



PERSPECTIVE: DEI IN BIOTECHNOLOGY

The STEM Arena in India: A Story of Exclusion in Many Colors

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Abstract

In this perspective, we examine the impact of social exclusion on marginalized communities in India within STEM education and careers. The structures of social inequality are viewed principally along the axes of caste, gender, and their intersectionality. In India, although caste-based discrimination is illegal, and affirmative action by the state is constitutionally mandated, the caste system is kept alive by social practices in society and among the scientific community. Caste privilege often masquerades as “merit” and its impact is underplayed. Dalits (from the most oppressed classes), especially from a rural background, are the worst represented in STEM. While gender-based discrimination is a global problem, specific practices in hiring and career advancement in India aggravate this problem. Intersectionality problems remain largely unacknowledged in India. While policy initiatives do attempt affirmative action, they are rather weak. We advocate community awareness and education on these issues, both among the general public and within the STEM community in India.

Keywords: social exclusion; caste of merit; underrepresentation; apathy

Caste is a multi-layered tower with no staircase and no entrance. Everybody has to die in the storey they were born in.

—B.R. Ambedkar, in “Annihilation of Caste”¹

The year is 1995. The population in the village of Silukkapatti, in the Virudhunagar district in the southern state of Tamil Nadu, is almost entirely from the so-called Backward Classes, and more than half of them are Dalits/Scheduled Castes (SC). One of us (R.R.), a scientist employed in a government-funded research institute, participated in a “Meet the scientist” program with village children, organized by the Tamil Nadu Science Forum, a voluntary group popularizing science in rural areas. Among the children is a 12-year-old Kuruvamma, who eagerly serves as the guest’s guide-in-chief, showing him around. She is a Dalit, a child of unschooled agricultural laborers who work the fields for daily wages. She goes to school, studies in class 7, and is proud of it.

Like many other children in the village, Kuruvamma is closely acquainted with nature. She can reel off a variety of names of plants, trees, birds, insects, and more. She knows how things grow and how to nurture plants. She knows many medicinal plants, shows which leaves to pluck for which ailment. She knows how to extract molasses and make jaggery and can identify constellations in the night sky. The visitor tells the children that this is all new learning for him. They don’t quite believe him: after all, he is the scientist.

As he turns to leave, the visitor expresses his appreciation for Kuruvamma and her extensive knowledge. “Kuruvamma, you will make a great scientist some day!” he says.

All the children laugh, including Kuruvamma. “But sir, I only get 20 out of 100 in science!” she says.

Looking solely at the attributes, Kuruvamma has the makings of a scientist, with her unending curiosity and keen observations of the world around her. But what are the chances that she would enter the portals of one of India’s scientific laboratories? Miniscule, we would have said in 1995. Three decades on, our prediction for today’s Kuruvammas remains much the same.

This story serves as a moral tale for the central thesis of this article: that the Indian STEM arena is characterized by deeply entrenched forms of exclusion that operate along the axes of caste, gender, and their intersectionality. Discrimination, manifested in various forms, has an impact on access to science education, academic performance in science, entry into higher education in science and technology, career opportunities in STEM, and life in the scientific workplace.

What we present here is a perspective rather than the results of a sociological study. While we point to many competent studies on these topics, it is also a sad fact that there is no single authoritative reference, offering analysis rooted in data, which might have rendered this article superfluous.

We first briefly discuss the social milieu in which the Indian system of science education and the STEM professions operate. We discuss gender, showing how gender bias operates in the

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scientific workforce, the forms of gender imbalance that are specific to India, highlighting sexist and ageist hiring practices that exacerbate such imbalance. From there, we discuss the intersectionality of caste and gender. After such a depiction of entrenched inequality, we discuss policy directions, pointing to their weakness. In closing, we call for initiatives within the scientific community and among the general public on these issues.

The Caste Axis

The Indian caste and social class system

India boasts of incredible diversity of religion, class, caste, language, and so on. When combined, one finds more diversity in this one country than there is in the whole of the European Union. At its core, India's caste system is a system of social hierarchy.² This system has bestowed privileges on the upper castes while sanctioning oppression for those in lower rungs. Historically, it has meant a lifetime of social exclusion, marginalization, and violations of their human rights for Dalits, formerly called "untouchables."

