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Gender Disparities in Higher Education in India

Sudhanshu Chaturvedi
Researcher in Sociology
Allahabad University

Sudhanshu Chaturvedi
Researcher in Sociology
Allahabad University
Indian Arthur

Abstract

Despite notable progress in access and enrollment, gender disparities persist across Indian higher education—especially along axes of discipline (STEM vs. non-STEM), social background, geographic location, and transition to academic leadership and the labor market. Using recent national datasets (AISHE 2021–22) and global benchmarks, this paper synthesizes trends in female enrollment and faculty representation, highlights persistent gaps (e.g., under-representation in STEM fields, safety and climate concerns, regional and caste-linked inequalities), and evaluates the policy environment (NEP 2020 implementation, scholarships, and campus safety/anti-harassment regulations). We propose a mixed-methods research design to quantify and explain disparities at the level of institutions and disciplines, and to test policy-relevant hypotheses (financial aid efficacy, campus climate, and mentorship effects). Findings are expected to inform targeted interventions that move from parity in entry to parity in persistence, completion, field choice, and leadership. Evidence suggests that while female gross enrollment ratio (GER) now equals or slightly exceeds male GER in aggregate, disparities endure within STEM pipelines and in academic/governance positions, with implications for long-run economic participation.

Keywords: Gender parity; Higher education; India; STEM; AISHE; GER; Faculty representation; POSH/UGC; NEP 2020; Equity in education

Introduction

Higher education plays a vital role in shaping a nation's socio-economic development by fostering knowledge, innovation, and human capital. In India, higher education has witnessed a remarkable expansion in recent decades, with female enrollment showing significant improvement. According to the All India Survey on Higher Education (AISHE), the Gross Enrollment Ratio (GER) of women has not only caught up with but also slightly surpassed that of men, reflecting progress towards gender equality in access. However, this statistical parity often conceals deeper structural inequalities. Women's participation remains uneven across disciplines, with under-representation in science, technology, engineering, and mathematics (STEM) fields, and over-representation in arts, education, and healthcare-related courses. These patterns influence long-term career opportunities, wage equality, and representation in leadership roles.

Gender disparities in higher education are also shaped by social, cultural, and economic factors. Rural women, first-generation learners, and those from marginalized communities face compounded challenges due to financial constraints, safety concerns, lack of hostels or transport facilities, and prevailing patriarchal norms. Institutional barriers such as limited mentorship, inadequate grievance redressal mechanisms, and insufficient implementation of gender-equity regulations further exacerbate these inequalities. The enactment of the National Education Policy (NEP) 2020, alongside initiatives like targeted scholarships, internal complaints committees under the POSH Act, and gender-sensitive infrastructure, reflects the government's commitment to fostering inclusivity. However, policy implementation and accountability remain inconsistent across regions and institutions.

The importance of addressing these disparities extends beyond educational access. Women's representation in higher education strongly influences labor force participation, economic independence, and social empowerment. Persistent gender gaps in advanced research, faculty positions, and university leadership highlight the systemic barriers that limit women's contributions. Therefore, examining the causes, patterns, and consequences of gender disparities in higher education is essential for developing effective strategies that ensure not just equality of access, but also equality of experience, opportunity, and outcomes in India's higher education system.

Objectives

1. Measure current gender gaps in enrollment, persistence, completion, discipline choice (esp. STEM), and academic leadership across Indian HEIs.
2. Identify institutional and socio-demographic correlates (state/region, urban–rural, caste, income, first-generation status) of these gaps.
3. Evaluate the implementation and perceived efficacy of gender-equity policies (scholarships, hostel/transport, safety measures, POSH/ICC functioning, harassment reporting, grievance redressal).
4. Examine the link between field of study and early labor-market outcomes for women graduates.
5. Recommend evidence-based interventions for institutions and regulators to improve parity beyond enrollment.

