GENDERED REPRESENTATION IN EDUCATION AND CAREER: THE CURRENT TRENDS FROM THE FIELD OF ENGINEERING AND SCIENCE

Vijayata Perwez
Assistant Professor
MANUU CTE Sambhal, U.P.

Abstract

Women's participation in higher education in India has increased significantly, rising from 10.9% in 1950–51 to 48.7% in 2019–20, with the female Gross Enrolment Ratio (GER) surpassing that of men in 2020–21. The Gender Parity Index (GPI) has improved across all social groups, reflecting a steady narrowing of the gender gap. Women now outnumber men in enrolments at the undergraduate and postgraduate levels in arts, science, and education, and their presence in postgraduate and doctoral programmes has grown steadily. However, disparities persist in key professional and technical fields. Women's enrolment in engineering and technology remains stagnant at around 29%, and their representation in premier institutions and high-demand courses such as B.Tech. and M.Tech. continues to be disproportionately low. Although female participation in science disciplines has surpassed 50%, their transition into research careers, R&D, and academic leadership is limited. Women account for less than one-fifth of India's R&D workforce and experience significant attrition after doctoral studies due to systemic and social barriers, including inadequate institutional support and family responsibilities. Faculty data reveal clustering of women in lower academic positions, with minimal representation in elite institutions such as the IITs and IISc. Leadership roles in research councils, academies, and scientific institutions remain largely male-dominated, and women continue to be underrepresented in fellowships, awards, and prestigious recognitions such as the Shanti Swaroop Bhatnagar Award. The analysis highlights that while access to higher education has expanded, structural inequities and organizational discrimination hinder women's advancement in science and technology. Strengthening gender-sensitive policies, institutional support, and recognition mechanisms is critical to ensuring equitable representation of women in India's scientific and technological workforce.

Representation According to Gender, Disciplines and Levels

The percentage of women enrolled in higher education in 1950–51 was 10.9 percent. By 2017, that number had risen to 46.8 percent, and by 2019–20 it had greatly grown to 48.7 percent (Chanana 1988, Rao 2007, Perwez 2019, AISHER 2020 and AISHER 2021). The Gross Enrolment Ratio (GER) in Higher Education which is calculated for the 18–23 age group is 27.3%. In 2020–21, the GER for the male population is 26.7 percent, and for the female population, it is 27.9 percent. According to the same survey, the percentages from the previous year were projected to be 27.3 percent for women and 26.9 percent for men (AISHER 2021). By 2021, however, the nation's total GER is 27.1%. Noticeably, the increase in higher education institutions has also been significant over the years. For example, there are 1113 universities and similar institutions listed on the AISHE portal in 2020–21, up from 760 in 2014–15, a nearly 31.7% growth. There are now 43796 colleges in 2020–21, up from 38498 in 2014–15—a 13% increase (AISHER 2021). The increasing trend of more women enrolling in higher education is also apparently indicating the Gender Parity as far as the GER is concerned (AISHER 2021). Trend analysis of GER, presented in the report, points out that the There are now 105 female students for every 100 male students, up from 85 in 2014–15.

Table 1 Gender Wise Participation of Students at different Levels

Level of study	2014-15		2020-21	
	Female	Male	Female	Male
UG	47	53	48.7	51.3
PG	51.5	48.5	56.45	43.55
M.Phil.	57.7	42.3	62.1	37.9
Ph.D.	41	59	44.9	55.1

Figures in percentage. Source: AISHE Report 2014-15 and 2020-21

The Gender Parity Index (GPI) has increased across all categories as well. Over the past five years, it has increased, rising from 0.92 in 2014–15 to 1.05 in 2020–21 (AISHER 2015 and AISHER 2021). During this time, GPI grew for SC (from 0.91 to 1.07), and for ST (from 0.81 to 1.02). In the past five years, there has been a notable surge in female participation at the M.A., M.Sc., and M.Com. levels (AISHER 2014 and AISHER 2021).

