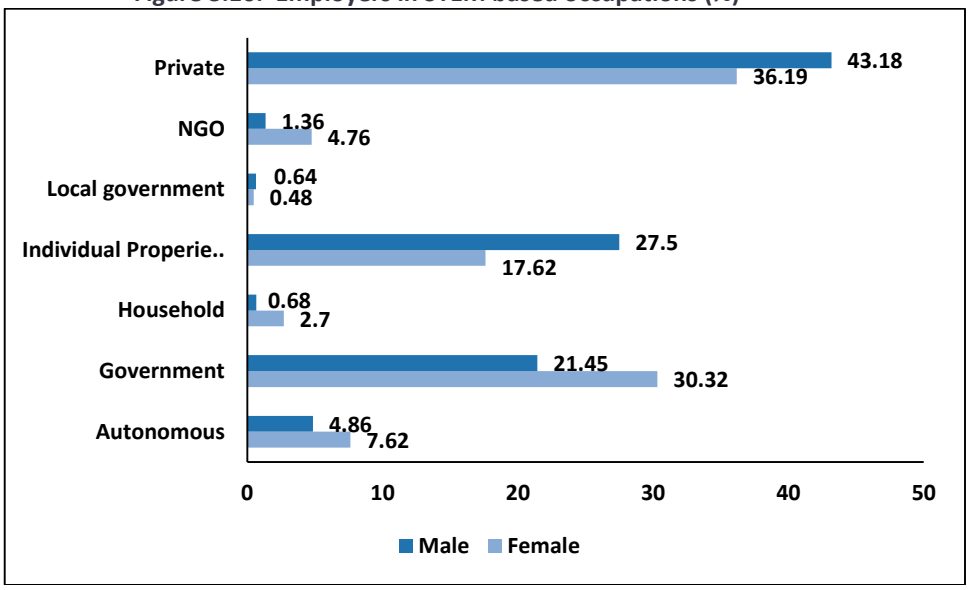
Figure 3.15 : Future training preference in STEM based occupations (%)



Source: Authors' calculation based on LFS 2016-17

Females have expressed interest in pursuing additional training in several areas, including computer science, health and paramedics, as well as in construction-related and electrical and electronics-related fields. However, minimal interest expressed by females in training programs related to mechanical/civil engineering or welding (figure 3.15).

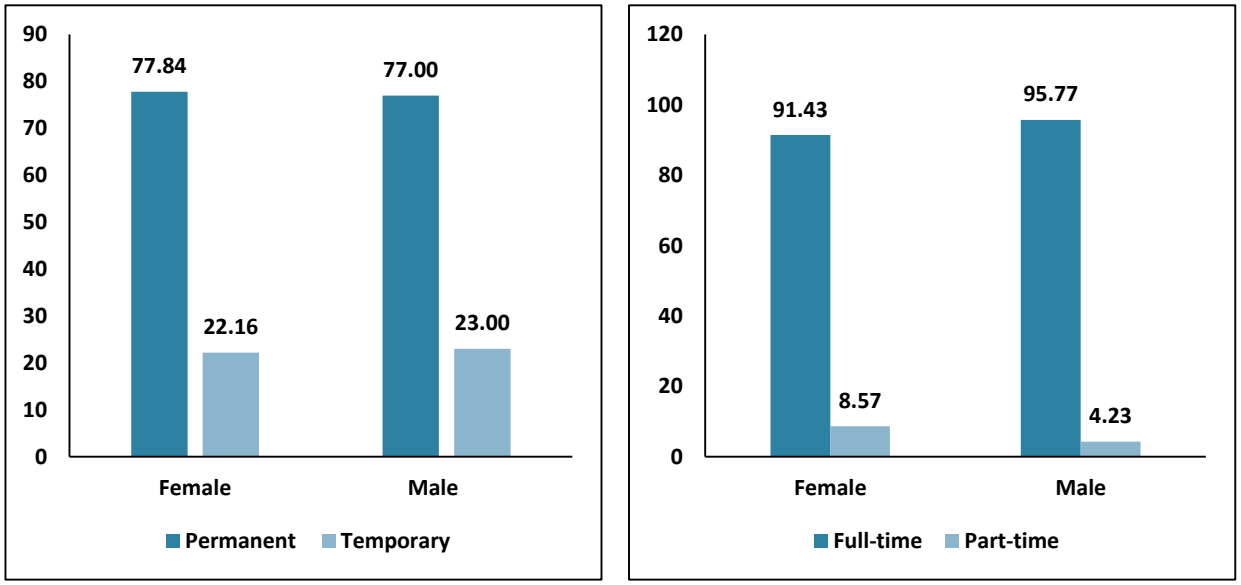
Figure 3.16: Employers in STEM based occupations (%)



Source: Authors' calculation based on LFS 2016-17

Approximately 36.19% of females in STEM-based careers are employed by private organizations, while 30.32% work in the public sector, and 17.62% are engaged in individual properties. This result from figure (3.16) suggests that the public sector is trailing behind the private sector in terms of generating STEM-based job opportunities.

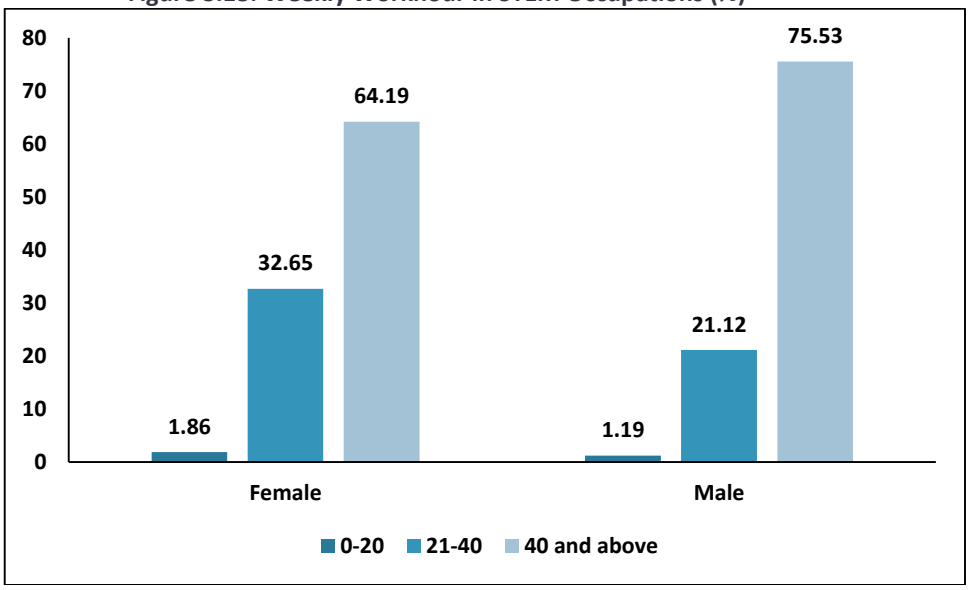
Figure 3.17: Nature of Job in STEM based occupations by Gender



Source: Authors' calculation based on LFS 2016-17

Figure (3.17) presents the employment nature within STEM occupations.

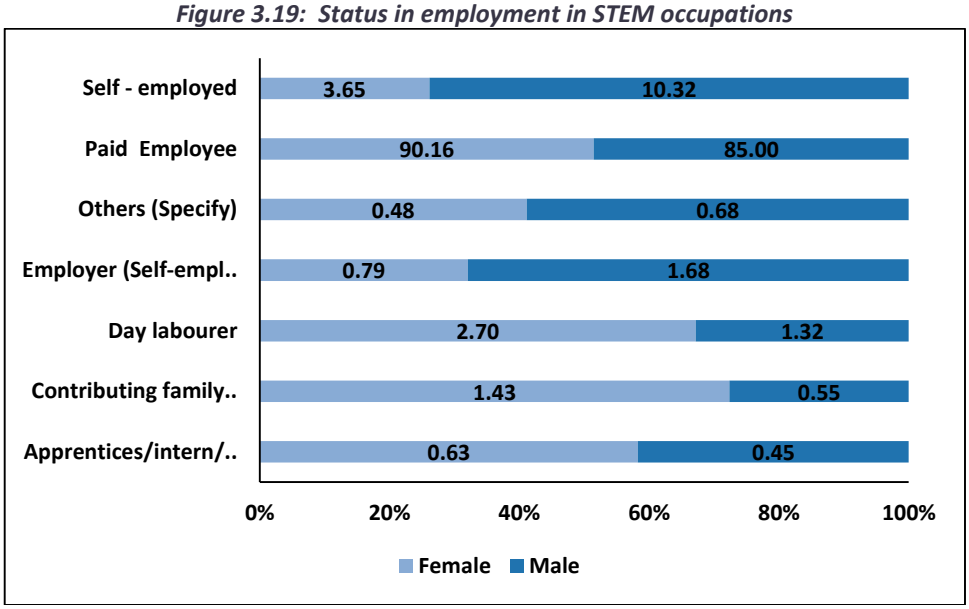
Figure 3.18: Weekly Workhour in STEM Occupations (%)



Source: Authors' calculation based on LFS 2016-17

In STEM-based careers, 64.19% of females work more than 40 hours per week, whereas this number is higher for males at 75.53%. (Figure 3.18).

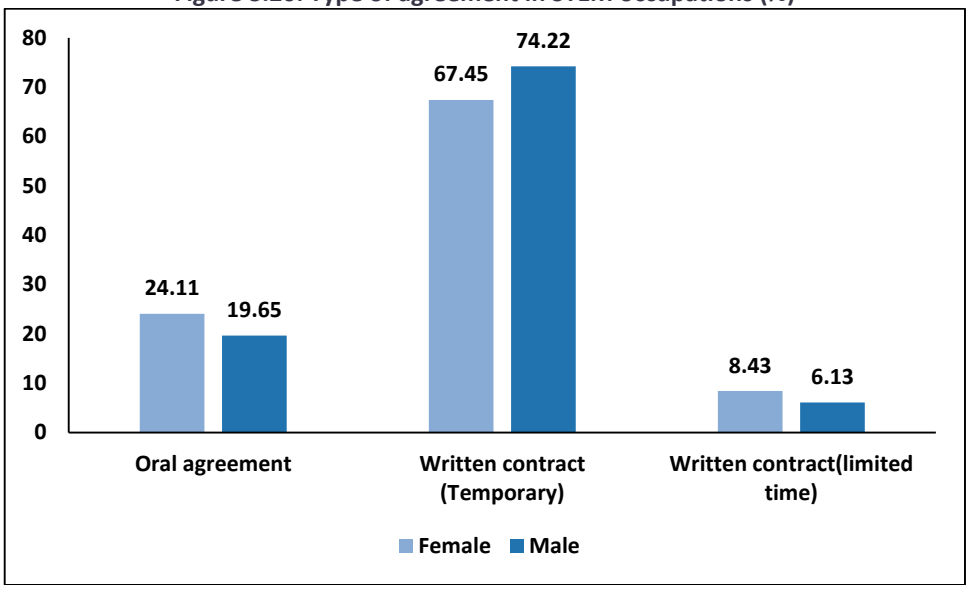
Figure 3.19: Status in employment in STEM occupations



Source: Authors' calculation based on LFS 2016-17

In STEM-based occupations, 90% of females are employed as paid employees (Figure 3.19). Additionally, about 2.70% of females work as day laborers in these fields. A higher percentage of males, 10.32%, are self-employed compared to females, who lag behind at 3.65%.