An attempt was made to right the historical wrongs when the country gained independence from the British, with affirmative action gaining a prominent place in India's constitution. As a result, caste-based discrimination was effectively made illegal. Moreover, provisions were made for historically oppressed groups, in education and employment, a system known in common parlance as "reservations." The constitution describes these groups as SC or Dalits and Scheduled Tribes (ST).

Here we wish to also highlight that legality and social acceptability can reveal very different aspects of the same issue. While it is illegal to discriminate on the basis of caste, a 2021 survey by the Pew Research Center reported that the social lives of most Indians are conducted largely within their caste hierarchies.³ The caste system is institutionalized in modern India, and as such, its influence is insidious, almost invisible to the untrained eye.

Caste can be a sensitive topic to bring up among peers and family; not unlike race relations in the United States, in that people from different castes may work side by side without ever acknowledging caste, let alone discussing it. In part, this can be because caste privileges may be implicit for many. They may know of caste as a societal parameter, but not much else beyond that. Acknowledging caste privilege may be hard because it may be interpreted as being complicit in caste discrimination.⁴

Social status and educational performance

The education system in India is reflective of societal divisions, with Dalit/SC children at the bottom of the social pyramid. Recent analyses have highlighted the direct correlation between social status and student performance, among students from the same school environment; this difference was not a function of their family income, thus pointing to the potential role of noneconomic aspects of governmental stratification, including caste affiliation.⁵ This is in direct contrast to

the prevalent myth among the populace that students from these social classes are just not capable.

The performance separation established at during school education carries on to higher education levels. In esteemed higher education institutes such as the Indian Institutes of Technology (IIT) and the Indian Institutes of Management, admissions are based on competitive examinations as well as academic performance in high school. The passport to the high table in academia remains largely unattainable for the socioeconomically disadvantaged students. These "gatekeepers of merit" stand between Kuruvammas and the portals of scientific academia.⁶

Educational differences sustain inequalities

The National Policy on Education of independent India had lofty aims. Starting from the premise that "all areas of development are science and technology based and for that we need experts, middle-order workers and scientifically literate citizens," it aimed for the citizenry to "live effectively in the science/technology based society" (the 1968 Education Policy).⁷ The National Curriculum Framework, developed in 2005, stated that science education should enable the learner to "acquire the skills and understand the methods and processes that lead to generation and validation of scientific knowledge."⁸ It laid an emphasis on processes: experimentation, making observations, collection of data, classification, analysis, making hypotheses, drawing inferences, and arriving at conclusions for the objective truth. Sadly, the Indian science classroom has remained largely theory-centered, with verbal and quantitative explanations of natural phenomena dominating the discourse.⁹ This trend can be traced back to the Brahminical attitude toward intellectual knowledge, and its association of hands-on work with menial work by the lower castes.¹⁰

What this means is that when Kuruvamma enters the classroom, she realizes that the relationship she has with nature is irrelevant. Theoretical knowledge is most valued, with academic merit measured strictly by the ability to do well in written examinations.⁹ With no access to books at home, or to science museums or the internet, she is decidedly at a disadvantage.

Kuruvamma needs modern science as she needs to travel beyond experiential learning. When Kuruvamma cannot speak the language of quantification, entry into the world of science is denied to her. As in other forms, language is a powerful means of social exclusion, perpetuating inequity. Her example perfectly sums up the gap between the perceived goals of science education and what actually takes place in the classroom.¹¹

Indian universities support caste bias

We cannot, and do not shed cultural practices at the door when we enter the domain of science, science education or science learning.

—DL Medin & CD Lee, 2012¹²

In his 2022 book, *Caste Discrimination and Exclusion in Indian Universities: A Critical Reflection*, N. Sukumar illustrates how caste bias permeates Indian academia, transforming potentially progressive spaces into dystopian environments.¹³ Knowingly or not, caste privilege often hides behind the veil of “merit.”¹⁶ The issue with the discourse on meritocracy lies in its failure to acknowledge structural inequalities when assessing an individual’s worth, thereby favoring those with access to social capital. Consequently, students entering academic spaces through affirmative action legislation are stigmatized as nonmeritorious.