However, women's participation has not increased significantly in important professional courses at under-graduate level. Time series data on the proportion of female students per 100 male students enrolled in significant post-graduate and under-graduate degrees in traditional modes of education shows that there has been more number of women at Bachelor of Arts (B.A.) level (AISHER 2015 AISHER 2021). For example, in 2014–15, there were 118 female students for every 100 male students; in 2018–19, that number rose to 126. However, while there were 119 female students for every 100 male students enrolled in B.A. degrees, women are now considering alternative, more profitable fields of study (AISHER 2015 and AISHER 2019). There are 112 female students for every 100 male students enrolled in the Bachelor of Science (B.Sc.) in 2020–21, up from 93 in 2014–15 (AISHER 2015 and AISHER 2021).

Table 2 Gender Wise Participation of Students in Different Programmes

Programme of study	**2014-15**		**2020-21**	
	Female	**Male**	**Female**	**Male**
B.A.	53	47	52	48
B.Sc.	47.6	52.4	52.3	47.7
B.Com.	45.5	54.5	48.5	51.5
B.Tech.	27	73	28.7	71.3
B.Ed.	63.9	36.1	64.5	35.5
B.E.	28.5	71.5	28.5	71.5
M.Sc.	57.9	42.1	60.9	39.1
M.A.	58.2	41.8	39.9	60.1
M.B.A.	36.5	63.5	56.6	43.3

Figures in percentage. Source: AISHE Report 2014-15 and 2020-21

The data for the Bachelor of Education (B.Ed.) programme is particularly striking. In 2014–15, there were 188 female students for every 100 male students; in 2019–20, there were 215 female students for every 100 male students; however, in 2020–21, this number drastically decreased to 184 female students for every 100 male students (AISHER 2015, AISHER 2020 and AISHER

2021). There are fewer women enrolled in other significant degrees, such as the Bachelor of Technology (B.Tech.) and Bachelor of Computer Applications (B.C.A.), as has been the pattern for some time. For example, in the B.Tech course, there were only 39 female students for every 100 male students in 2014–15. In 2020–21, that number slightly climbed to 40 female students for every 100 male students. In 2020–21, there will be approximately 47 female students for every 100 male students enrolled in M.Tech. (Master of Technology) programmes. In 2014–15, this number was higher, with 64 female students for every 100 male students enrolled in M.Tech. programmes.

During the 1950-51, percentage of women out of the total engineering students was 0.1% which rose marginally to 3.8% by 1980-81 (Chanana 1988). Figures for the same programme in the year 2001-2002 were 21.3 percent and nearly 30 percent in the year 2020-21 (Rao 2007 and AISHER 2021). The proportion of male students enrolled in engineering and technology is 71 percent whereas female enrolment is 29 percent for the year 2020-21 (AISHER 2021).

Table 3 Gender Wise Participation of Students across Major Disciplines

Discipline	**2014-15**		**2020-21**	
	Female	**Male**	**Female**	**Male**
Arts	53.1	46.9	52	48
Commerce	44.5	54.5	48.5	51.5
Science	46.7	53.3	52	48
Engineering and Technology	28	72	29	71

Figures in percentage. Source: AISHE Report 2014-15 and 2020-21

Women constituted only 7.1 per cent of total science students in 1950-51, but by 1980-81 they constituted 28.7 per cent of all bachelor's and master's degree science students and in the year 2001-2002, these figures rose to 40.2 percent (Chanana 1988 and Rao 2007). By the year 2020-21, female students have outnumbered male students as there were 112 female students per 100 male students (AISHER 2021).

Trends of enrolment over the years in science has shown immense growth according to the latest data available. Similarly, there is an increasing trend of more women enrolling in engineering

disciplines, though at a very slow pace (AISHER 2021). However, the AISHE report from 2020–21 states that the number of female students in Institutions of National Importance is extremely low, with State Private Open Universities and Government-Deemed Universities coming in second and third, respectively, which shows that the leading institutions offering professional science and engineering education has least number of women students (AISHER 2021).