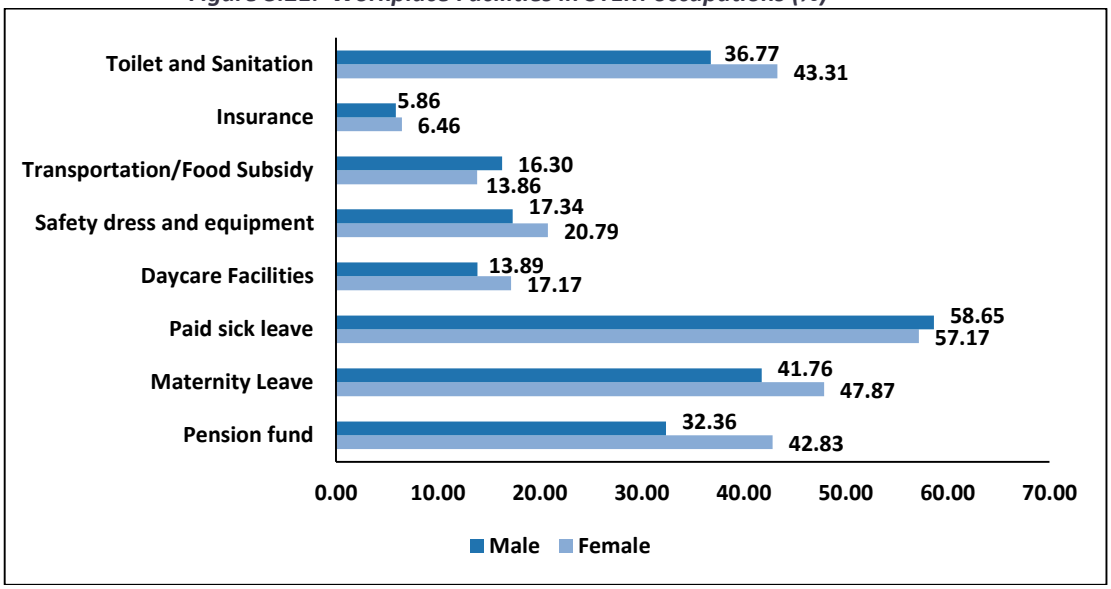
Figure 3.20: Type of agreement in STEM occupations (%)



Source: Authors' calculation based on LFS 2016-17

Written contract can be considered as an indication of formality. Formal employment contract, as opposed to informal employment, usually entails better job security, more definite terms of employment, and access to legal remedy in the event of disagreements. Written contracts frequently come with perks like paid time off, retirement plans, and health insurance, as well as a more secure work status. Oral agreements can result in unstable working circumstances and frequently lack the legally binding provisions of written contracts. Workers who have oral agreements may be more vulnerable to exploitation or abrupt termination without due process, as well as uncertainty about job tenure, compensation, responsibilities, and benefits. Among female workers in STEM-based occupations, only 67.45% have a written contract, while approximately 24.11% are working based on an oral agreement. For males, the percentage with written contracts is higher at 74.22% (Figure 3.20).

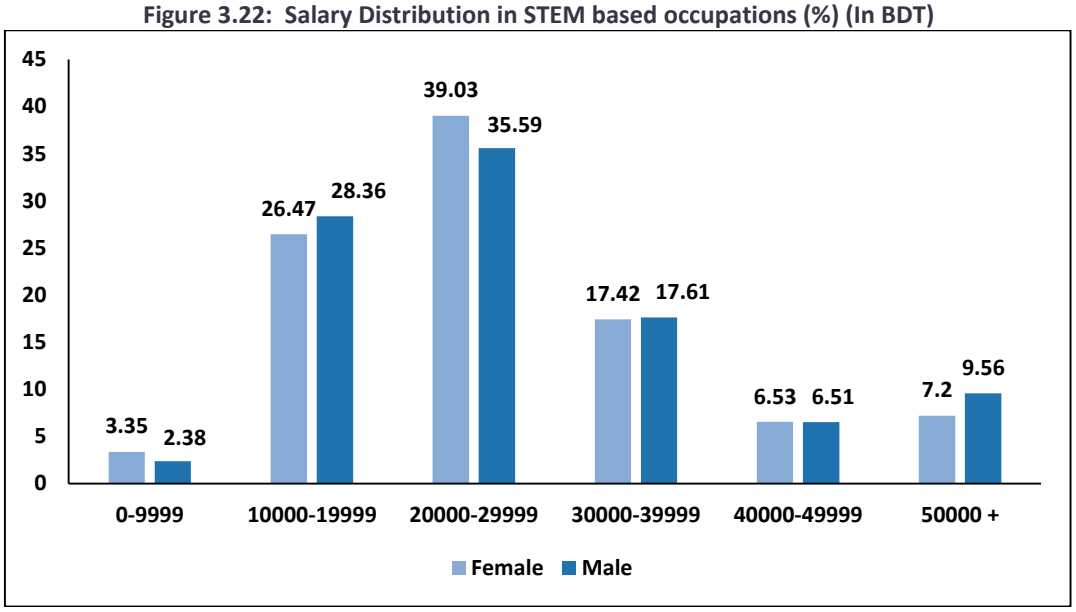
Figure 3.21: Workplace Facilities in STEM occupations (%)



Source: Authors' calculation based on LFS 2016-17

Regarding workplace amenities, approximately 43% of females have access to toilet and sanitation facilities, and 47.87% work in environments where they are offered maternity leave benefits. Figure (3.21) suggests, only 20.79% reported having access to safety gear and equipment at their workplace. A small fraction, 13.86%, of females indicated they are provided with transportation and food subsidies, and 17.17% have access to daycare facilities. Additionally, 57.17% of female workers benefit from a paid sick leave system.

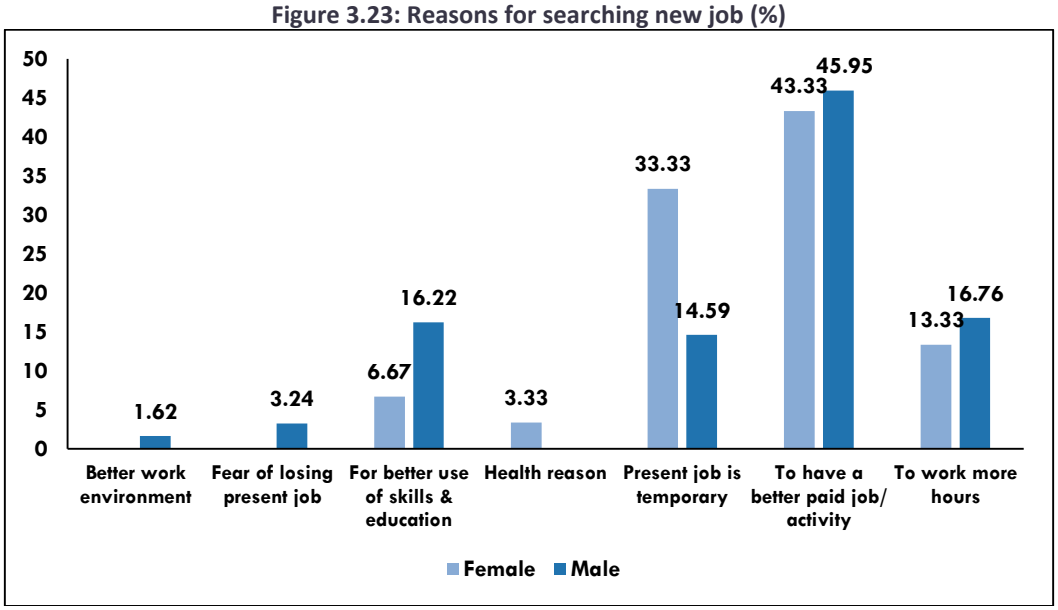
Figure 3.22: Salary Distribution in STEM based occupations (%) (In BDT)



Source: Authors' calculation based on LFS 2016-17

Within STEM occupations, females are slightly more represented in lower wage jobs. Specifically, 3.35% of females in STEM fields earn less than 10,000 BDT. Close to 39% of female workers are paid within the 20-30 thousand BDT salary range (figure 3.22). However, the proportion of females decreases in salary ranges above 50 thousand BDT. Only 7.2% of females earn more than 50 thousand BDT, indicating that in the higher salary segments, females are less represented.

Figure 3.23: Reasons for searching new job (%)



Source: Authors' calculation based on LFS 2016-17

According to Figure (3.23) 43.33% of female workers are seeking new employment opportunities for better pay, while 33.33% cite the temporary nature of their current job as the reason for their desire to switch. Additionally, 13.33% of females wish to work more hours, which may indicate that current employment is limited in scope of work and compensation, and 3.33% are considering a job change due to health reasons. In terms of skill utilization and education, 16.22% of males believe they could make better use of their skills and education by changing jobs, compared to only 6.67% of females who feel the same.

3.3 Understanding the policies regarding women in STEM

We conducted a thorough desk review of the current education policies to assess the government's efforts in promoting and supporting women's engagement in STEM education. Our study encompassed documents such as:

- the National Education Policy 2010,
- the 8th Five-Year Plan (2021-2025), and
- the Education Sector Plan (ESP) for Bangladesh (2020/21 – 2024/25)

Our analysis revealed key government initiatives aimed at encouraging and enhancing female involvement in STEM education. These initiatives aim to provide equal opportunities for girls and boys in choosing their fields of study, with a special emphasis on encouraging girls to pursue STEM, and ICT. Initiatives include increasing female enrollment in technical and vocational education, establishing more women's polytechnics, integrating gender issues into teacher training, and providing additional support and stipends for female students. This comprehensive approach signifies a transformative shift in Bangladesh's education system, aiming to empower girls and women through education and equip them with the skills necessary for the modern workforce. The results of the policies we studied are listed in Table 3.7.

Table 3.7: Existing Policies and Highlights

Policy	Highlight
National Education Policy 2010	• All students, irrespective of their sex, must have equal liberty to choose their courses of studies at the secondary level and equal importance will be attached to all subjects. Girls will not be persuaded to take up some specific courses like home economics. • Girls will be encouraged to study science and professional subjects (i.e., engineering, medical, law and business studies). • There are four women's polytechnics in the country. In order to include more girls within the technical or vocational education net, if necessary, more polytechnics for women will be established. Women's enrollment in the proposed Upazila-level technical schools will be encouraged. Adequate opportunities will be created for them.
8th Five Year Plan	• Girls' education in STEM is being promoted. The contents of education are being reviewed to reduce gender bias and to incorporate sexual and reproductive health issues. Separate toilets for girls (95.59%) were created in educational institutions. Teachers' training contents now include gender issues. • **STEM and ICT education for girls**: Community awareness and motivation should be strengthened to send girls to STEM at the school and at the tertiary level and technical education. Additional stipends and support for girls, science fair, special training for teachers and science education facility at upazila levels should be

Policy	Highlight
	expanded to increase female students in STEM. Girls should be introduced to ICT and encouraged to undertake higher education in ICT. • **Access to technology and information on upcoming opportunities in ICT and technology**: Access to modern technology related to business and jobs should be expanded at a low cost. Women's access to information related to markets, employment, or business opportunities should be increased through using media and ICT. Information dissemination through mobile phones, internet, radio and social media etc. should be increased and women should be trained to access the information. The A2I should reach young girls and the least educated persons. Opportunities in outsourcing, ICT and other technological work should be identified, and disseminated, and women should be supported to access them.
Education Sector Plan (ESP) for Bangladesh (2020/21 – 2024/25)	• Increased affirmative action with TVET institutions especially for girls, and – types, numbers and enrolment for the base year and end-year to be determined, with phasing Baseline 4 female TVET institutes (2019) to 16 female TVET institutes (2025). • Increased enrolment of girls in TVET institutions with the percentage of girls increasing. Baseline 26.71% (370,658) in 2019 to target 35% (770,000) by 2025. • Increased affirmative action with stipends for TVET students – categories and number of beneficiaries to be determined for base-year and end-year disaggregated by gender, with phasing. Baseline 180,000 students (2019) to target 750,000 students (2025). • Taking affirmative action in favour of girls and increasing the girl's quota and the other quotas for the disadvantaged.
National Women Development Policy 2011	• To remove existing male-female disparities. • To innovate and import technology favoring the interest of women and prohibit anti-women technologies. • To take steps to gender disaggregated collection and insertion of information/data and arrange their regular publication. • To continue with gender responsive budget making program to ensure women development. • To take all out efforts to appoint women in the 30% posts to ensure women's equal and full participation at the decision-making levels including policy making positions in accord with the recommendations of the United Nations' Economic and Social Council.

Source: Authors' compilation from various source

Policy Gap:

- **National Education Policy 2010:** This policy places equal emphasis on education for female students, encouraging them to pursue science and professional subjects. However, it lacks a specific policy on STEM education and does not address gender-specific challenges that contribute to the lower participation of females in STEM fields.
- **8th Five-Year Plan:** This plan actively promotes STEM education for girls through initiatives like community-level awareness, additional stipends, support for science fairs, specialized teacher training, and enhanced science education facilities. It aims to strengthen community awareness and motivation for sending girls to STEM at both school and tertiary levels, including technical education. However, the plan fails to specify which stakeholders are responsible for these initiatives and lacks details on the implementation process. It mentions additional stipends at the upazila level to boost girls' participation in STEM but does not clarify the source of these funds or how they will be allocated.