Caste discrimination manifests in various forms, from offensive jokes directed at Dalit students to instances where they are assigned menial tasks such as cleaning toilets. Sukumar aptly argues that understanding caste discrimination requires recognizing it as a spectrum of behaviors and attitudes toward individuals from lower castes. He contends that discrimination persists not merely due to individual actions but as a systemic feature embedded within the Indian education system.

While the number of students from marginalized or historically oppressed communities has increased over the years, these students continue to face institutional and structural discrimination upon entering higher education institutions.¹⁴ In severe cases, this discrimination has tragically led to suicides, with elite research centers alone recording 122 suicides over a 7-year period (2014–2021).¹⁵

Faculty positions across universities and research institutes in India are predominantly held by individuals from upper castes.¹⁶ Documentation of experiences of academics from lower castes in India has uncovered stark disparities depending on caste background.¹⁷ “Higher education has not eradicated caste but has instead made it increasingly challenging for those from lower castes, who often feel compelled to suppress their caste identity,” writes Dina Zoe Belluigi, lead author of a study that also reported that many upper caste academics, despite professing support for equity, still harbored casteist views and questioned whether colleagues from less privileged backgrounds had earned their positions on merit or through affirmative action.

Regarding grants and fellowships awarded by Indian funding agencies, while total numbers are readily available, data disaggregated by caste are rarely disclosed. When such information does emerge, it underscores the stark reality: for instance, between 2016 and 2020, 80% of recipients of the prestigious INSPIRE Faculty Fellowships were from privileged castes, with only 6% being Dalits and less than 1% from ST.¹⁶

Summary

In this section, we have argued that despite legislation against discrimination on the basis of caste, such discrimination flourishes in different forms. The theory-centric science classroom alienates the rural Dalit girl, negating her relationship to nature and excludes her from the language of quantification in science. Academic performance, closely linked to access to higher education in science and technology, is again linked to caste, providing another barrier. When these are overcome, caste

practices flourish in university education and workplaces, thus spanning a spectrum of discrimination in STEM.

The Gender Axis

Gender bias in academic spaces

The default perception of a scientist remains male for most Indians. A Google search for “Indian scientist” does not include a single woman in the top results (Table 1). Over the history of India’s major government funding agencies for basic research—Department of Biotechnology, Department of Earth Sciences, and Council for Scientific and Industrial Research—only two female secretaries have been appointed to lead the agency. The All India Institute of Medical Sciences and Indian Council for Medical Research have had only one woman director each, despite the large numbers of women in medicine. A “leaky pipeline” is a popular reason to explain this trend. But could additional factors be at play?

Although the overall numbers of women in higher education and in the scientific workforce have increased, there is a noticeable decline as we look further up the career progression ladder (AISHE, 2019–20).¹⁸

Strict hierarchical structures are pervasive in Indian institutions, serving as a patriarchal tool. Every research step, from accessing laboratory equipment to submitting publications to journals, requires a senior’s approval. Unfortunately, this authority is sometimes abused (see below). Power asymmetries in academia can be significant. Sabharwal et al. examined how social exclusion affects career opportunities at academic conferences for marginalized communities.¹⁹ Their analysis of administrative data revealed that access to conferences was disproportionately lower for women²⁰ and marginalized caste groups compared with their representation at the faculty level. As such, while policies exist that appear to guarantee fairness and representation—reservation policies and allocations for academic leave—these processes are themselves open to relational exclusion where the policies are implemented differently for different social groups.

In engineering fields, a notable exception is observed in computer science and engineering (CSE). According to the Ministry of Human Resource Development (MHRD, 2018), women constituted around 40% of enrollees in undergraduate CSE programs and 50% in master’s CSE programs at most Indian colleges between 2015 and 2018.²¹ Even here, an ethnographic study

Table 1. Top results for “Indian scientist” on Google search. Not a single woman scientist appears in the results

<i>Name</i>	<i>Gender</i>
C. V. Raman	Male
Vikram Sarabhai	Male
Meghnad Saha	Male
S. N. Bose	Male
Srinivasa Ramanujan	Male
A. P. J. Abdul Kalam	Male
Homi Bhabha	Male
J. C. Bose	Male
Har Gobind Khorana	Male

published in 2021 revealed that female participants from two IIT campuses—IIT Kanpur and IIT Madras—principally belonged to the economic middle class and social upper castes.²²