The engineering and technology stream has 56625 students enrolled in Ph.D. studies overall, of whom 18875 are female, according to the AISHE report for 2020–21. There are 59267 female students among the 177279 postgraduate students enrolled in different engineering degrees. With 7598 students registered for Ph.D. programmes, computer engineering has the highest percentage of male students—57.8%. The second-highest field is mechanical engineering, with 7361 students, 90.8 percent of whom are male Ph.D. candidates. At the postgraduate level, Civil Engineering boasts the largest student body with 36312, of which 71.8 percent are male. There are 48600 Ph.D. students registered in the science stream. Ph.D. students in chemistry make up the largest group, with 9863 total—5438 men and 4425 women. There are 7720 Ph.D. students studying physics, 4584 of them are men and 3136 of whom are women. There are 4537 students enrolled in the Ph.D. programme in mathematics, 2567 of them are men. There are 679178 students enrolled in different science courses at the postgraduate level. Chemistry has the most enrollment of any Science stream, with 153635 students (AISHER 2021).

Table 4 Percentage of Women in Science and Engineering

Discipline	1950-51	1980-81	2010-2011	2020-21
Science	7.1	28.7	45.78	52
Engineering	0.1	3.8	29.25	29

Figures in percentage. Source: Chanana 1988, Rao 2007 AISHE Report 2010-11 and 2020-21

Of the total, female students make up 55.27 percent. At the post-graduate level, mathematics has 1104269 students enrolled, 39.97% of them are male. There are 84742 PG students enrolled in physics and 66129 PG students enrolled in zoology, with 56.3 percent and 70.6 percent of the

students being female, respectively. Additionally, there are more female students studying mathematics—60% of all PG students are female (AISHER 2021).

At the Ph.D. level, women make up 43.82 percent and men 56.18 percent (AISHER 2021). Those with doctorates are among the most skilled members of the higher education faculty. An examination of data related to Ph. D. recipients between 2015 and 2016 shows that 38.8% of doctorate degrees given in S&T (Science and Technology) faculties were to women (DST S& T Report 2015, 2016). As per the UGC annual report 2016–17, women accounted for 44.2 percent of all doctorates awarded in pure science, with the highest percentages going to medicine (42.8%) and agriculture (36.5%). In the field of engineering and technology, women accounted for 32% of all doctorates granted. The corresponding figures of the year 2020-21 drawn from AISHE report (2021) are given in the following table. (Table 5)

Table 5 Ph.D. awarded in major Science and Technology Fields (S&T)

Area of Study	**2020-21**	
	Female	**Male**
Pure Science	2959	3063
Medicine	683	1074
Agriculture	703	1009
Engineering and Technology	1430	3126

Source: UGC Annual Report 2021-22 and AISHE Report 2020-21

Post Degree Engagements

Understanding the trends of women's post-degree participation in the scientific and technical fields is now crucial. As of April 1, 2021, 67441 (18.6%) of the 3.62 lakh R&D (Research and Development) employees were directly engaged in R&D activities, per the Department of Science and Technology's (DST) most recent Research and Development Statistics at a Glance (2022–23). According to additional data classification, as of April 1, 2021, 60107 out of 336067 employees were women employed in the institutional sector, which includes important science agencies and other federal and state departments. In specifically, by 2021, there were 137526 researchers in the higher education sector, with 17877 of them being women (DST R&D Statistics at Glance 2021).

In the industrial sector which covers public as well as private sector units, there were total of 218644 personnel involved in R&D activities and the number of women in this sector was 57790 by the April of year 2021(DST R&D Statistics at Glance 2022). Women in extramural Research and development projects constituted 25 percent of the total representation in the year 2019-20 which is significant rise from 13 percent in the year 2001-01 (DST R&D Statistics at Glance 2020). Compared to 232 in 2000–01, 848 women principal investigators (PIs) received extramural assistance for research and development in 2019–20 in absolute terms In AASSA India report, Godbole et.al. (2015) highlight the important indicators about status of women as Principal Investigators (PI), showing the trend of significant increase in number of women PIs from 2000-01 to 2009-10. More particularly, women constituted 30 percent fraction of total number of personnel as project and division heads by the years 2010–11, in departments such as the Department of Space (DOS), ISRO (Indian Space Research Organisation), and Defence Research and Development Organisation (DRDO) (Godbole et.al 2015). The proportion of female principal investigators (PIs) has been steadily rising, approaching 23 percent in 2010. According to Godbole et al. (2015), this gradual rise over the 10 years also corresponds with the establishment of the special funding programmes for women. Women make up a sizable portion of both science teachers and students in undergraduate institutions and schools. Godbole et.al (2015) also state that women in India engage in science education in great numbers, making up a sizable portion of science instructors in universities and schools as well as students. This is untrue, though, for women who work in science and pursue careers in scientific research.