- **Education Sector Plan (ESP) for Bangladesh (2020/21 – 2024/25):** This plan underscores the importance of female participation in Technical and Vocational Education and Training (TVET) and sets various targets to enhance their involvement. Nevertheless, it does not provide details on how these female students should transition into the workforce or whether adequate job placements are available for TVET graduates.

3.4 Challenges in women's participation in STEM occupations in Bangladesh

The study has explored the challenges female students face in STEM education and careers in Bangladesh. In this regard, the study team has conducted KIIs and FGDs with industry stakeholders, representatives of government agencies, and female students and employees in the sector. Based on the interviews the study has identified some key challenges for women in the sector.

Urban-Rural Disparity: There's a significant gap regarding enrollment and participation in the formal education of science and technology between urban and rural areas. For a variety of reasons, females in rural areas are lagging. Social barriers such as stigma, stereotypes, and care work; economic reasons such as the cost of tuition fees; and institutional reasons such as lack of qualified teachers, lack of adequate infrastructure, etc. are mainly responsible for the disparity.

According to one KII participant, "Once, I came across a girl with an excellent educational background and was looking forward to working with her. However, she texted me that her family is unwilling to let her work. She has to get married first, and if her in-laws allow it, she can only be allowed to do a job.

Rural area is lacking behind in terms of whole education system. The rural system doesn't have lab facilities for practical, lack of qualified teachers. Many students come out from the rural are every year but they are self-enthusiastic about studying STEM. Not necessarily the system helps them to grow interest. There are resource constraints."

Socioeconomic and Cultural Barriers: Female students face significant barriers in accessing STEM education and pursuing careers in STEM fields due to stigma, gender stereotypes, and prejudice. These barriers ultimately lead to gendered disparities.

According to one KII participant, "As Science is an expensive field, because of cultural barriers and stigma, female fall behind here. However, two sectors- medical and teaching are open for all and female are thriving here. Here, society think that in the medical sector, there is not much outside job, consider it more of just a study-oriented field where physical labour is very little, thus, they deem it better for female.

This this is common that people say on the face that girls can do well in the field of science. In my experience many people, even some female students had they tendency of relying on male classmates for any assignment or tasks related to programming or logic. Girls will do the writing part or reporting part. So, I don't know where this perception came from, but I noticed most people had this perception that girls can't do programming."

Economic Barriers: For a lot of students the cost of STEM education is not yet affordable. The cost of tuition, private tutors, course material, and special coaching centers is considerably high.

According to one KII participant, "There are two primary barriers for women, Firstly, female students are 80% more susceptible than their male counterparts to be affected because of a lack of social security. Secondly, Economic Solvency is also a barrier."

Quality of Teachers: There exists a countrywide shortage of skilled teachers in the STEM fields which compromises the overall quality of the education standards. The teachers lack adequate training facilities and proper infrastructure to design updated course materials.

According to one KII participant, "To get qualified teachers, we should focus more on subject-wise teachers at all levels but in no level of education in Bangladesh, it is ensured. For example, a geography student teaches Bangla at the primary level- this situation is an example of the deteriorating quality of teachers. This has happened because of focusing more on quantity, rather than quality**."**

Lack of Academic and Career Guidance: Students at the higher secondary level face a great deal of misconceptions and misdirection due to a lack of proper guidance and career discussion, especially for female students. That's why they face confusion when deciding their discipline and subject area, as a result, their future career projection becomes haphazard. Due to this asymmetric Information existing in the STEM fields, their career opportunities become limited.

According to one KII participant, "Organizing alum meetings, career club events, and other ways of getting to know people working in the industry might come in handy to the students to paint a picture for their future correctly. Internships also let students taste practical work outside the theoretical realm, but most students need clarification about which internship to do.

Once, I came across a girl with an excellent educational background and was looking forward to working with her. However, she texted me that her family is unwilling to let her work. She has to get married first, and if her in-laws allow it, she can only be allowed to do a job. In our country we rarely have this system."

Lack of Practical Education*:* Since the nature of STEM education is practical-oriented, the existing education system, including the tertiary level, cannot adequately adopt all of its requirements because of its predominantly theoretical and traditional outlook, which is, in turn, discouraging for students as they lack the practical exposure in their education.
Technical education institutions are still very much backdated. Whereas industries are going to conquer 4IR, AI generated machines etc. the institutions are using traditional machinery.

Education Policy and Curriculum: The country's education policy lacks specific provisions on STEM education, and the curriculum revisions have not specifically addressed STEM education.

According to one KII participant, “To grow the interest of studying science among the students is absent in our curriculum. Merely bookish knowledge isn't enough. Science is all about practical knowledge. Even now this division system is closed. But before this when the system was there, schools and colleges used to give science, business studies and humanities based on results or GPA rather than interest and knowledge. Students with higher GPA were only allowed to take science.”

Issues Regarding Residence*:* Lack of secured residence for students, especially females, at the tertiary levels in the public universities in Bangladesh, leads to an increase in dropout rates and discouragement among undergraduate career aspirants.

Lack of Academia-Industry Collaboration: In our existing academic culture collaboration and coordination with industries and involvement in industrial projects is hardly emphasized and practiced. This should be emphasized to enhance the quality of education and provide students with practical experience in the job market and industry.

Educating women for marriage as a bid: In many traditional societies, there is a prevalent belief that investing in a girl's education may not benefit the family in the long term because she will eventually marry and her contributions will then benefit another family. This perspective often leads to prioritizing sons' education over daughters', under the assumption that sons will remain in the family and provide support in old age.

According to one KII participant, “Parents often have the mentality to spend more on their sons than their daughters. So, more girls take up humanities subjects rather than the costlier STEM education.”

Additionally, there exists another viewpoint that supports educating girls, but mainly as a means to enhance their marriage prospects. In this view, a degree in a prestigious field like engineering or medicine is seen not primarily as a pathway to personal and professional fulfillment for the girl, but rather as a means to secure a good marriage proposal. This is based on the idea that an educated woman is preferred as she is perceived to be a better caretaker and able to contribute positively to the children's upbringing.

According to one KII participant, “I met a parent whose daughter will soon graduate from BUET, and he was bragging about how many marriages offers she was getting. His way of speaking made his daughter seem like a product, which is very dehumanizing. Some parents think that their daughter studying engineering is a good marriage prospect; they don’t think about their daughter’s career at all.”

Occupational Gender Exclusion: Most of the company does not want to higher women as they do not believe women will be able to fulfill the task even though she has qualification. Also, in sight operations, late night support requires extra security and maintenance cost which company do not needs to provide if they higher male employee. Therefore, even though a lot of female students completes STEM based education, due to lack of smooth career transition they switch to non-stem jobs with female preferences.

According to one KII participant, “The representative there told me off the record that as the job on computer network demand late night support or going on sites, so they prefer male candidates. So just because of mobility and safety issue they prefer male candidates. The don’t even consider female candidates because of the reason.”

Another KII participant responded, “Many (male and female) do not want to work under female bosses, thinking that they will not be able to learn much. However, the female workers should have felt more comfortable working under a female boss.”

According to another KII participant, “In a few private companies, maternity laws are maintained and welcomed. However, many women are fired from their jobs as if pregnancy is a crime.”

Chapter 4: Climate Change and Construction Sector

The construction sector presents a complex picture when it comes to climate change. The sector is intricately linked to climate change, serving as both a significant contributor to the phenomenon and being acutely affected by its repercussions (Liao, 2021; Hurlimann et al., 2019). On the one hand, the sector is responsible for a considerable portion (37%) of greenhouse gas emissions, attributed to the production of building materials, the energy consumption involved in construction activities, and also the ongoing energy use of buildings for heating, cooling, and lighting. This substantial carbon footprint places the construction industry at the forefront of climate change contributors.

Conversely, the construction sector is heavily impacted by the consequences of climate change. For instance, extreme weather events like floods, storms, and heatwaves damage infrastructure and requiring extensive repairs and reconstruction (Camilleri et al., 2001). Again, rising sea levels threaten coastal construction projects, and also climate change can cause disruptions in supply chains can lead to shortages in essential materials, escalating costs and delaying projects.

While the industry itself contributes significantly to the problem, its workers bear the brunt of its consequences on the ground, particularly in terms of working conditions, work safety and productivity. Climate change translates to increased risks and challenges for construction workers. They face greater exposure to extreme weather events like heatwaves, storms, and floods. These hazardous working conditions create risks of heat exhaustion, injuries, and complications due to working in wet environments. Furthermore, the physical strain of working in extreme heat can lead to heatstroke and dehydration. Kjellstrom (2009) and Lundgren (2013) both emphasize the potential health risks and reduced work capacity due to heat stress, a problem exacerbated by rising temperatures. Mohamed (2002) highlights the importance of a positive safety climate, which can be compromised by extreme weather events and changing work conditions.

Additionally, extreme weather disrupts construction projects, leading to delays, cancellations, and ultimately, reduced work hours and potential job losses. The constant threat of these hazards and witnessing the destruction caused by extreme weather events can also take a toll on the mental well-being of construction workers. Kjellstrom (2009) further predicts a decrease in labor productivity in many regions, particularly in Southeast Asia, Andean and Central America, and the Caribbean.

Acharya (2018) emphasizes the rising risk of heat stress among construction workers, particularly women, in a changing climate. In particular female construction workers face heightened vulnerability due to several factors. Firstly, physiological differences make them more susceptible to heat stress than men, placing them at greater risk of heat exhaustion and dehydration during increasingly frequent extreme weather events. Additionally, a lack of safety gear designed for women's bodies can hinder their safety and comfort during construction work. Furthermore, informal employment and limited access to social safety nets, which are more prevalent among female construction workers, leave them with fewer resources and support during climate-related disruptions. Patel (2019) highlights the migration of women to urban areas due to climate-related factors, leading to improved living

conditions but also increased vulnerability. In other words, the broader societal impact of climate change fuels migration from rural to urban areas as individuals seek new opportunities in the face of environmental vulnerabilities. Many of these migrants, lacking specialized skills, find employment in the construction sector. The promise of higher wages draws men to more dangerous roles, while women typically engage in less skilled, physically demanding jobs. Abid (2018) further underscores the disproportionate burden of climate change on women, particularly in developing countries, and the need for their inclusion in mitigation efforts.

Climate change poses a multifaceted challenge to the construction industry, affecting both the planet and its labor force. To effectively adapt to these shifts, it's imperative for the sector to take proactive measures. Upskilling workers with new technologies and sustainable practices is crucial. Additionally, prioritizing worker safety through stricter regulations and appropriate equipment is essential, especially for women who face unique vulnerabilities due to physiology and lack of properly designed gear. Furthermore, ensuring social safety nets protects workers from income insecurity during climate-induced disruptions. By addressing these challenges and specifically empowering women through skill development and fostering a more inclusive work environment, the construction sector can leverage the valuable contributions of its entire workforce to build a more sustainable future for all.

4.1 Challenges regarding Climate Change and Construction Sector

The industry's preparedness for climate change varies, with the sector facing challenges in translating awareness into action (Hurlimann et al., 2019). Navigating this changing landscape requires addressing several challenges.

The skills gap: Bridging the skills gap through training programs and educational initiatives is crucial to equip the existing workforce with the necessary skills for sustainable construction practices.

Stricter regulations and enforcement of safety protocols: Stricter regulations and enforcement of safety protocols are essential to protect workers from climate-related hazards. This includes ensuring access to proper protective gear, heat stress prevention measures, and adequate hydration breaks. Providing adequate safety measures by designing PPE that fits women's bodies and addresses their specific health and safety concerns related to climate hazards is critical.

Social safety net: Strengthening social safety nets through formalizing employment practices, providing health insurance, and ensuring income security during disruptions are essential for supporting women construction workers during periods of climate-induced disruptions.

Gender bias: Combating gender bias against women in construction is crucial for ensuring equal opportunities for training and advancement in green jobs.

Higher upfront costs: Sustainable practices might require higher upfront costs compared to traditional methods.

Lack of awareness: A lack of awareness and education about the long-term benefits of sustainable construction across all stakeholders involved hinders progress.

Collaboration: Effective collaboration between architects, engineers, construction companies, policymakers, and consumers is crucial to achieve a significant and lasting shift towards a more sustainable construction sector that minimizes its environmental impact, builds resilience, and contributes to a greener future for all.