BiasWatchIndia, led by Shruti Muralidhar and Vaishnavi Ananthnarayanan, has undertaken commendable efforts to address gender-biased representation in Indian science, including at conferences. They surveyed 98 universities and institutes across the country, calculating the base rates of women faculty members across STEM disciplines. Their analysis showed a median base rate of 16.7% across all fields, with biology having the highest at 22.5% and engineering the lowest at 8.3% (Figures 1 and 2).²⁰

The issue is not solely about underrepresentation; it also involves women being inadequately mentored and recognized, often overlooked for awards and other career advancements. For instance, the prestigious Shanti Swarup Bhatnagar Award, instituted in 1958, has honored more than 500 male recipients but fewer than 20 female scientists.²³

Reasons for gender imbalance in the sciences

“Girls need to be protected”. One reason for low participation of women in science is the prevailing attitude toward girls being seen as needing protection. Parents often insist that their daughters attend universities closer to home. This inclination persists into their professional careers, restricting opportunities for fieldwork, which is crucial in many scientific disciplines.²⁴

Sexist and ageist hiring practices. During hiring, female scientists are often asked to justify how they will balance family and professional responsibilities, a question never posed to

their male counterparts. In many scientific institutions in the country, the upper age limit for consideration for a permanent position is 35. Consequently, any career break, regardless of reason, proves costly for women. A comparison of faculty job advertisements between India and the United States reveals age limit as a predominant exclusion criterion in India: if candidates do not meet the age requirements, hiring committees may not even review their CVs, regardless of their research area, societal value, or previous contributions to science. Furthermore, Indian academia suffers from “two body problem,” which makes it hard for scientists to secure a faculty position at an academic institution if their spouse already has a similar position there.²⁵

Aversion to discussing systemic challenges. There is a widespread indifference toward systemic challenges or a failure to acknowledge the difficulties faced by women scientists, sometimes leading to overt aversion. Interviews conducted by The Life of Science, a science media platform documenting stories of diversity in Indian science, have revealed instances where male scientists leave conference sessions, insultingly remarking to their female colleagues that “your session” is starting.

Summary

Gender discrimination operates in the STEM arena around the world. However, we have argued that the Indian S&T system absorbs these forms as well as adds its own specifics such as protective social attitudes, sexist and ageist hiring practices, and policies that work against the hiring of partners in the same institution. We refer the reader to the recent work of Jayaraj & Dogra for a deeper analysis of such experiences recorded by women scientists in India.²⁶

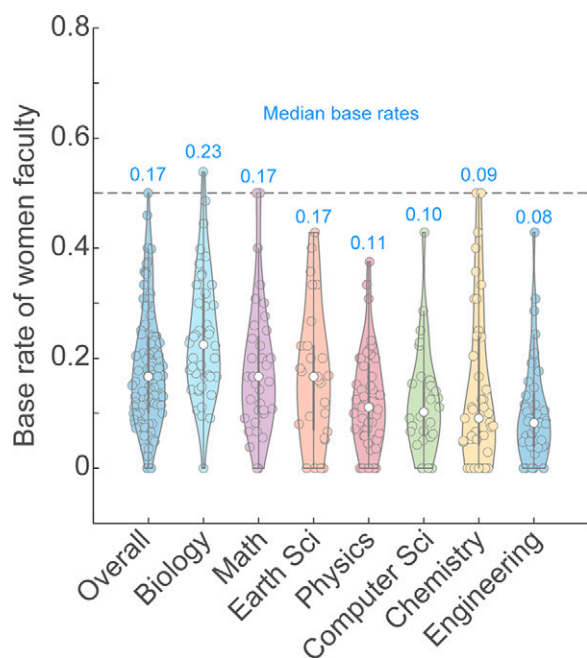


FIG. 1. Overall base rates of women faculty in Indian academia.²⁰

Intersectionality of Caste and Gender

In 2022, Kumar & Sahoo analyzed the dynamics of social inequalities within Indian STEM fields, using nationally representative data spanning a decade to demonstrate that girls and individuals from historically disadvantaged castes are significantly less likely to pursue studies in science.²⁷ Their intersectionality analysis showed that girls are 9% less likely than boys to choose science. SC and ST students are 4.4% and 6.6% less likely to opt for science. They confirmed additive disadvantages for female students from marginalized caste groups.