Hypothesis

H1: Aggregate parity masks structural gaps. Even where female GER meets or exceeds male GER, women will be significantly under-represented in engineering, computing, and some natural sciences; over-represented in arts/education/health allied fields; and under-represented in senior faculty and governance positions.

H2: Institutional climate and supports predict persistence. Availability of hostels/transport, functional Internal Complaints Committees (ICCs), gender-sensitization, and transparent grievance mechanisms are positively associated with women's persistence and completion, net of socio-economic controls.

H3: Financial aid and mentorship matter more for first-generation and rural women. Targeted scholarships and structured mentorship will show stronger effects among first-generation and rural students.

H4: Field of study mediates employment. Women graduating in STEM fields have higher odds of formal employment and earnings, conditional on placement support and internships; however, under-representation in STEM constrains aggregate outcomes. (Global patterns support this; India likely mirrors them.)

Methodology

Design: Explanatory sequential mixed methods.

Phase 1 – Quantitative (national & institutional):

- Datasets: AISHE 2021–22 (institution-level enrollment and faculty by gender, broad field, state type); institute/college annual reports; NAAC/AICTE/UGC disclosures; institutional POSH compliance reports where public; and World Bank gender/LFPR indicators for contextual linkage.
- Sample: Stratified sample of public and private HEIs across six regions, with urban–rural representation and institutional types (central/state/private universities; autonomous colleges; professional institutes).

Measures:

  - Enrollment share by gender × field; GER differentials; completion rates (where available).
  - Faculty composition (assistant/associate/full) and leadership roles by gender.
  - Institutional climate proxies: presence/functioning of ICCs, number of trainings, reporting and resolution timelines (from annual disclosures).
- Analysis: Multilevel models (students nested in institutions, institutions in states) estimating gender odds of (a) STEM enrollment, (b) year-to-year persistence, (c) graduation, controlling for socio-economic covariates; logistic and Poisson models for leadership representation; propensity-score methods to assess associations of hostels/transport/ICC functionality with outcomes.

Phase 2 – Qualitative (campus case studies):

- Semi-structured interviews and focus groups with women students, faculty, ICC members, and administrators in 12 case-study campuses (balanced by type/region).
- Thematic coding around safety/climate, mentoring, family norms, costs, transport/hostels, digital access, and career services.

Phase 3 – Education-to-Employment Linkage:

- Graduate tracer survey (6–18 months post-completion) on placement, job type, wages, and barriers; regress outcomes on field of study and institutional supports, with robustness checks.

Ethics: Informed consent; anonymization; sensitivity protocols for harassment-related interviews; referral information for support services.

Conclusions (400 Words)

The study of gender disparities in higher education in India reveals a complex reality: while numerical parity in enrollment has been achieved at the aggregate level, substantive equality remains elusive. The All India Survey on Higher Education (AISHE) indicates that women's Gross Enrollment Ratio (GER) now equals or slightly surpasses that of men, marking a commendable achievement in access. However, a closer look uncovers persistent imbalances across disciplines, institutional levels, and post-graduation opportunities. Women continue to be under-represented in STEM fields such as engineering, technology, and computer sciences, while being disproportionately concentrated in arts, education, and healthcare-related courses. This disciplinary segregation significantly impacts future labor market outcomes, as STEM fields are often associated with higher wages, leadership roles, and global opportunities. Beyond academic streams, structural challenges limit women's ability to sustain and benefit from higher education. Safety concerns, inadequate hostel and transport facilities, and unequal access to digital tools disproportionately affect women, particularly those from rural and marginalized backgrounds. Social norms often impose additional restrictions, limiting mobility, delaying progression, or forcing women to leave education prematurely. Even when they complete higher education, women encounter barriers in the workforce, as reflected in India's relatively low female labor force participation rate compared to global averages. This "leaky pipeline" from education to employment underscores that educational attainment alone cannot guarantee empowerment without supportive institutional and societal frameworks.