4.2 Policy Recommendations regarding Climate Change and Construction Sector from a Gendered Lens

The construction sector holds the key to adapting to and mitigating climate change. While it plays a significant role in contributing to the problem, it also holds immense potential to be part of the solution. By adopting sustainable building practices, the industry can significantly reduce its environmental impact. This involves using recycled materials, incorporating energy-efficient designs, and optimizing construction processes. Sustainable design, including the use of green building materials, is crucial in reducing CO2 emissions and mitigating these impacts (Ahmed et al., 2021). In particular, the use of autoclaved aerated concrete as an alternative to reinforced concrete can significantly reduce embodied carbon emissions (Ahmed et al., 2021).

The need for adaptation and mitigation strategies, such as passive solar design and reduced lighting and equipment loads, is also emphasized (Camilleri et al., 2001). Additionally, building climate-resilient infrastructure and implementing stricter green building standards can further contribute to a more sustainable future. These strategies are particularly important in addressing the urgent impacts of flooding and overheating on housing (Camilleri, 2000). The implementation of green building principles is also crucial in reducing the industry's impact on climate change (Kryvomaz & Savchenko, 2021).

Additionally, the focus on sustainability opens doors for new job markets in areas like renewable energy integration, energy-efficient construction, and green building materials. The growing focus on climate-resilient infrastructure and sustainable construction practices creates a demand for specialized skills. Workers who can adapt to new technologies and materials for building energy-efficient structures or disaster-resistant buildings will have better job prospects. Furthermore, the rise of renewable energy projects opens doors for new job opportunities in construction and maintenance, potentially creating a green jobs boom in the sector.

The focus on green jobs and skill development in sustainable construction allows women to gain new skills in areas like energy-efficient building practices and green building materials. This can empower them to access more secure and higher-paying jobs within the sector. Moreover, women can play a crucial role in promoting sustainable practices within construction companies. Their unique perspective can contribute valuable insights and lead to innovative solutions for building climate-resilient infrastructure and conserving resources. Afolabi (2018) underscores the potential of women in green jobs, but also identifies barriers to their participation.

Finally, the need for a skilled workforce in sustainable construction presents an opportunity to build more inclusive workplaces. Addressing gender bias and promoting diversity can attract more women to the sector, fostering a safer and more welcoming work environment. Companies that take the lead in embracing sustainability practices position themselves as frontrunners and attract environmentally conscious clients.

Chapter 5: Policy Recommendation and Best practice

5.1 Policy recommendations for increasing participation of women in Construction sector

- **Data Base:** In order to get accurate insights about various aspects of the construction industry and to propose targeted policies, a solid database of the construction sector workforce should be constructed and duly maintained.

- **Gradual Formalization of the Construction Sector:** In order to safeguard the sustainable growth of this sector and to enhance participation of women, steps should be taken to gradually move towards formalization of this sector. This can be done through a number of steps like, through the introduction of structured recruitment process, better salary and benefits, standard working hours, well defined health and safety standards, adoption of gender-responsive practices etc.

- **Having a Well-Coordinated Public-Private Effort:** There is no denying that, without combined effort at the stakeholders' end, enhancement of female participation will be difficult. There should be a framework by which each stakeholder's role can be defined, coordinated, and evaluated. As for the government, it can take the initiative to create an enabling environment for females to get accommodated in the mega projects. On the other hand, with the assistance and guidance from the government, the private sector will work for a dignified working environment with gender-responsive workplace practices.

- **Having a Well-defined Structure for Health and Safety of the Workers:** In construction sector, despite the high risk attached to the relevant jobs, there is no specific compensation policy regarding injuries and accidents on-site. There exists no life insurance system either. Hence, if someone is fatally injured or killed in the process, no formal measures can be followed. The compensation settlement deal is done informally as per the will of the contractor. The stakeholders recommend that there should be a defined compensation and dispute settlement policy, and a health or life insurance system must be in place in favor of the workers in the sector.

- **Having a Separate body to Ensure Workplace Safety:** There are hardly any policy measures at hand in cases of on-site sexual abuse, physical assault, and harassment for the female workers. The workers have to seek justice following the general legal practice, which often proves costly and lengthy for the workers. The workers feel that there should be a separate body that can ensure prompt justice at minimal cost in the industry.

- **Gender-Sensitive Training:** In order to break the dominant attitude toward female participants, male participants should be given adequate training on workplace safety, security, and professional conduct. This moral education should be made part of their skill training. In addition to that, an enabling environment should be made for females so that they do not feel discouraged.

- **Incentivizing and Popularizing the Sector:** Although there exist several skill-training programs for construction-related jobs, female participation in those programs is meager. The respective authority should provide different incentives to the female participants to ensure greater participation of women in this sector.

- **Having a Gender Responsive Eco-system:** We have to create an overall ecosystem that can accommodate female workers and professionals with adequate support mechanisms and through an enabling environment such as standard wages, workplace safety and health standards, compensation for workplace injuries and accidents, insurance and security schemes, separate sanitation and hygiene management, maternity benefits, daycare centers, flexible working hours, necessary leaves, safe transportation, etc. Without an enabling environment that includes gender-responsive workplace practices, no support measures will be sustainable and we cannot ensure dignified work conditions for the female participants.

5.2 Global Best Practices in Construction sector for women

Without coordinated policy supports, it would not be possible to increase the participation of women in the construction sector. It must be ensured that the construction sector offers a safe working environment with competitive benefits for women. In this regard, it is important to look into the best practices globally to identify components that can be incorporated in the policies of Bangladesh.

Table 5.1: Global Best Practices in Construction for women

Country	Year	Policy	Descriptions	Take away
US	2004	The Occupational Safety and Health Act (OSHA)	• Regulate OSHA standards for the construction industry • Provides information, training, and assistance to workers and employers • Conduct inspections in response to complaints and/or referrals • OSHA has proposed to revise its personal protective equipment standard in construction to explicitly require that the equipment must fit women properly. • Recommends specific policy measures on "Women in the Construction Workplace: Providing Equitable Safety and Health Protection"	➢ Ensuring availability of PPE for women across a full range of sizes according to the International Safety Equipment Association ➢ Establishing Safety and Health Complaints and Referrals center ➢ Health and Safety of Women in Construction to address health and safety issues specific to female construction workers

Country	Year	Policy	Descriptions	Take away
Australia	2023	**The Building Equality Policy (BEP)**	• Aims for a gender-inclusive construction industry with specific training and employment goals for women. • BEP's three actions: setting project gender equality targets, mandating women apprentices or trainees, and requiring Gender Equality Action Plans (GEAP). • Targets government projects, enforcing a minimum female representation of 3% in trade roles, 7% in non-trade, and 35% in management and specialist positions.	➢ Providing Construction industry based specific trainings for women ➢ Mandating women trainees' participation in all the existing training program ➢ Developing gender equity targets for all the construction project ➢ Creating gender equity action plans for construction sector ➢ Enabling minimum female representation for specific roles in government projects
India	2005	**Mahatma Gandhi National Rural Employment Guarantee Act**	• Seeks to boost rural livelihood security by providing at least 100 days of wage employment per financial year • Open to all rural households seeking wage employment in manual, unskilled work, prioritizing projects with at least one-third female workers • Guarantees a minimum wage of Rupees 331 per day • Includes provision for unemployment allowance if work is not provided within 15 days of application.	➢ Provision to Include rural women to create durable assets like roads and canals, with employment within their own locality and ensure payment of minimum wages.
Australia	2019-2022	**Safe and Strong: A Victorian Gender Equality Strategy**	**1. Priority 1: Attract** • Tackle barriers hindering girls and women from considering trades and roles in the industry, focusing on: - School career counselors. - VET and VCAL (Victorian Certificate of Applied Learning) course providers. - Families of students. • Create clearer pathways for women to enter and advance in the construction industry. • Develop routes for women to progress from low and semi-skilled positions to skilled and trade roles in the industry. **2. Priority 2: Recruit**	➢ Attract and incentivize women to participate in construction based career ➢ Incentivize the major construction firms, subcontractors, and labor hire companies to attract and hire women ➢ Encourage women to form communities for shared practices and experiences.

Country	Year	Policy	Descriptions	Take away
			• Enhance the ability of major construction firms, subcontractors, and labor hire companies to attract and hire women for a variety of trade and semi-skilled positions within Industry **3. Priority 3: Retain** • Foster a culture of gender equality in the construction industry. • Offer chances for women to form communities for shared practices and experiences. • Assess the wellbeing of women in trades and semi-skilled roles in the sector. • Improve facilities for women workers and adapt work practices to accommodate employees with caregiving responsibilities.	

Source: Authors' compilation from various source

5.3 Global Initiatives for Women in Construction

There are various initiatives taken worldwide to facilitate women participation in construction sector. We have reviewed the existing initiatives and shortlisted few which might be relevant in our country context.

National Association of Women in Construction (NAWIC) – UK

NAWIC, or the National Association of Women in Construction[14], is an international non-profit in the United Kingdom dedicated to the advancement of women in the construction industry. Entirely run by committees of volunteers who work within organizations or run their businesses in the construction industry, (NAWIC) started as Women in Construction of Fort Worth. It was founded on September 11, 1953, by sixteen women actively employed in the construction industry seeking a support system. Currently, NAWIC members include architects, operatives, lawyers, engineers, surveyors, project managers, students, and any individual working in construction or providing services to the industry. NAWIC has expanded over the years and has branches in the North East, North West, Scotland, Jersey, Yorkshire, Midlands, and London and South East.

The NAWIC aspires to foster equity and inspiration within the construction industry. They have supported numerous women in expanding their skills, securing promotions, and gaining industry knowledge while increasing their visibility at work. NAWIC's goals include providing career support for women in construction, thus positively impacting the industry and encouraging the next generation to pursue construction-related roles. They offer networking opportunities and affordable training and contribute to improving industry standards. NAWIC engages with allies to advocate for their cause, celebrates role models, and promotes the construction industry as an appealing career choice. They actively identify areas for improvement and collaborate with leading companies, institutes, and associations.

NAWIC is not only for women, though they are women-focused. Most of their events are open to everyone, and they value the contributions of all those who work towards a more gender-equal future construction

14 Source: https://www.nawic.co.uk/

industry. In the coming years, their goal is to increase the number of women joining the construction industry and to support women in construction so their careers may flourish continuously.

CWIT Women Build Illinois – USA

Chicago Women in Trades (CWIT) is an association in the United States of America that works to increase the number of women in the skilled trades and other blue-collar occupations and to eliminate the barriers that prohibit women from entering and remaining in non-traditional careers. CWIT provides free training programs titled– 'Women in Welding,' 'Technical Opportunities Program,' and 'Women Build Illinois' [15]to guide women interested in high-wage jobs in the Union Construction trades and welding or manufacturing industries.

Women Build Illinois, funded by Illinois Works: Pre-Apprenticeship Program is a 10-week day-time training program with a focus on basic construction skills, practical training, and industry-recognized credentials provided by apprenticeship programs, contractors, and tradeswomen. It prepares its students to pass apprenticeship program entrance exams successfully, introduces them to career opportunities in the construction industry, and equips them with basic construction skills such as blueprint reading and tool recognition. It also prepares women to meet the physical challenges of the trades by connecting them to apprenticeship programs.

Equal Representation in Construction Apprenticeship (ERiCA) – California

The California Department of Industrial Relations (DIR) and the Division of Apprenticeship Standards (DAS) offer the Equal Representation in Construction Apprenticeship (ERiCA) grant to organizations working toward creating career pathways for women, non-binary and underserved populations interested in careers in the building and construction sectors. The funds from this grant go towards supportive resources for childcare outreach and community building. The supportive resources for childcare go to DAS-registered construction pre-apprenticeship and apprenticeship programs that hire parents with childcare challenges.

The estimated total funding for ERICA is $25,000,000. However, eligible Grant applicants are limited to organizations that support equal representation in the construction workforce, such as– non-profits, community-based organizations, local education agencies, workforce development boards, unions, and state-registered construction apprenticeship and pre-apprenticeship program sponsors. The maximum combined grant proposal cannot exceed $4,000,000 if an applicant applies to both funding categories.