Similarly, a very small fraction of women who pursue engineering end up venturing out in significant engineering projects, though they largely take up teaching assignments in various colleges and universities (Godbol et.al. 2015). Although statistics on the number of female engineers in various government and private organisations are still lacking, there are very few of them teaching at prestigious national engineering institutes. Crucially, the trend in India indicates that actual attrition starts after research degrees are earned. Although there is no data on the number of women appointed as instructors in different science and engineering departments across India, the AISHE report from 2018–19 states that 42.2% of all teachers are female and have been appointed at various levels. Just 35,150, or 27.7 %, of the 128949 professorial professors are female. In contrast, 413754 (43 %) of the 971201 assistant professors and 56181 (36.7 %) of the 152557 female associate professors are female (AISHE 2019).

Large proportion of women faculty is appointed in colleges and standalone institutions as 76 and 71 female teachers per hundred male teachers respectively. At the level of university, where there are extensive possibilities for professional growth and recognition for work, number of women teachers per hundred male teachers is limited to 58 (AISHER 2021). To determine the true status of women who choose to teach after earning their research degrees in science and engineering, data from the reports of numerous recent studies on the subject may be evaluated. Data on women teachers appointed to various teaching positions in science and engineering departments of a few chosen universities and institutions where they engage in both teaching and research as part of their profession is provided in a recent document called Women in Science and Technology: A Vision Document, which was co-compiled by INSA, NASI, and IAS in 2016. By the end of 2008, there were only about 10–12% of women on the faculty of prestigious universities like as TIFR (Tata Institute of Fundamental Research), the IITs, and the IISc. This number was considerably lower when one takes associate professorships and higher into account (Inter Academy Panel 2016). An earlier study by Kumar (2001) demonstrates that a significant part of the social organisation of Indian science is gender inequality in the academic hierarchy. Physical experts from four different Indian cities who worked in national laboratories and universities of both sexes participated in the study. Just 56 of the 490 scientists that were the subject of the study were female. The percentage breakdown of male scientists by title, including assistant, associate, and professor was 44.3 percent, 37.7 percent, and 18.0 percent respectively comprising the total distribution whereas females were largely congregated at lower level positions of assistant professor (60.7 percent) and were only 35.7 percent at associate professor level and as 3.6 percent at professor level positions (Kumar 2001). There is a clear clustering of women in the lower classes, states Kumar (2001).

Although there isn't any statistics on women professors across India in different engineering departments and institutes, several recent research might shed some light. Some important guidelines are suggested by data obtained from the Council of Indian Institutes of Technology (CIIT) website and presented as Faculty Strength Statistics. In 2019, IIT Kharagpur had only 93 female faculty members out of a total of 712 faculty members, IIT Madras had 67 out of 594, IIT Guwahati had 54 out of 412, IIT Roorkee had 64 out of 427, IIT Indore had 13 out of 129, IIT BHU Varanasi had 39 out of 288, and IIT Dhanbad had 23 out of 298.

Additionally, Pushkar (2015) performed a quick analysis of the data on faculty numbers among different IITs. His research was restricted to highlighting the proportion of men and women in three well-known engineering areas— electrical, mechanical, and computer science—at the assistant professorial level (ibid). According to the survey, only 34 of the 482 assistant professors in mechanical, computer science, and electrical engineering at the 16 IITs were female in 2014–15. In other words, women make up only around 7% of recent recruits (ibid). The faculty has a male to female ratio of 1:14. The lack of female assistant professors in any of these three areas distinguishes two of the older IITs, Kharagpur and Kanpur (ibid). Godbole et.al. (2015) also point out that proportion of women faculty in pure engineering departments of various institutes was nearly 5 percent in the year 2008. The inference that is drawn is that there are relatively few female faculty members in departments solely dedicated to engineering or in establishments with a specific mission of providing professional training. Nonetheless, the main reason the fractions are better in universities is due to the range of disciplines, which tends to enhance the gender balance.