Consider the case of Deepa Mohanan, the sole Dalit PhD scholar in her cohort at the International and Inter University Centre for Nanoscience and Nanotechnology (IIUCNN) in Kottayam, Kerala, in South India.²⁸ She faced persistent discrimination under Professor Kalarikkal, then the Director of IIUCNN, enduring difficulties in receiving her stipend, access to equipment, laboratory facilities, and even a place to sit. Despite numerous complaints to the institute administration and law enforcement, her situation remained unchanged. Mohanan eventually initiated an indefinite hunger strike. After 11 days, Kalarikkal was dismissed from his position. In an impassioned open letter on Facebook, Mohanan declared: “I cannot move

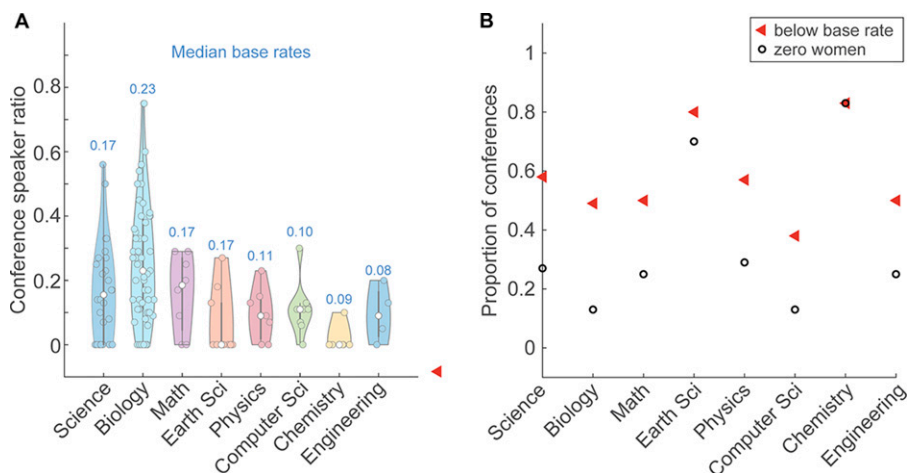


FIG. 2. Underrepresentation of women scientists in Indian STEM conferences.

(A) Proportion of female speakers organized by field, indicated along x-axis. Results are indicative of conferences held between August 2021 and March 2023. **(B)** Proportion of conferences that featured either no women speakers (circles) or the number was below base rate of women faculty in the respective fields, indicated by triangles. (See original analysis by Muralidhar and Ananthanarayanan.)²⁰

back from the protest without fighting for justice. I should fight for my people. I should win here for many who lost.” Indeed, Mohanan’s case does stand out. But for countless others, their struggles go unaddressed, even unreported.

The lack of systematic documentation on discrimination faced by Dalit/SC women in higher education hinders a comprehensive assessment. However, qualitative studies have highlighted concerns such as fear of bullying among these women and a limited awareness of government welfare initiatives.²⁹ Sexual harassment faced by Dalit girls also differs from that suffered by upper caste girls. When Dalit girls assert themselves and question the upper caste behavior, the consequence is caste- and gender-based verbal abuse, harassment, and violence. Public humiliation is often used as a tool by upper caste faculty against Dalit girls. They also face harassment at the hands of institute administrative staff.³⁰

Challenges for gender nonbinary persons

There have been no surveys to ascertain the numbers of LGBTQ+ scientists in India. Many prefer to hide their identities for fear of being ostracized. “Don’t ask, don’t tell” may have been outlawed in the United States, but continues to be the default way of life for the majority of LGBTQ+ people in India, especially in their professional lives. In the sciences, the 2020 report, “No space for some,” documents “the exclusionary nature and culture, the gendered and segregated infrastructure, the lack of affirmative action, and the epistemically violent curriculum” as the various mechanisms of exclusion of queer-trans individuals.³¹

Although India-specific reports are exceedingly rare, we found one that recorded instances of violence and bullying in schools in the southern state of Tamil Nadu (UNESCO 2019).³²

Most students bullied on account of their sex or gender do not report these incidents, and when they do, authorities often fail to take action, instead advising victims to ignore bullies or modify their behavior.