The ERICA grant has been helping organizations recruit and train mentors for support, offering technical assistance to apprenticeship programs to enhance representation and advancement, and establishing regional networking opportunities. Developing innovative marketing strategies, such as career fairs tailored to women and non-binary and underserved communities interested in construction, has been made possible by this grant. The grant also ensures collaboration with relevant public officials for training on workplace rights and safety.[16]

15 Source: https://cwit.org/trade-programs/women-build-illinois/

16 Source: https://www.dir.ca.gov/DAS/Grants/ERICA.html

NSW's Women in Construction Industry Innovation Program (IIP) – Australia

Only in its second year, a relatively new grant, the Industry Innovation Program (IIP)[17], funded and administered by the Department of Education of the Government of Australia, started by providing grants to support industry initiatives that will encourage female participation and retention in the construction industry and non-traditional roles. In the second rendition of the program, IIP is looking to support innovative industry-led initiatives that aim to create a more diverse, safe, and inclusive construction industry for all, increase the number of women in the construction industry, and support female leadership and female employees.

As part of the Women in Construction strategy by the New South Wales (NSW) Government, any organization willing to get the grant must remove obstacles that prevent women from entering the construction industry and implement reforms to create safe and inclusive workplaces focusing on the benefits and opportunities construction offers. The IIP grant came to fruition to achieve the goal of 15 percent of women in construction by 2030.

5.4 Policy recommendations for increasing women's participation in STEM

- ***Social Awareness Campaign:*** In order to overcome socioeconomic and cultural barriers, the respective stakeholders can arrange social awareness programs with the parents and teachers at the community level. The academic institutions can also arrange science fairs, and the government can also take small campaigns like observing STEM education awareness week countrywide.

- ***Initiatives at Different levels of Education:*** Students at higher secondary and tertiary levels of education should be provided with proper orientation/introductory programs in relation to different subjects like that of STEM. Setting examples of successful female professionals can be an effective way to encourage other females to enter STEM-based careers, thus female role models can also be invited to inspire female students in pursuing science-related careers. Various programs should also be adopted to highlight the benefits of females entering the science and technology sectors.

- ***Infrastructure, Laboratory and Skill Training Facilities:*** Given the gap in STEM based education and training between males and female in semi-urban and rural areas in particular, the academic institutions providing STEM education should have the adequate supporting infrastructure and laboratory and skill training facilities while focusing on female based educational institutes. The government should take steps to introduce modern and more advanced trainings and should link those to the demand side of the labour market.

- ***Skill Training of the Teachers:*** In order to provide high-quality training on STEM, it is extremely important to enhance the quality of the existing teachers and to recruit highly skilled teachers at the secondary and higher secondary levels. Besides, the training programs should be scaled up and more teachers should be accommodated in the programs.

17 Source:https://www.nsw.gov.au/grants-and-funding/industry-innovation-program-year-2
https://www.nsw.gov.au/grants-and-funding/women-construction-industry-innovation-program-iip-year-1

- ***Upgradation of Curriculum:*** The academic system for STEM education and relevant policies should be revised and aligned to the practical issues in the context of STEM education. Besides, the laboratory facilities at educational institutes should be upgraded and modernized in line with the growing demand.

- ***Academia-Industry Collaboration:*** There is no denying that, if the females are better equipped in terms of information about the job market, they can deal better with the related challenges. In our existing academic structure, greater collaboration and coordination with the industries should be incorporated so that the female students in particular have first-hand information of the labour market.

- ***Congenial Academic Environment:*** Since STEM education has certain challenging issues especially at the tertiary level, in addition to the complexity of the subject, female students face additional challenges like a male-dominated academic as well as working environment. Therefore, creating a supportive academic environment for both students and faculty members is crucial for a gender-sensitive and positive academic environment**.**

- ***Career Guidance and Information Centers:*** Every academic institution should take the initiative to adopt career guidance and information centers within their systems so that students can get assistance whenever they need it. Initiatives like career fairs and educational field trips are crucial for exposing students to various career paths.

- ***Introducing Incentive Structure:*** In order to encourage female students in STEM based education, various types of incentives like allowances, stipends, and scholarship programs can be introduced and expanded. The universities can also be actively engaged in arranging internship opportunities for providing effective exposure.

- ***Integration of TVET in Mainstream Education:*** The curricula of secondary, higher secondary, and tertiary levels should be designed in such a way that students can ensure a smooth career transition and alignment of educational objectives. In this connection, Technical and Vocational Education and Training (TVET) should be promptly integrated into the mainstream education system, and challenges in implementation and coordination of TVET with general education should be duly addressed.

- ***Allocation of separate Budget for STEM Education:*** Despite being a highly promising and forward oriented sector, there is no specific and targeted budget allocation for STEM education. STEM education is not separately accounted for in budget allocation and falls under the Ministry of Education and TVET. Given the growing importance of STEM education, the government should consider allocating budget targeting specifically for the expansion and betterment of STEM education.

- ***Better Planning and Implementation of Budgetary Resources:*** Apart from the issues of lower level of allocation, another key concern in the context of education budget is that of planning and execution. Though there are certain efforts to promote STEM education and for addressing gender disparities as outlined in national planning

documents e.g. the 8th five-year plan, there remains concern in case of implementation. In this context, better monitoring and evaluation of allocation of resources should be introduced.

5.5 Global Best Practices in STEM for women

Increasing the number of women working in the STEM based occupation as well as encouraging them in STEM education might not be feasible without efficient policy supports. It is essential to make sure that the construction industry provides women with a safe place to work and favourable wages. Examining global standards in this area is crucial in order to find elements that Bangladeshi policies might adopt.

Table 5.2 : Global Best Practices in STEM for women

Country	Year	Policy	Descriptions	Take away
India	2020	**Science, Technology, and Innovation Policy**	• Develop an India-centric Equity & Inclusion (E&I) charter to address all forms of discrimination and inequality in STI, fostering an inclusive culture with equal opportunities for women, rural and marginalized communities. • E&I Charter aims to combat STI discriminations based on gender, caste, religion, geography, language, disability, and other factors. • Ensure equal academic opportunities for women, candidates from rural areas, marginalized and differently abled groups, regardless of caste, creed, religion, or race. • Mandate at least 30% women representation in all decision-making bodies, including selection and evaluation committees. • Focus on promoting women scientists in leadership roles to inspire women in science careers. • Attract young women, girls, and other excluded groups to STEM fields, enhancing awareness and interest in science careers. • Address ageism and career breaks to retain trained women in the STI workforce, considering academic age for professional milestones like recruitment, awards, and funding, applicable across genders and broader contexts.	➢ Require a minimum of 30% female representation in all decision-making entities, including selection and evaluation committees. ➢ Emphasize advancing women scientists into leadership positions to motivate women in science careers. ➢ Encourage young women, girls, and other underrepresented groups to pursue STEM fields, increasing awareness and interest in science careers.
United States		**National Strategy on Gender Equity and Equality**	a. Promote Equity, Access, and Nondiscrimination in STEM Field • Promote STEM education tailored for underrepresented groups, focusing on girls and people of color. • Create new STEM career paths for women, emphasizing computer science	➢ Create and Implement a Gender Equity Act to eradicate discrimination in the workplace and society.

			and clean energy, to enhance job equity and economic security. • Address bias and discrimination in STEM, and offer flexible career options for better work-life balance. • Invest globally in STEM education for women and girls, supporting initiatives to break down barriers in these fields. b. Improve Gender Equity in Access to Technology • Increase investments to reduce gender gaps in technology access, enhancing telemedicine, online education, and key workforce skills. • Fund studies on social media's mental health effects, especially for women, girls, and LGBTQI+ people, and on safe technology for mental health services. c. Encourage STEM innovation and entrepreneurship • Foster diversity and gender parity in the innovation economy by embedding entrepreneurial skills in STEM education and training. • Increase access to STEM research and development opportunities in various institutions, including partnerships with federal STEM-focused agencies.	➢ Develop new STEM careers for women, focusing on computer science and clean energy, for job fairness and economic stability. ➢ Boost investment to close gender divides in technology, improving telemedicine, online education, and essential workforce skills.
China		**National Program for Women's Development**	**Mainstreaming Gender:** • Enhance training for women in technology and technical fields. Refine policies to establish a diverse, multi-channel training system for female science and tech talents, leveraging state key labs and major projects. • Balance gender representation in secondary and higher education study areas, encouraging diverse student development and reducing gender bias in major selection. Use varied methods to promote women's participation in high-tech studies and research. • Encourage women's active involvement in scientific research and tech development, creating conditions for their qualification improvement.	➢ Improve training for women in technology and technical fields. Revise policies to create a diverse, multi-channel training system for female science and tech talents, utilizing state key labs and major projects. ➢ Equalize gender representation in tertiary and higher education programs in STEM fields.
Malaysia	2013-2020	**National Policy on Science, Technology and Innovation, 2013-2020 (NPSTI)**	• Emphasize the crucial role of Science, Technology, and Innovation (STI) in enabling both men and women to drive socio-economic transformation and inclusive growth towards a scientifically advanced nation. • Encourage and strengthen equitable female participation in all levels and sectors of STI.	➢ Foster and enhance equal female involvement across all levels and areas of Science, Technology, and Innovation (STI).

Malaysia	2009	**Malaysia Woman Policy**	• Strengthen human capital by empowering women to be competent, resilient, and innovative in STEM, aiming to make them competitive for national development and reducing digital gender gaps in ICT access and use. • Implement a National Securities Commission initiative requiring companies to report gender diversity indices, supporting a goal of 30% women in leadership roles in both public and private sectors by 2016. • Launch a career comeback program for women who left the workforce for family reasons, along with a national action plan for single mothers. • Establish a Women's Advisory and Consultative Council to monitor and guide government policies and legislation related to women's issues.	➢ Strengthen women's role in STEM innovation and narrow the gender gap in ICT access and usage. ➢ Set a target for increasing women's leadership in both public and private sectors. ➢ Initiate a career comeback program for women returning to the workforce after family commitments, including a national action plan for single mothers.
Australia	2019-2022	ADVANCING WOMEN IN STEM 2020 Action Plan	**ACCELERATING CHANGE THROUGH GOVERNMENT PRACTICES** • SAGE Program Support: The Australian government is funding the Science in Australia Gender Equity (SAGE) program ensuring participation and success of all eligible organizations, with strong representation from publicly funded research agencies. • Anonymized Research Funding Trials: Under the Women in STEM Ambassador's guidance, a trial is underway to test anonymized assessment in research funding proposals, aiming to gather data to support more equitable practices in STEM. • Gender Equity in Research Funding: The Australian Research Council (ARC) and National Health and Medical Research Council (NHMRC) are implementing strategies to increase women's participation and advancement in research funding and the health and medical research workforce **LEADING A DATA-DRIVEN APPROACH** • STEM Equity Monitor Development: The Australian government is creating an annual report from 2020 for 10 years, tracking girls' and women's participation in STEM education and employment, identifying progress and investment targets.	➢ Unlocking women's STEM potential via diverse educational programs and funding options. ➢ Generating a yearly report for a decade to track girls' and women's involvement in STEM education and careers, pinpointing advancements and investment goals. ➢ Conducting evaluations on workplace gender monitoring. ➢ Highlighting the presence of women in STEM.

			• Measuring STEM Workplace Progress: From 2021-2022, the Workplace Gender Equality Agency allows voluntary reporting for public sectors and smaller organizations, aiding in evaluating, comparing, and publicly reporting progress in STEM fields, especially regarding gender pay gaps and inequalities. **EMBEDDING A CULTURE OF EVALUATION** • National Evaluation Guidelines for Women in STEM: The Australian government is backing the Women in STEM Ambassador to create national guidelines for evaluating projects supporting girls' and women's participation in STEM. These guidelines will allow for consistent self-evaluation across Australia, building evidence of effective strategies. • Pilot of Evaluation Guidelines with WISE Grants: The Department of Industry, Science, Energy, and Resources will trial these guidelines in collaboration with the Women in STEM Ambassador and past recipients of Women in STEM and Entrepreneurship (WISE) grants. This will provide insights into the effectiveness of funded projects and refine the guidelines. • Implementation with WISE Projects: Starting 2020-21, all WISE-funded projects will receive these evaluation guidelines. Future WISE grants may focus on scaling up projects that have successfully demonstrated their impact in promoting gender equity in STEM.	
UK	2022-2025	**EPSRC 3 year EDI Action Plan**	• Highlight role models from underrepresented groups in engineering and physical sciences, particularly focusing on women, ethnic minorities, people with disabilities, and the LGBTQ+ community, to showcase their significant contributions. • Set diversity targets for advisory groups: 30% women and 20% ethnic minorities for Strategic Advisory Teams; 40% women and 20% ethnic minorities for the Strategic Advisory Network and Science Engineering and Technology Board. • Address the consistent underrepresentation of ethnic minority and women researchers in our portfolio	➢ Create Role models from STEM based occupations for Women ➢ Generate mandatory gender ➢ diversity targets for every sectoral advisory groups

Source: Authors' compilation from various source

5.6 Global Initiatives for women in STEM

Numerous global initiatives have been implemented to encourage women to participate in STEM education and also to increase women's participation in the STEM based occupations. After reviewing the current efforts, we have selected a select few that may be pertinent to the circumstances of our country.