Women in Leadership Roles

Women who excel in scientific and technology fields and hold prominent roles in research and administration make up a very small percentage of the workforce (INSA 2004, Godbole et al. 2015, SSESS NITI Aayog Report 2017). These reports claim that the situation becomes even more dire when one takes into account those in positions of leadership, such as directors, deans, or advisory board members of these institutes. According to Godbole et al. (2015), the four main government organisations that fund fundamental research in different fields such as the Department of Earth Sciences (DES), the Council for Scientific and Industrial Research (CSIR), the Department of Science and Technology (DST) and the Department of Bio Technology (DBT), have never had a female secretary. The Departments of Space and Atomic Energy (DOS and DAE) also make significant investments in basic as well as research with a mission focus. With one exception, none of the secretaries in these departments have been female thus far. There aren't many women on these departments' Programme Advisory Committees. Similarly, there aren't many female directors of significant scientific institutions.

Despite the fact that there are many women in medicine, the Indian Council for Medical Research (ICMR) and the All Indian Institute of Medical Sciences (AIIMS) have surprisingly only had one female director in their combined 60-year history. The esteemed Indian Statistical Institute,

established in 1931, has appointed its first female director. After the Indian Institute of Geomagnetism was established as an independent institute in 1971, the first female director was appointed in 2005. The National Institute of Immunology, the National Brain Research Centre, and the Institute of Advanced Study in Science and Technology are among other organisations that have had women leaders at various points in time (Godbole et al. 2015). Bal (2002) conducted a review of the annual reports of select science institutes and found that the percentage of women serving on advisory committees was under 15%. Bal (2002) reports that an esteemed biological scientific institute, with a female faculty comprising thirty percent, lacked a single female member on its advisory council. When the institution's repute rises, the figures are much lower.

Apart from very low representation in leadership positions in the field of science and technology, women scientists and engineers have to face various forms of organizational discrimination (Jaiswal 1993). Unequal treatment and subtle discrimination are noticed in the interpersonal relations against women scientists and engineers (Jaiswal 1993). A significant report titled "Science Career for Indian Women: An examination of Indian Women's Access to and Retention in Scientific Careers" was released in 2004 as a result of an earlier survey carried out by the Indian National Science Academy (INSA). This study was conducted in major R&D units and a few leading universities of the country to assess the real picture of Indian women practicing science. According to the document, the people with science degree are largely employed in teaching institutions and public or private R&D establishments (INSA 2004). The report emphasises that women who meet the qualifications in science either become faculty members or teachers at universities or other institutes that do research both with and without instruction. However, the report does not include data on the estimated number of women who choose to teach in undergraduate colleges or schools without research opportunities (INSA 2004).

Instead, it shows that, with the exception of the DBT and ICMR, where the percentage exceeds 25%, less than 15% of women are employed by top colleges and national laboratories (INSA 2004). The report also shows the comparison of these figures with that of figures of women studying at post-graduate level (42.5 %) and at doctorate level (37 %) to indicate the attrition from studying science to practicing science (INSA 2004). According to this report, compared to the physical sciences, biology has a far larger proportion of female students. Since DBT and ICMR are primarily involved in biological science research, the greater representation of women in both organisations is thus thought to be an indicator of this trend.