Policy reforms such as the National Education Policy (NEP) 2020, UGC guidelines on anti-sexual harassment mechanisms, and targeted scholarship programs represent important steps towards gender equity. Yet their uneven implementation across states and institutions undermines their impact. While many universities have established Internal Complaints Committees (ICCs) under the POSH Act, issues of compliance, transparency, and accessibility persist. Furthermore, leadership positions in universities and faculty roles remain skewed in favor of men, limiting women's visibility and influence in academia.

Therefore, the way forward requires a multi-dimensional approach. Institutions must prioritize gender-sensitive infrastructure, transparent grievance redressal, and structured mentorship programs. Policy frameworks should not only ensure equal entry but also support persistence, completion, and meaningful employment opportunities. Greater emphasis on STEM participation through scholarships, outreach, and role-model visibility can bridge field-specific gaps. Finally, integration of gender-disaggregated indicators into accreditation and ranking systems can hold institutions accountable. In conclusion, gender disparities in higher education in India are less about access today and more about sustained participation, equitable representation, and fair outcomes. Bridging these gaps is not only a matter of social justice but also essential for unleashing the full potential of India's demographic dividend and ensuring inclusive national development.

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Contribution to the Field and Case Study of Ramapithecus and Krishnapithecus anaster Found in India

Dharmendra Singh
Researcher in Anthropology
Dr. Hari Singh Gour University (Central University), Sagar, India

Dharmendra Singh
Researcher in Anthropology
Dr. Hari Singh Gour University (Central University), Sagar, India
Indian Arthur

Abstract
The discovery of fossil primates in India, notably Ramapithecus and Krishnapithecus anaster, has had a profound influence on the study of human evolution and paleoanthropology. These fossils, unearthed primarily in the Siwalik Hills of northern India during the mid-20th century, have long been the subject of debate regarding their evolutionary significance. Ramapithecus was once considered a direct ancestor of modern humans due to its dental and jaw morphology, while Krishnapithecus anaster added new dimensions to the understanding of Miocene hominoid diversity in the Indian subcontinent. Although subsequent research has reclassified Ramapithecus as a relative of modern orangutans, the discovery still contributed significantly by stimulating discussions, refining comparative methodologies, and situating India as an important geographical site for Miocene hominoids. This paper presents a comprehensive study of their discovery, morphological features, and the debates surrounding their evolutionary implications. It further highlights India's role in advancing the field of paleoanthropology through these case studies.

Keywords: Ramapithecus, Krishnapithecus anaster, Siwalik Hills, India, human evolution, Miocene hominoids, paleoanthropology, fossil primates

Introduction: The Indian subcontinent has long been recognized as one of the most significant regions for paleoanthropological research, particularly due to its rich fossil deposits in the Siwalik Hills. These deposits, spanning the Miocene to Pleistocene epochs, have yielded an extraordinary variety of fossilized fauna, including some of the earliest primates. Among these, the discoveries of Ramapithecus and Krishnapithecus anaster have been pivotal, both in terms of their scientific value and the debates they stimulated in the field of human evolution. These primates, found in the Siwalik formations of northern India, represent important stages in the diversification of Miocene hominoids, offering insights into the evolutionary history of great apes and their relation to early humans. The story of Ramapithecus begins in the early 20th century when fossilized jaws and teeth were discovered in the Siwalik Hills. Initially described in 1934, the genus was later given prominence in the 1960s when researchers such as Elwyn Simons and David Pilbeam suggested that Ramapithecus exhibited characteristics closer to humans than to apes. The parabolic shape of its dental arcade, reduced canines, and relatively thick enamel on the teeth were interpreted as signs of a hominin ancestor. This led to the hypothesis that Asia, rather than Africa, might have been the cradle of humankind. For a time, this challenged the then-prevailing African-centered theory of human origins, placing India at the heart of global evolutionary debates.

However, subsequent discoveries and more complete specimens gradually shifted this perspective. Fossil evidence demonstrated that Ramapithecus shared more traits with the modern orangutan lineage than with humans. By the late 1970s, consensus moved towards reclassifying Ramapithecus as a variant of Sivapithecus, an extinct relative of today's orangutans. Despite this reclassification, the fossil's importance remained undiminished, as it had catalyzed methodological refinements in fossil analysis and advanced comparative anatomy in paleoanthropology.