Technovation Cambodia

The Technovation Girls program is a 12-week global entrepreneurship program that empowers young women aged 8-18 to become tech entrepreneurs and leaders. Through this initiative, girls collaborate in teams, guided by volunteer mentors and parents, to code mobile apps addressing real-world issues.in Cambodia, the initiative was established in 2014 through a collaboration between USAID, Cambodia's education ministry, Tech for Kids Academy, and Youth and Sports; the program aims to foster interest in STEM fields among girls. The Technovation Girls program employs a three-part model to foster STEM engagement in girls. Participants identify and address real-world problems in their communities, connecting technology to tangible solutions. Working in teams with mentors and parents (for those under 12), girls build a supportive community of learning. The program also emphasizes community involvement by building trust with local leaders, ensuring flexibility to adapt to diverse needs and goals in different settings.

Over the past 15 years, Technovation Girls has trained 150,000 young women as technology entrepreneurs and innovators, empowering them to use technology for community problem-solving. Post-program, participants exhibit increased interest in technology and leadership, with 58% of alumni enrolling in additional computer science courses.[18]

APEC – Australia Women in Research Fellowship

Initiated by the Australian Government, the APEC-Australia Women in Research Fellowship[19] aims to empower women researchers from developing APEC (Asia-Pacific Economic Cooperation) economies by providing up to AU$ 20,000 each for collaborative projects with Australian educational institutions. This program, spanning one to three months, fosters economic and technical cooperation to address regional challenges and opportunities. The objectives include supporting women researchers in STEM-related fields, facilitating collaboration with leading Australian experts, utilizing state-of-the-art facilities, and enhancing the employability, social well-being, and economic empowerment of women in developing APEC economies.

Since its inception in 2015, the program has successfully facilitated numerous collaborations, offering women in STEM valuable opportunities to work alongside professionals from renowned Australian research institutions.

Kalpana by VigyanShaala International

VigyanShaala International's Kalpana program[20] is an online initiative designed in India to ignite innovation and foster a scientific spirit among participants. It aims to inspire individuals through interactions with STEM leaders, offer professional development tools, create a supportive Kalpana network for women from diverse backgrounds, and broaden opportunities in STEM fields. The Kalpana Fellowship, an 8-week mentoring program for female STEM undergraduates, pairs them with expert mentors for continuous interpersonal and STEM development. The Kalpana Network provides a supportive structure for female STEM students, fostering a 'She for STEM' community where mentors and subject experts gather to offer guidance. Kalpana

18 Source: https://technovationchallenge.org/press/cambodian-girls-defy-gender-barriers-excel-technology/

19 Source: https://www.apec.org.au/2023-apec-australia-women-in-research

20 Source: https://vigyanshaala.com/kalpana-2/

Stories features powerful narratives of women leaders in STEM, sharing their journeys to inspire and facilitate interaction. The program envisions enrolling over 100,000 students globally by 2030.
In the period from 2015 to 2018, VigyanShaala International received grants from various science academies to bring hands-on STEM experiences and cutting-edge research to Indian classrooms. Through this volunteer movement, they conducted workshops nationwide, engaging nearly 8000 students and teachers. Additionally, around 100 STEM PhD students were trained in communication through workshops, involving them as volunteers in the initiative.

Bank of America initiatives to increase equality in STEM fields

Bank of America is dedicated to advancing equality in STEM fields through a comprehensive approach. They actively support Girls Who Code (GWC)[21], a nonprofit committed to closing the gender gap in technology. Hosting the Summer Immersion Program in partnership with GWC and other organizations across the U.S., Bank of America provides high school girls with a chance to explore technology, connect with professional women role models, and recognize that a STEM career is attainable. In the summer of 2020, 360 girls participated in classrooms across multiple locations.
In addition to GWC, Bank of America collaborates with organizations like the Girl Scouts of America, the National Center for Women & Information Technology, Rewriting the Code, Code First: Girls, Stemettes, Ada, and the National College for Digital Skills. Their ongoing partnerships with these groups play a crucial role in ensuring that the upcoming generation of young women sees a career in STEM as well within their reach.

Indo-U.S. Fellowship for Women in STEMM

The Department of Science and Technology (DST), Government of India, and the Indo-U.S. Science & Technology Forum (IUSSTF) jointly introduced the "Indo-U.S. Fellowship for Women in STEMM" (WISTEMM) program[22]. WISTEMM focuses on providing bright Indian women students and scientists with the opportunity to access world-class research facilities in U.S. academia and labs. The program aims to promote research and capacity building for Indian women in Science, Technology, Engineering, Mathematics, and Medicine (STEMM), fostering collaboration in various frontline areas. This initiative is designed to pave the way for the next generation of Women Scientists and Technologists from India to engage with their American counterparts. By facilitating interactions between outstanding women students and researchers, the program seeks to build long-term research and development linkages and collaborations. The scheme comprises two modules: The Women Overseas Student Internship Program and the Women Overseas Fellowship Program.
The program has served as a source of motivation for women in STEMM, providing them with valuable opportunities to engage with global peers, share experiences, and contribute to the advancement of science and technology on an international scale.

21 Source: https://about.bankofamerica.com/en/making-an-impact/stem-gender-equality

22 Source: https://www.indiascienceandtechnology.gov.in/programme-schemes/women-schemes/indo-us-fellowship-women-stemm

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Annex:

Annex 1.1: Number of Students Enrolled by STEM and Other Science-related Subjects 2022

Subject Name	Class	
	Nine	Ten
Mathematics	1943558	1806660
Science	1332575	1257306
Physics	610983	549354
Chemistry	610983	549354
Biology	366589	329612
Higher Mathematics	244394	219742
Information and Communication Technology (ICT)	1943558	1806660
Agricultural Science	732916	289568
Geography and Environment	1006979	950560
Economics	1006979	950560
Total	9799514	8709376

Source: Bangladesh Education Statistics 2022, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education

Annex 1.2: FGD participants (female STEM students)

Subjects FGD participants are currently studying	Level
Computer Science Engineering (CSE)	Tertiary level
Civil Engineering (CE)	Tertiary level
Architecture	Tertiary level
Mechanical Engineering	Tertiary level
Industrial and Production Engineering (IPE)	Tertiary level
Electrical & Electronic Engineering (EEE)	Tertiary level
Mathematics	Tertiary level
Chemistry	Tertiary level
Nuclear Engineering	Tertiary level
Geology	Tertiary level
Zoology	Tertiary level
Applied Chemistry and Chemical Engineering	Tertiary level
Total Participants	12

Source: Author's compilation

Annex 1.3: KII respondents

Stakeholders	Number of KIIs
Government officials/ agencies	12
Private sector	2
Academician	2
STEM alumni	3
Professional associations	3
Development partners	2
Total	22

Source: Author's compilation

Annex 1.4: KII Checklist (for women employed in STEM)

Enrollments and Career Transition

1. We have seen in the literature that the average enrollment of female students in STEM education at the secondary and the higher secondary level is around 25%, whereas the average enrollment in humanities subjects is well above 50%.
2. What is the Rural vs Urban scenario of female participation in STEM education?
3. The transition of STEM students from the secondary and the higher secondary level to the tertiary level and, consequently, to STEM-based careers is not significant according to what the literature suggests. What might be the major reasons in this regard?

Data Gap

4. What data gaps exist in this sector? What can be done to close that data gap? What is your recommendation to create a solid database in this sector?
5. Is there any gender-disaggregated data at the tertiary level available nationwide?

Challenges /Bottlenecks

6. What are the major barriers/ challenges, external and within the fields, female students face to be enrolled/ sustained in STEM education in Bangladesh?
7. Is the national budget allocation for Education an issue in this regard? What should be the proper budget allocation for the nationwide enhancement of quality STEM education and infrastructure build-up, especially, in rural areas?
8. Is there any shortage of qualified teachers in this field? What is the scope of improvements?
9. How available are the ICT facilities, training courses, and logistics support to aspiring rural STEM students?
10. How does gender stereotype and social stigma play roles in the lack of participation of female students in STEM education?
11. Technical and Vocational Education and Training (TVET) is considered a very integral part of promoting STEM education and STEM-based careers in Bangladesh. Do you think the current academic status, curriculum, and overall institutional and infrastructural framework are sufficient to do so? What is the scope of improvements? Is this academic system accommodating to female students?
12. What is the impact of COVID-19 on the STEM fields?

Policy Recommendation

13. How should the national budget for Education, particularly for STEM education, be revised, implemented, and administered?
14. Do you think that there is a need for a separate (priority) budgetary provision to strengthen the overall STEM structure, such as research, policy formulation, implementation, and infrastructure, in Bangladesh?
15. What are the current national policies/strategies to encourage women/girls in STEM? What policy should be taken according to you to strengthen women's stake in this field?
16. What are the Key factors & key recommendations for promoting women/girls in STEM-based education to increase women's participation in STEM-based careers in public and private sectors?
17. As you might be aware of the 10th strategy in Chapter 16 of the National Education Policy 2010, which focuses on Women's Education, particularly the initiative to encourage girls to study science and professional subjects such as engineering, medicine, law, and business studies. Could you please elaborate on the specific measures that the government has implemented up until now in alignment with this strategy? Additionally, based on your

knowledge or experience, how would you assess the progress in terms of increasing girls' participation in science and STEM-related professional subjects?

18. Given the 8th FYP's focus on promoting girls' education in STEM and ICT, including measures like **additional stipends, science fairs, and teacher training,** how effective have these initiatives been in increasing female participation in these fields? Could you provide us with any specific outcomes resulting from these policies? What further steps do you suggest to enhance girls' engagement in STEM and ICT education?

Annex 1.5: KII Checklist (for women employed in construction)

Participation and Education

1. What are the main reasons for meager female workforce participation in the construction industry?
2. We have seen that the female participation rate in top-tier STEM-based and managerial jobs in the construction industry is also very low. What might be the reasons?
3. What is the minimum education requirement for the workers in general, and particularly for the female workers across various occupations in the construction sector?
4. Are there any skill gaps among the potential & existing female workforce for the construction sector? How intense is the extent of the skill gaps?
5. Do you think if the skillsets required for the sector can be enhanced through appropriate TVET training, female workforce participation will be improved?
6. How do you think the government can contribute more to the vocational training for female construction workers?
7. What are the academic, vocational, and technical institutes which are providing vocational, and construction-related training/courses as well as job placements for women to secure higher-value technical jobs within the sector?

Challenges /Bottlenecks

8. What are the most common challenges female workers face in the construction industry?
9. Do the marital status of women and the state of pregnancy pose any challenges to women sustaining in this sector?
10. How does the care work influence a female participant's tendency to enter into this industry? What measures could be taken by the private sector employers for women in construction sectors to establish an accommodating ecosystem with mechanisms such as daycare centers, flexible working hours, leave, safe transportation, etc.?
11. Do the casual nature and volatility of employment associated with the sector make it less desirable for women to get into this sector? What about their competitiveness against male workers?
12. How frequently are the on-site sexual abuse, physical assault, and harassment being reported by the female workers? How do these factors affect female workers' preferences entering into the industry?
13. How safe is the working environment in the sector evaluated from the gender lens (considering the health risk, separate sanitation and hygiene management, and privacy)?
14. How do the following factors affect female preference and participation in the construction industry: informal/ casual nature of employment, uncertain working hours, unsafe working conditions, wage exploitation, abrupt termination of jobs without any notice, and workplace harassment? In such cases, how could the government, construction companies, and other stakeholders step forward to create dignified and decent working conditions for women in the construction sector? And, what might be the possible challenges in the current context to ensure decent work conditions for women?