In another very recent and an extensive study sponsored by NITI Aayog under RSNA (Research Scheme of NITI Aayog Report 2017), the position of women in science in a few chosen institutions was evaluated and discussed. The goal of this study is to uncover the problems and obstacles that women in science confront when attempting to further their education or conduct research. The poll is based on an all-India survey of female scientists working in prestigious science institutes across six zones: North, North East, Central, West, South, and East. The study's 2017 report attempted to offer a thorough analysis of the dire circumstances surrounding women's entry into and retention in science, as well as some recommendations for potential government initiatives to improve the higher education sector's accommodation of female scientists. It offers a thorough understanding of the position of women in science today, as well as their history and the obstacles they have to overcome to pursue further education and research. The study presents an overview of the prevalence of career and job gaps and identifies the many reasons behind them based on a purposeful sample of 1,500 female scientists and female science students. The major findings suggest that quite a sizable number of sampled women science professionals (82 % of 991) had full time permanent jobs and 43.1 % of 991 respondents reported to have partially achieved their goals of career attainment (RSNA 2017). It's interesting to note that 72.4% of the tested women who worked in the scientific fields were members of professional groups, and 72.1% of them had won different professional honours. Only 35.4% of the respondents, nonetheless, were employed in academic administration. The statistics about women as science students reveal that a large percentage of respondents (92% of 518 sampled female students of science) had academics as their highest career pursuit. Of all the science majors, biology, health, and related sciences accounted for the majority with over one-third (36%) of the female students. The remaining three common disciplines are computer science and engineering (13%), physical sciences (14%), and chemistry and related sciences (15%). Though this study was conducted on a sampled data but brings out important pointers regarding current status of women in science professions. It highlights that regulations and the workplace are essential for the continued participation of women in science. As a result, general management and regulatory procedures assist students pursue higher education and professional continuity. On the basis of the findings, the report further suggests that the provision of non-academic infrastructure by institutions, namely concerning housing, transportation, family assistance, and health care-related services, is seen to facilitate the performance of dual roles by female scientists (RSNA 2017).

Dropout of women pursuing science studies and not continuing with science professions is the most alarming trend in the Indian scenario. The issue of how marriage and family responsibilities affect women's career advancement and career continuity in science in India starts at the higher education and research stages of the field. Gupta (2019) asserts that there are a numerous reasons about why women leave the STEM fields, some of which are well-known to the public and others of which are hidden yet nonetheless have a significant impact. Data show that many women discontinue their higher education and scientific research (Kurup 2016, Godbole et al. 2015, Kurup et al. 2010; SSESS NITI Aayog report 2017). Numerous studies on the issues surrounding the retention of skilled scientific women in India have been funded by the INSA, IAS, and NIAS. These research studies came to the conclusion that the variety of features among the many subgroups of women in science contributes to the difficulty of developing treatments to keep women in science as women in science are referred to as a heterogeneous category by Kurup (2010, 2016 and 2019). As a result, despite many similarities in the women's demographic profiles, there are variations on significant issues like childcare, job possibilities, and family duties, which indicates that the groups have different priorities.

The dropout rate of Indian women scientists was examined by Kurup et al. (2010) in a significant study titled "*Trained Scientific Women Power: How Much are We Losing and Why?"* India Academy of Science and National Institute of Advance Studies collaborated on the project. A survey comprising 226 men and 568 women scientists with Ph.D.s in science, engineering, or medicine was carried out throughout India. Among these women there were also women who were trained in science but were not employed currently (Kurup et.al. 2010). The study finds out that high percentage of women who have research degrees in science disciplines but are not working report to have received no support for childcare either from their parental family, marital family or professional help causing their dropout (ibid). Also, most of these women had their spouse working in the same field or organization, which is another contributing factor for their dropping out (ibid). Women who are unemployed also cite difficulty locating employment and educational opportunities in their communities as a major contributing cause to career pauses. According to the study, certain provisions regarding scheduling flexibility, transportation and lodging options, and childcare facilities at work may be crucial in keeping women in science across all survey categories, including women not working (WNW), women not in scientific research (WNR), and women in science research (WIR). It's interesting to note that a significant percentage

of men in the scientific research examined in the study indicated that awareness and sensitisation campaigns, fellowships, and refresher courses are necessary to keep women in science (Kurup et.al. 2010).