In higher education and professional academia, gender-queer scientists encounter numerous challenges, including marginalization, exclusion, and oppression based on their gender identities, significantly impacting their mental health. A recent commentary by Aghi et al. illustrates how basic needs such as using gender-appropriate facilities or accessing health care can become political statements for transgender scientists in India, where most academic institutions maintain gender-segregated restrooms and dormitories.³³

According to a survey-based questionnaire in 2021, members of the trans community perceive STEM fields as less accepting, with limited awareness among students and faculty about the prevalence and impact of queerphobia in India. Respondents also noted that the representation of queer-trans people in STEM curricula often pathologizes their identity, associating it with a disorder. Instructors frequently lack sensitivity to queer-trans issues.³⁴

Current legislative measures, such as the Transgender Persons (Protection of Rights) Act, 2019; the National Education Policy 2020; the Science, Technology and Innovation Policy (STIP) 2020 Draft; and the Comprehensive Accessibility Guidelines and Standards for Higher-Education Institutions and Universities 2022, primarily focus on inclusion without addressing the systemic changes needed to truly enable inclusion.

Summary

While there are signs of awareness of the intersectionality of caste, gender, and multiple sexual identities in Indian academia

and scientific workplaces, essential practices that impact hiring and career remain largely unaffected. Stories of systemic discrimination occasionally surface but require heroic suffering on the part of their tellers to make it to public discourse. Largely, the situation is one of silent suffering and fear of social stigma.

Policy Initiatives

Policy directions to promote equity

The National Education Policy 2020 advocates inclusion as a priority for the education system. But it contains many contradictions.³⁵ The policy talks of merging and closing existing schools considered “suboptimal,” increasing public–private partnerships, and training teachers in special education. Closing existing small schools could further marginalize children from the lower socioeconomic strata. There is also the risk of further disadvantaging children from marginalized groups by terming them “Socio-Economically Disadvantaged Groups,” and cordoning off disadvantaged geographical locations as Special Education Zones.³⁶

The policy promotes the study of indigenous “knowledge traditions.” However, these same knowledge traditions can potentially exacerbate trans-generational trauma resulting from caste, patriarchy, and colonial injustices. Indeed, deeply held adverse beliefs among teachers about learning and teaching in the context of caste and social hierarchies constitute a significant barrier to the participation of Dalits in school.³⁷ Failure to fully recognize the barriers marginalized children face to access meaningful school education, and to propose clear guidelines to tackle structural inequalities, makes it hard for us to be optimistic about the impact of this policy.

Promoting female representation in Indian science

Gender Advancement for Transforming Institutions (GATI) is an innovative pilot launched by India’s Department of Science and Technology. This initiative aims to analyze patterns and provide a comprehensive view of the environment for women across all career levels in their respective institutions. Currently being tested across select institutes, the program was created in recognition of the importance of advancing gender equity in STEM and is expected to be rolled out nationally in the near future. A report from IISER-Mohali, one of the institutes where GATI has been piloted, highlights several key observations: “Masculinity inherent in the culture and practice of science has been internalized by faculty and students, which plays out in subtle forms.” In addition, it notes the “ignorance of the privilege that men have due to the historical structures in the culture and practice of science.” Women are notably underrepresented at the decision-making levels, except in committees dealing with issues traditionally categorized as “women’s issues,” such as childcare and sexual harassment.³⁸

Another recent initiative, launched in February 2024, “Science for Women: A Technology and Innovation” (SWATI) is an online portal dedicated to all women scientists in the country. Spanning academia and industry, SWATI aims to facilitate long-term research on gender patterns and equality in STEM.

While these attempts may be a step in the right direction, it should be noted that the discourse on diversity and inclusion, in large part, remains limited to cisgender women.

Summary

While the Indian constitution pioneered affirmative action in the country and rendered it illegal to discriminate on the basis of caste, social discriminatory practices have remained immune to such legislation. We have pointed to state initiatives that seek to provide systemic support in the face of such discrimination, but they seem extremely weak when viewed against the scale of the problem. The question remains: what is to be done and by whom? We suggest below that systemic initiatives backed by extensive social engagement on inclusion are needed.

Our Advocacy

Until Dalits lay claim to power and Brahmins join hands against Brahminism to effect real transformation, caste will continue to matter.