Recruitment Process and Job Facilities (Salary & Benefits)

15. What is the recruitment process of your firm? Is there any special provision or corporation guidelines for gender equality in consideration of the informal nature of employment within the sector?
16. Why is the average salary of female workers lower than that of male workers? And why is the recruitment volume lower despite their low average salary?
17. Why don't most recruiters or employers consider female workers preferable to males for the majority of the occupations existing in the sector?
18. What kinds of payment methods are usually followed in the industry? (Hint: Wage form, formal contract, etc.) Is there any defined pay scale (like the national pay scale) to issue salary and benefits? What is the best practice in the industry?
19. What sort of benefits other than the salary do the female workers enjoy currently working in the sector?

Policy Support and Measures

20. What policy supports are there for women specifically in the construction sector?
21. Keeping in view the challenges of LDC graduation of Bangladesh, meeting the targets of SDGs, and meeting the visions of 2041 of the Government of Bangladesh, what will be the major strategies to be undertaken by the private sector to promote and practice gender-responsive practices in the construction sector (construction site and companies)? Please Identify the key roles of the private sector, construction companies, and other stakeholders, and What strategies/ regulations to be adopted by them in this regard.
22. What is the compensation policy in general and in the case of female workers if any severe accidents befall them on the construction site?
23. What policy measures are at hand in cases of on-site sexual abuse, physical assault, and harassment?
24. What can be done (as an employer or policymaker) to make this sector more desirable to women and to ensure widespread female participation?
25. What sort of social awareness programs should be implemented and administered to break the dominant attitude and gender stereotypes that barred female participants from this sector?
26. What kind of training should be provided to women at managerial level skills, life skills, and technical skills in the construction sector for their upgradation from low-paying jobs to higher-value technical jobs?
27. What is the general tendency of the career growth graph in the top-tier occupations in the construction industry? How predictable is it? How suitable is it for women to fit in and to project a smooth career? Are there any standard corporation career guidelines in the industry?
28. Given that the Bangladesh Labour Act and National Occupational Safety and Health (OSH) Policy lack specific provisions for women in the construction sector, how do you believe this affects their participation and wellbeing in this field? Additionally, what amendments or initiatives would you recommend to facilitate and enhance the participation and safety of women in the construction industry?

Data Gap

29. What data gaps exist in this sector? What can be done to close that data gap? What is your recommendation to create a solid database in this sector?

Annex 1.6: BSCO Tree Representation of STEM occupations

One-Digit BSCO Codes	Two-Digit BSCO Codes	Three-Digit BSCO Codes	Four-Digit BSCO Codes	Four-Digit BSCO STEM Occupations
01 Managers	12 Administrative and Commercial Managers	122 Sales, Marketing, and Development Managers	1223	Research and Development Managers
	13 Production and Specialized Services Managers	133 Information and Communications Technology	1330	Information and Communications Technology Services
02 Professionals	21 Science and Engineering Professionals	211 Physical and Earth Science Professionals	2111	Physicists and Astronomers
			2112	Meteorologists
			2113	Chemists
			2114	Geologists and Geophysicists
		212 Mathematicians, Actuaries, and Statisticians	2120	Mathematicians, Actuaries and Statisticians
		213 Life Science Professionals	2131	Biologists, Botanists, Zoologists and Related
			2132	Farming, Forestry and Fisheries Advisers
			2133	Environmental Protection Professionals
		214 Engineering Professionals (excluding Electrotechnology)	2141	Industrial and Production Engineer
			2142	Civil Engineers
			2143	Environmental Engineers
			2144	Mechanical Engineers
			2145	Chemical Engineers
			2147	Textile Engineers
		215 Electrotechnology Engineers	2151	Electrical Engineers
			2152	Electronics Engineers
			2153	Telecommunications Engineers
		216 Architects, Planners, Surveyors, and Designers	2161	Building Architects
			2163	Product and Garment Designers
			2164	Town and Traffic Planners
			2165	Cartographers and Surveyors
			2166	Graphic and Multimedia Designers
	22 Health Professionals	221 Medical Doctors	2211	Generalist Medical Practitioners
			2212	Specialist Medical Practitioners
		222 Nursing and Midwifery Professionals	2221	Nursing Professionals
		224 Paramedical Practitioners	2240	Paramedical Practitioners
		225 Veterinarians	2250	Veterinarians
		226 Other Health Professionals	2261	Dentists
			2262	Pharmacists
			2264	Physiotherapists
			2265	Dieticians and Nutritionists

One-Digit BSCO Codes	Two-Digit BSCO Codes	Three-Digit BSCO Codes	Four-Digit BSCO Codes	Four-Digit BSCO STEM Occupations
		232 Vocational Education Teachers	2320	Vocational Education Teachers
		235 Other Teaching Professionals	2356	Information Technology Trainers
		243 Sales, Marketing, and Public Relation Professionals	2433	Technical and Medical Sales Professionals (excluding ICT)
			2434	Information and Communications Technicians
		251 Software and Applications Developers and Analysts	2511	Systems Analysts
			2512	Software Developers
			2519	Software and Applications Developers and analysts not elsewhere classified
		252 Database and Network Professionals	2521	Database Designers and Administrators
			2522	Systems Administrators
			2523	Computer Network Professionals
03 Technicians and Associate Professionals	31 Science and Engineering Associate Professionals	311 Physical and Engineering Science Technicians	3111	Chemical and Physical Science Technicians
			3112	Civil Engineering Technicians
			3113	Electrical Engineering Technicians
			3115	Mechanical Engineering Technicians
			3117	Mining and Metallurgical Technicians
			3118	Draught persons
			3119	Physical And Engineering Science Technicians not elsewhere classified
		313 Process Control Technicians	3131	Power Production Plant Operators
			3133	Chemical Processing Plant Controllers
			3134	Petroleum and Natural Gas Refining Plant Operators
		314 Life Science Technicians and Related Associate	3142	Agricultural Technicians
			3143	Forestry Technicians
			3151	Ships' Engineers
		315 Ship and Aircraft Controllers and Technicians	3152	Ships' Deck Officers and Pilots
			3153	Aircraft Pilots and Related Associate Professionals
			3154	Air Traffic Controllers
			3155	Air Traffic Safety Electronics Technicians
	32 Health Associate Professionals	321 Medical and Pharmaceutical Technicians	3211	Medical Imaging and Therapeutic Equipment Technicians
			3212	Medical and Pathology Laboratory Technicians

One-Digit BSCO Codes	Two-Digit BSCO Codes	Three-Digit BSCO Codes	Four-Digit BSCO Codes	Four-Digit BSCO STEM Occupations
			3213	Pharmaceutical Technicians and Assistants
		322 Nursing and Midwifery Associate Professionals	3221	Nursing Associate Professionals
		324 Veterinary Technicians and Assistants	3240	Veterinary Technicians and Assistants
		325 Other Health Associate Professionals	3251	Dental Assistants and Therapists
			3254	Dispensing Opticians
			3255	Physiotherapy Technicians and Assistants
			3256	Medical Assistants
			3257	Environmental and Occupational Health Inspectors and Associates
	33 Business and Administration Associate Professionals	331 Financial and Mathematical Associate Professionals	3314	Statistical, Mathematical, and Related Associate Professionals
	35 Information and Communications Technicians	351 Information and Communications Technology Operations and User Support Technicians	3511	Information and Communications Technology Operations Technicians
			3512	Information and Communications Technology User Support Technicians
			3513	Computer Network and Systems Technicians
			3514	Web Technicians
		352 Telecommunications and Broadcasting Technicians	3521	Broadcasting and Audiovisual Technicians

Source: Authors' compilation from various sources

Annex 1.7: BSCO Tree Representation of construction occupations

One-Digit BSCO Codes	Two-Digit BSCO Codes	Three-Digit BSCO Codes	Four-Digit BSCO Codes	Description
1 Manager	13 Production and Specialized Services Managers	132 Manufacturing, Mining, Construction and Distribution Managers	1323	Construction Managers
2 Professionals	21 Science and Engineering Professionals	214 Engineering Professionals (excluding Electrotechnology)	2142	Civil Engineers
			2144	Mechanical Engineers
		215 Electrotechnology Engineers	2151	Electrical Engineers
			2152	Electronics Engineers
		216 Architects, Planners, Surveyors, and Designers	2161	Building Architects
			2162	Landscape Architects (Not Found)
			2164	Town and Traffic Planners
3 Technicians and	31 Science and Engineering	311 Physical and Engineering Science Technicians	3112	Civil Engineering Technicians
			3113	Electrical Engineering Technicians
			3115	Mechanical Engineering Technicians

Associate Professionals	Associate Professionals	312 Manufacturing, Mining, Construction Supervisors	3123	Construction Supervisors
	33 Business and Administration Associate Professionals	333 Business Services Agents	3334	Real Estate Agents and Property Man
	34 Legal, Social, Cultural, and Related Associate Professionals	343 Artistic, Cultural, and Culinary Associate Professionals	3432	Interior Designers and Decorators
7 Craft and Related Trades Workers	71 Building and Related Trades Workers (excluding Electricians)	711 Building Frame and Related Trades Workers	7111	House Builders
			7112	Bricklayers and Related Workers
			7113	Stonemasons, Stone Cutters, Splitters and Carvers
			7114	Concrete Placers, Concrete Finisher and Related Workers
			7115	Carpenters and Joiners
			7119	Building Frame and Related Trades Workers not elsewhere classified
		712 Building Finishers and Related Trades Workers	7121	Roofers
			7122	Floor Layers and Tile Setters
			7123	Plasterers
			7124	Insulation Workers
			7125	Glaziers
			7126	Plumbers and Pipe Fitters
			7127	Air Conditioning and Refrigeration Mechanics
		713 Painters, Building Structure Cleaners, and Related Trades Workers	7131	Painters and Related Workers
			7132	Spray Painters and Varnishers
			7133	Building Structure Cleaners (Not Found)
	74 Electrical and Electronics Trades Workers	741 Electrical Equipment Installers and Repairers	7411	Building and Related Electricians
9 Elementary Occupations	93 Labourers in Mining, Construction, Manufacturing, and Transport	931 Mining and Construction Labourers	9312	Civil Engineering Labourers
			9313	Building Construction Labourers

Source: Authors' compilation from various sourcess

Annex 1.8: Trainings provided by various Agency

Name of Ministry/ Division	Name of Agency	Name of Occupation
Technical and Madrasah Education Division	Bangladesh Technical Education Board (BTEB)	Electrical Installation and Maintenance (Civil Construction) (117)
Technical and Madrasah Education Division	Bangladesh Technical Education Board (BTEB)	Plumbing (118)
Technical and Madrasah Education Division	Bangladesh Technical Education Board (BTEB)	Masonry (138)
Technical and Madrasah Education Division	Bangladesh Technical Education Board (BTEB)	Rod Binding (152)
Technical and Madrasah Education Division	Bangladesh Technical Education Board (BTEB)	Tile Works (127)
Technical and Madrasah Education Division	Bangladesh Technical Education Board (BTEB)	Welding (101)
Technical and Madrasah Education Division	Bangladesh Technical Education Board (BTEB)	Fitting (102)
Ministry of Expatriates' Welfare and Overseas Employment (MoEWOE)	Bureau of Manpower Employment and Training (BMET)	Civil Construction
	PKSF	Plumbing
	PKSF	Welding
	PKSF	Electrical Installation & Maintenance
	PKSF	Refrigeration & Air Conditioning
Ministry of Industries	Bangladesh Small Cottage Industries Council (BSCIC)	Electrical House wiring and Motor winding
Rural Development and Co-operatives Division	Bangabandhu Academy for Poverty Alleviation and Rural Development (BAPARD)	Electrical & House Wiring
Rural Development and Co-operatives Division	Rural Development Academy	Training on Plumbing and Pipe Fitting
Rural Development and Co-operatives Division	Department of Cooperatives	Plumbing
Rural Development and Co-operatives Division	Bangladesh Rural Development Board	Plumbing & Pipefitting
Rural Development and Co-operatives Division	Bangladesh Rural Development Board	Solar Panel Technician
Ministry of Social Welfare	Department of Social Service	Hardware and Networking
Ministry of Social Welfare	Department of Social Service	Aminship
Ministry of Youth and Sports	Department of Youth Development	Electrical & House Wiring
Ministry of Youth and Sports	Department of Youth Development	Welding