The study concludes that it is pertinent to take into consideration the perspectives of males scientists who are sensitive to gender, as well as gender-aware female scientists with a sophisticated grasp of the intricate workings of S&T organisations, to develop policies that would draw and keep a sizable proportion of women in science (ibid). The SSESS NITI Aayog study report (2017) also brings out several case studies of women scientists dropping out from their careers and highlights that the performance and accomplishment of women scientists in their careers are negatively impacted by domestic duties and family obligations. The report further reaffirms that lack of permanent job opportunities for even the highly qualified and experienced women scientists also prove to be detrimental to continue on short tenured temporary positions (ibid). The majority of the practices and policies that the research identifies as supporting working women scientists' career advancement and continuity are connected to management restructuring, policy frameworks, fellowship grants and recognition of valuable contribution in science by giving away the awards (ibid).

Representation of Women in Fellowship and Award Distribution

Fellowship and award distribution to women scientists have also been contentious in Indian scenario over the years thereby limiting participation of women and willingness to work. The report jointly brought out in 2016 by NASI (National Academy of Science, India), IAS (India Academy of Sciences), and INSA (Indian National Science Academy) titled “Women in Science and Technology: A Vision Document, reveals that in three major academies of science in India” namely, INSA, IAS, NASI, there are not adequate number of women fellows (Inter Academy Panel 2016). The percentage of women receiving fellowship for research in IASc is 9.83 percent, in INSA it is 7.85 percent and in NASI it is 8.19 percent in the year 2015 (ibid). Women fellows from all over the world in TWAS (The World Academy of Sciences) were only 10.28 percent in 2015 and the number of Indian women in TWAS receiving fellowship was limited to 15 as compared to 222 Indian men out of total 1138 fellows in the same academy (ibid). Here again, 07 out of 15 women were receiving fellowship for medical and health science research programmes, indicating the traditional subject choices of Indian women (ibid). Godbole et.al. (2015) scanned

the historical data and analysed that ironically, only once has a woman held the position of president of any of the academies; in 1934, there were two women among the Indian Academy of Sciences' Foundation Fellows in Bangalore. Women have been vice presidents and members of the academies, but both in absolute and relative terms, their numbers have been restricted. Previous information taken from the INSA report from 2004 indicates that, up until that point, no woman had been elected as an INSA fellow in the fields of engineering, technology, or plant sciences. During this time, the fields of biology, genetic engineering, and agriculture sciences each had one fellow who was a woman. According to the research, women in biological sciences are also underrepresented despite their relatively high presence.

As a result, Indian women are severely underrepresented in academic recognition and accolades at the highest levels. Seldom do women win prizes that are available to both sexes. For example, the CSIR established the Shanti Swaroop Bhatnagar Award for Young Scientists in 1958. It is one of the most distinguished honours granted to Indian scientists under the age of forty-five, for the excellent work done in the field of natural sciences. According to The Vision Document (Inter Academy Panel 2016), over the period of 56 years (1958 to 2014), 462 SSB (Shanti Swaroop Bhatnagar) awards have been given, out of which only 15 have gone to women scientists comprising only 3.38 percent fraction of the total. The field in which women received the greatest acclaim was medicine (four honours), followed by biology, chemistry, engineering, mathematics, earth sciences, and none at all in physics. Women continue to be underrepresented in another esteemed National Biosciences prize that the DBT established in 1999. Out of the 24 DBT National Biosciences awards that were presented between 1999 and 2003, just 2 awards (8 percent) went to women, according to an INSA study from 2004. Godbole et al. note in the AASSA India report (Godbol et.al. 2015) that of the roughly 40 Infosys prizes given out thus far, just one has gone to a woman in the natural sciences and six have gone to women overall. Additionally, the research shows that women have received about 7% of the INSA awards awarded.

Vineeta Bal (2004) conducted a significant study in which she attempted to evaluate the contributions made by Indian women biologists based on their publications in 38 high-impact journals (Impact factor 5 and above). Based on the restricted examination, 85.7 percent of the Indian articles had male corresponding/senior authors, whereas just 14.3 percent had female authors. This suggests that women are underrepresented in important academic endeavours. The Indian scenario on women's involvement in science and technology indicates that while women

appear to have no barriers to pursuing engineering projects and scientific research, there do appear to be some obstacles standing in the way of women scientists and engineers reaching professional excellence. It goes without saying that there have been exceptional female scientists and technologists who have advanced science and demonstrated that gender does not limit scientific endeavours.