— Suraj Yengde, in “Caste Matters”³⁹

Caste hierarchy is one of the oldest systems of social stratification. While discrimination may not always be overt, caste privilege can operate in subtle yet pervasive ways, often hidden from plain sight. Academia is no exception. Seeing how caste operates can be difficult, especially from the vantage point of privilege and power. However difficult, it needs to be acknowledged that ever since the practice of untouchability has been outlawed, the devil has just changed its shape. Discrimination against marginalized sections continues unabated, as we have highlighted in this article.

Yet, we believe there is hope. Steps can be taken, individually and collectively, to make academia a more equitable space. We suggest a few here:

Be an anti-caste ally

While affirmative action has increased opportunities for access to higher education and academia, access alone has not resulted in their equitable participation of marginalized communities. The greatest folly of our times is the notion of academic spaces as “casteless.” This means that the caste of academics is typically not considered a factor in their interactions, let alone in their positions and successes. However, this assumption results in the various dimensions of privilege and discrimination remaining largely unexamined. The belief in castelessness is often accompanied by a reluctance to address caste-related issues on university and research campuses.

Upper caste academicians need to educate themselves in the numerous ways in which caste (and its privileges) operates within academic settings, and actively speak out against both subtle and overt forms of discrimination faced by marginalized communities.

Education policies must account for intersectionality

We need more studies such as the Kumar & Sahoo 2023 report to better understand the ramifications of intersectionality of caste, class, gender, and sexual preference in the Indian context, in access to science education and equity in scientific career opportunities.²⁷

Foster dialogue among stakeholders

The Indian education system presents caste discrimination without acknowledging caste privilege, when they really are two sides of the same coin. A recent study highlighted a robust pedagogy aimed at addressing caste privilege.⁴ The authors argued that discussing caste remains challenging because mainstream discourse has historically misinformed rather than educate people on this issue. Their project design encouraged students to confront their own caste identities. An awareness of the lived reality of oppression and discrimination of the marginalized also has the added advantage of being attentive to one's own patronizing ways, a common trap for otherwise well-meaning individuals from upper castes.

Similar discussion fora could be built for discussing various manifestations of privilege, from the perspective of gender, sexual orientation, and so on.

For a public understanding of science

We propose a public dialogue concerning the essence of science. A pressing priority is the conduct of national surveys to gauge public comprehension and attitudes toward science and scientists. This encompasses not only the application of science and technology to tackle contemporary challenges such as new pathogens and climate change, but also ethnographic investigations into research institutions and universities.

It is crucial to openly address discrimination within scientific establishments, inviting public inquiry into issues of caste, gender, and other forms of discrimination. These discussions are pivotal in shaping the conduct of scientific research and education in our nation, sparking fresh debates among the populace regarding the fundamental nature of science.⁴⁰

Conclusion

We have attempted to present a view of deeply entrenched inequality in the Indian STEM arena, principally along the axes of caste, gender, and their intersectionality. Discrimination along these axes is prevalent in access to science education, academic performance, and career opportunities in science, and even when all these barriers are overcome, they continue on to the workplace, in laboratories, in career advancement, and leadership.

The Indian state does acknowledge caste discrimination and has legislated affirmative action in state education and employment, but the dual nature of acknowledging discrimination while being silent on caste privilege contributes to insidious forms of discrimination. Governmental policy initiatives come across as being very weak in the scale of inequality being discussed. We advocate a strong initiative within the scientific community as well as among the general public to acknowledge the pervasiveness of forms of discrimination as well as

forms of privilege in the Indian STEM arena. Higher education institutions in science and technology in India bear a social responsibility to discuss the social milieu and makeup of Indian science as well.

In a country riven by caste, class, and religion, science education holds out hope for nation building, for developing critical thinking in citizens. Whether or not students pursue careers in science, it is important that their interest in science is nurtured, if for no other reason than to encourage them to use scientific information for individual and collective decision-making. It is also a modern imperative: with one-fifth of the global population being Indian, the major global challenges of the 21st century will need to be addressed by India through science and technology. This cannot happen without inclusion gaining centrality in the STEM agenda in India.

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Authors' Contributions

Both authors contributed equally to the article: conceptualization, writing, and editing; and have approved the submitted version.

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