Name of Ministry/ Division	Name of Agency	Name of Occupation
	Mirpur Agricultural Workshop and Training School (MAWTS)	Finishing Carpenter
	Mirpur Agricultural Workshop and Training School (MAWTS)	Gypsum Work (Interior Design)
	Mirpur Agricultural Workshop and Training School (MAWTS)	Masonry (Mosaic, Tiles Fixer, Marble Stone & Ceramics)
	Mirpur Agricultural Workshop and Training School (MAWTS)	Masonry (Plaster, Bricks & Hollow Blocks Setting)
	Mirpur Agricultural Workshop and Training School (MAWTS)	Shutter carpenter
	Mirpur Agricultural Workshop and Training School (MAWTS)	Machinist (Lathe, Milling, Shaper & Grinding)
	Mirpur Agricultural Workshop and Training School (MAWTS)	Auto Painting & Denting
	Mirpur Agricultural Workshop and Training School (MAWTS)	Painting (Building & Spray)
	Mirpur Agricultural Workshop and Training School (MAWTS)	Painting (Metal Spray)
	Mirpur Agricultural Workshop and Training School (MAWTS)	Plumbing (Pipe fitting & sanitary works)
	Mirpur Agricultural Workshop and Training School (MAWTS)	Pipe fitter (Welding Arc & Gas)
	Mirpur Agricultural Workshop and Training School (MAWTS)	Steel Fabricator (Welding Arc & Gas)
	Mirpur Agricultural Workshop and Training School (MAWTS)	Welding (MIG)
	Mirpur Agricultural Workshop and Training School (MAWTS)	Welding TIG
	Mirpur Agricultural Workshop and Training School (MAWTS)	Welding (Arc & 1G-6G position
	Mirpur Agricultural Workshop and Training School (MAWTS)	Welding (Gas)
	Dhaka Ahsania Mission	Electrical Installation & Maintenance
	Dhaka Ahsania Mission	Plumbing & Pipe Fitting
	Dhaka Ahsania Mission	Masonry

Name of Ministry/ Division	Name of Agency	Name of Occupation
	Dhaka Ahsania Mission	Rod Binding
	Dhaka Ahsania Mission	Tile & Marble Fitting
	UCEP	Machinist
	UCEP	Masonry
	UCEP	Plumbing
	UCEP	Marble & Tiles
	UCEP	Electrical Installation & Maintenance
	UCEP	Solar Electrical System
	UCEP	Rod Binding & fabrication
	Construction ISC	Mason
	Construction ISC	Plumbing
	Construction ISC	Welder/Grill Maker
	Construction ISC	Tiles and Marvel works
	Construction ISC	Rod Binding
	Construction ISC	Building Painting
	Construction ISC	Aluminum Fabrication
	Construction ISC	Shattering
	Construction ISC	Lift Installation
	Construction ISC	Glazing Fitter
	Construction ISC	Apartment House Management
	Construction ISC	Refrigeration and Air condition
	Construction ISC	Construction Supervisor
	BRAC Skills Development Programme	Masonry
	BRAC Skills Development Programme	Metal Sheet Cutting & Fabrication
	BRAC Skills Development Programme	Milling Machine Operation
	BRAC Skills Development Programme	Plumbing & Pipe fittings
	BRAC Skills Development Programme	Steel Binding & Fabrications
	BRAC Skills Development Programme	Tiles & Marbles Works
Technical and Madrasah Education Division	Directorate of Technical Education	EIM
Technical and Madrasah Education Division	Directorate of Technical Education	Plumbing
Technical and Madrasah Education Division	Directorate of Technical Education	Rod Binding
Technical and Madrasah Education Division	Directorate of Technical Education	Tiles Fitting
	SOS Vocational Training Centre Dhaka	Electrical Installation & Maintenance (01 Year)

Name of Ministry/ Division	Name of Agency	Name of Occupation
	SOS Vocational Training Centre Dhaka	Electrical Installation & Maintenance (06 Months)
	SOS Vocational Training Centre Dhaka	Electrical Installation & Maintenance (03 Months)
	SOS Vocational Training Centre Dhaka	Machineshop Practice (01 Year)

Source: Authors' compilation from NSDA Action Plan

Annex 1.9: **Percentage Share Male and Female Students at STEM-based Faculty-level in the Public Universities**

Percentage Share Male and Female Students at STEM-based Faculty-level in the Public Universities			
Sl. No.	**Name**	**Male**	**Female**
1	Dhaka University	61.78	38.22
2	Rajshahi University	66.07	33.93
3	Bangladesh Agricultural University	55.91	44.09
4	Bangladesh University of Engineering and Technology	78.88	21.12
5	Chittagong University	61.51	38.49
6	Jahangirnagar University	52.30	47.70
7	Islamic University	65.70	34.30
8	Shahjalal University of Science and Technology	75.16	24.84
9	Khulna University	60.56	39.44
12	Bangabondhu Sheikh Mujib Medical University	47.92	52.08
13	Bangabondhu Sheikh Mujibur Rahman Agricultural University	45.87	54.13
14	Hajee Mohammad Danesh Science and Technology University	55.45	44.55
15	Mawlana Bhashani Science and Technology University	58.03	41.97
16	Patuakhali Science and Technology University	65.71	34.29
17	Sher-e-Bangla Agricultural University	56.47	43.53
18	Chittagong University of Engineering & Technology	78.42	21.58
19	Rajshahi University of Engineering & Technology	79.02	20.98
20	Khulna University of Engineering & Technology	80.12	19.88
21	Dhaka University of Engineering & Technology	90.63	9.37
22	Noakhali University of Engineering and Technology	57.22	42.78
23	Jagannath University	58.30	41.70
24	Comilla University	51.78	48.22
25	National Poet Kazi Nazrul Islam University	59.34	40.66
26	Chittagong Veterinary and Animal Science University	55.06	44.94
27	Sylhet Agricultural University	55.87	44.13
28	Jashore University of Engineering and Technology	63.22	36.78
29	Pabna University of Engineering and Technology	65.75	34.25
30	Begum Rokeya University, Rangpur	60.84	39.16
31	Bangladesh University of Professinals (BUP)	52.24	47.76
32	Bangabondhu Sheikh Mujibur Rahman University of Engineering and Technology	77.54	22.46
33	Bangladesh Textile University	78.07	21.93

34	Barishal Unversity	64.64	35.36
35	Rangamati University of Engineering and Technology	65.29	34.71
36	Bangabondhu Sheikh Mujibur Rahman Maritime University, Bangladesh	69.81	30.19
37	Islami Arabic University		
38	Chittagong Medical University	42.56	57.44
39	Rajshahi Medical University	34.00	66.00
40	Rabindra University Bangladesh		
41	Bangabandhu Sheikh Mujibur Rahman Digital University	71.00	29.00
42	Sheikh Hasina University	57.61	42.39
43	Khulna Agricultural University	48.57	51.43
44	Bangamata Sheikh Fojilatunnesa Mujib Science & Technology University	69.57	30.43
45	Sylhet Medical University	30.44	69.56
46	Bangabondhu Sheikh Mujibur Rahman Aviation and Aerospace university	79.01	20.99
47	Sheikh Hasina Medical University		
48	Kurigram Agricultural University		
49	Habiganj Agricultural University	57.14	42.86
50	Bangabondhu Sheikh Mujibur Rahman Science and Technology		
10	National University	56.70	43.30
11	Bangladesh Open University	59.53	40.47

Percentage of Female Students in STEM Subjects out of the Total Number of Female Students in the Public Universities		
Sl. No.	**Name**	**Percentage**
1	Dhaka University	21.18
2	Rajshahi University	33.23
3	Bangladesh Agricultural University	74.80
4	Bangladesh University of Engineering and Technology	93.46
5	Chittagong University	27.22
6	Jahangirnagar University	36.22
7	Islamic University	23.81
8	Shahjalal University of Science and Technology	43.55
9	Khulna University	43.07
12	Bangabondhu Sheikh Mujib Medical University	100.00
13	Bangabondhu Sheikh Mujibur Rahman Agricultural University	50.95
14	Hajee Mohammad Danesh Science and Technology University	88.16
15	Mawlana Bhashani Science and Technology University	44.19
16	Patuakhali Science and Technology University	79.22
17	Sher-e-Bangla Agricultural University	51.82
18	Chittagong University of Engineering & Technology	100.00
19	Rajshahi University of Engineering & Technology	100.00
20	Khulna University of Engineering & Technology	100.00
21	Dhaka University of Engineering & Technology	100.00

22	Noakhali University of Engineering and Technology	54.12
23	Jagannath University	30.11
24	Comilla University	33.46
25	National Poet Kazi Nazrul Islam University	10.72
26	Chittagong Veterinary and Animal Science University	100.00
27	Sylhet Agricultural University	82.44
28	Jashore University of Engineering and Technology	83.56
29	Pabna University of Engineering and Technology	49.66
30	Begum Rokeya University, Rangpur	35.06
31	Bangladesh University of Professinals (BUP)	12.52
32	Bangabondhu Sheikh Mujibur Rahman University of Engineering and Technology	33.09
33	Bangladesh Textile University	80.73
34	Barishal Unversity	35.87
35	Rangamati University of Engineering and Technology	81.66
36	Bangabondhu Sheikh Mujibur Rahman Maritime University, Bangladesh	52.46
37	Islami Arabic University	
38	Chittagong Medical University	100.00
39	Rajshahi Medical University	100.00
40	Rabindra University Bangladesh	
41	Bangabandhu Sheikh Mujibur Rahman Digital University	100.00
42	Sheikh Hasina University	11.45
43	Khulna Agricultural University	80.90
44	Bangamata Sheikh Fojilatunnesa Mujib Science & Technology University	35.00
45	Sylhet Medical University	100.00
46	Bangabondhu Sheikh Mujibur Rahman Aviation and Aerospace university	79.07
47	Sheikh Hasina Medical University	
48	Kurigram Agricultural University	
49	Habiganj Agricultural University	
50	Bangabondhu Sheikh Mujibur Rahman Science and Technology	
10	National University	9.07
11	Bangladesh Open University	0.74

Average Percentage of Male and Female Students at Faculty Level				
Category	**Variable Name**	**Male**	**Female**	**Total**
All Public Universities Except NU & BOU	Total STEM Students	93539	53473	147012
	Average Percentage	63.6267788	36.3732212	
General Public Universities	Total STEM Students at Facuty Level	27788	18346	46134
	Average Percentage	60.2332336	39.7667664	
Engineering, Science & Technology Universities	Total STEM Students at Facuty Level	52005	20613	72618
	Average Percentage	71.6144757	28.3855243	

Agriculture & Vetenerary Universities	Total STEM Students at Facuty Level	7166	5879	13045
	Average Percentage	54.9329245	45.0670755	
Medical Universities	Total STEM Students at Facuty Level	4414	7504	11918
	Average Percentage	37.0364155	62.9635845	
National University (NU)	Total Number of STEM Students at Faculty-level	187956	143562	331518
	Average Percentage	56.695564	43.304436	
Bangladesh Open University (BOU)	Total Number of STEM Students at Faculty-level	3024	2056	5080
	Average Percentage	59.5275591	40.4724409	

Average Percentage of males & females in STEM out of the total number of males & females in university				
Category	**Variable Name**	**Male**	**Female**	**Total**
All Public Universities Except NU & BOU	Total Students in all Universities	182867	109429	292296
	Average Percentage	51.1513832	48.8654744	50.2955908
General Public Universities	Total Students in all Universities	96430	65553	161983
	Average Percentage	28.8167583	27.9865147	28.4807665
Engineering, Science & Technology Universities	Total Students in all Universities	69154	31226	100382
	Average Percentage	75.2017237	66.0122974	72.3416549
Agriculture & Vetenerary Universities	Total Students in all Universities	9924	8568	18488
	Average Percentage	72.2087868	68.6157796	70.5592817
Medical Universities	Total Students in all Universities	4414	7504	11918
	Average Percentage	100	100	100
National University (NU)	Total Number of Students at University-level	1588311	1582090	3170401
	Percentage	11.8337026	9.07419932	10.4566583
Bangladesh Open University (BOU)	Total Number of Students at University-level	360030	276798	636828
	Percentage	0.83993001	0.74277993	0.79770362

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Flat K-5, House 1/B, Road 35, Gulshan 2
+88 02 58813075
www.sanemnet.org
sanemnet@yahoo.com
www.facebook.com/sanemnet

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