REFRENCES

Bal V. (2002). Gendered Science: Women as Practitioners and as Targets of Research. *Economic and Political Weekly*. Vol. 37. No. 52 pp 5163-5167

Bal V. (2004). Women Scientists in India: Nowhere Near the Glass Ceiling. *Economic and Political Weekly.* Vol. 39, No. 32 pp 3647- 3653.

Chanana, K. (1988) (ed.) *Socialisation, Education and Women: Explorations in Gender Identity*. Orient Longman, New Delhi.

Godbole R., R. Ramaswami (2015). Women Scientists in India. In *Women in Science and Technology in Asia* The Association of Academies and Societies of Scientists in Asia. Republic of Korea.

Government of India (2015). All India Survey of Higher Education Report 2014-15. Ministry of Education.

Government of India (2019). All India Survey of Higher Education Report 2018-19. Ministry of Education.

Government of India (2020). Research and Development Statistics 2019-20. Ministry of Science and Technology.

Government of India (2021). All India Survey of Higher Education Report 2020-21. Ministry of Education.

Government of India (2023). Research and Development Statistics at a Glance 2022-23. Ministry of Science and Technology.

Gupta N. (2019). Intersectionality of Gender and Caste in Academic Performance, Quantitative Study of An Elite Indian Engineering Institute. *Gender, Technology and Development*, 23(2), pp 165–186. https://doi.org/10.1080/09718524.2019.1636568

Indian National Science Academy INSA (2004). Science Career for India Women, An Examination of Indian Women's Access to and Retention in Scientific Careers: A Report. New Delhi.

Inter Academy Panel IAS, NASI, INSA (2016). A Roadmap for Women in Science and Technology: A Vision Document.

Jaiswal R.P. (1993). Professional Status of Women: A Comparative Study of Women in Science and Technology. Rawat Publications. Jaipur.

Kumar, N. (2001). Gender and Stratification in Science: An Empirical Study in the Indian Setting. *Indian Journal of Gender Studies,* 8(1), pp 51-67. https://doi.org/10.1177/097152150100800103

Kurup A., Maithreyi, R., Kantharaju, B., & Godbole, R. (2010). Trained scientific women power, How much are we losing and Why? *IAS–NIAS Research Report*. http://eprints.nias.res.in/142/1/IAS-NIAS-Report.pdf.

Kurup, A, Leya Mathew, and Taniya Singh. (2017). Taking the next steps (Meeting report on NIAS' collaboration with women in STEM in India. *Current Science* 112(10): pp 1986-1987.

Kurup, A. (2015).Will Mentoring Bridge the Gender Gap In Indian Science? In *la Physique Au* Canada, 71(2).

Kurup, A. (2016), Impact of Science and Technology on Women, *Yojana*, Issue December, pp.68-71. http://yojana.gov.in/Recent_archive_English_2016.asp

Kurup, A. (2019). The Leaky Pipeline: a Social Scientist Perspective. *Spoorthi: Celebrating Indian Women in Science*. https://indiabioscience.org/women-in-science/spoorthi-celebrating-indian-womenin-science.

Parikh P.P. and S.P. Sukhatme (2004). Women Engineers in India. *Economic and Political Weekly*, Jan. 10-16, 2004, Vol. 39, No. 2, pp 193-201.

Perwez Vijayata. (2019). Neo- Liberalism, Higher Education and Gender: What has Changed, How and Why? In Mrinal Raste, Bhupal Bhattacharya and Sarmistha Bhattacharya (eds.) *Strategies and Dimensions for Women Empowerment*. Central West Publishing. Australia.

Pushkar (2015). Straight Talk: Why are there No Women at IITs. *Braingainmag.com.* 26-08-2015.

Rao, S.S. (2007). Neglected Terrain in the Quest for Equality: Women in Elite Engineering and Technology Institutions. In J. B. G. Tilak (ed.) *Women's education and Development*. Gyan Publishing House, New Delhi.

RSNA, Research Scheme of NITI Aayog (2017). Government of India.
Society for Socio-Economic Studies and Services (2017). Final Report Status of Women among Select Institutions in India: Policy Indicators. SSESS. Kolkata.