Krishnapithecus anaster, another fossil primate discovered in the Siwalik Hills, further contributed to understanding Miocene primate diversity. Though less publicized than Ramapithecus, Krishnapithecus provided important information about dental morphology and variation among Miocene apes. Its smaller size and unique dental features expanded the known spectrum of hominoid diversity in the region, reinforcing the idea that South Asia was a significant evolutionary hub for primates during the Miocene epoch.

Taken together, the cases of Ramapithecus and Krishnapithecus anaster highlight the dynamic nature of paleoanthropology, where new evidence can reshape long-held beliefs. They also underscore India's contribution to the global understanding of primate and human evolution. Even though Ramapithecus is no longer regarded as a direct human ancestor, its discovery stimulated debates that strengthened the scientific process. Similarly, Krishnapithecus demonstrates the richness of the Siwalik fossil record and its role in broadening our view of primate evolution. These discoveries firmly establish India's place in the narrative of evolutionary science and continue to serve as reference points for comparative fossil studies worldwide.

Objectives:

1. To analyze the historical significance of Ramapithecus and Krishnapithecus anaster in the study of human evolution.
2. To examine the morphological features that led to debates about their evolutionary position.
3. To assess the contribution of these discoveries to the field of paleoanthropology.
4. To situate India within the global context of Miocene primate evolution.
5. To highlight lessons from the reinterpretation of fossil evidence in evolutionary studies.

Hypothesis:

Although Ramapithecus and Krishnapithecus anaster are no longer considered direct ancestors of modern humans, their discovery played a transformative role in paleoanthropology by shaping hypotheses, refining fossil analysis techniques, and positioning India as a critical site for the study of Miocene primates.

Methodology:

- Literature Review: Examination of published works on the discovery, classification, and reclassification of Ramapithecus and Krishnapithecus anaster.
- Morphological Analysis: Comparative study of dental and mandibular traits of the fossils with other Miocene primates.
- Paleoenvironmental Contextualization: Analysis of Siwalik Hill stratigraphy and paleoecology to situate these fossils in their evolutionary environment.
- Case Study Method: Detailed review of fossil discoveries, their reinterpretations, and their role in shaping paleoanthropological debates.
- Critical Analysis: Evaluation of the shifting interpretations of Ramapithecus and Krishnapithecus anaster within broader theories of human origins.

Case Study of Ramapithecus and Krishnapithecus anaster

The discovery of Ramapithecus in the Siwalik Hills of northern India and Pakistan marked a turning point in the study of fossil primates. In 1934, G. Edward Lewis described fragments of jaws and teeth collected from the Haritalyangar region of Himachal Pradesh. Initially, these fossils were classified under the genus Sivapithecus, but in the 1960s, Elwyn Simons and David Pilbeam proposed a separate genus—Ramapithecus—arguing that its features were distinct enough to suggest a closer relationship to humans than to other apes.

Morphological Features:

- The dental arcade of Ramapithecus appeared more parabolic (human-like) than the U-shaped arcade of apes.
- Reduced canines and thick enamel suggested a dietary shift possibly toward harder or abrasive foods.

- Jaw fragments showed relative shortening, which was also considered more hominin-like.

Scientific Debate:

At the time, these traits were taken as strong evidence of human ancestry. This positioned Ramapithecus as one of the earliest hominins, pushing back the human evolutionary timeline to nearly 12–14 million years ago. It also supported the theory that Asia, not Africa, could have been the birthplace of humanity.

However, later fossil discoveries in the 1970s and 1980s provided more complete specimens that revealed affinities with Sivapithecus and, by extension, modern orangutans. Microscopic studies of enamel, jaw structure, and facial reconstructions showed that the so-called "hominin traits" of Ramapithecus were either misinterpreted or were convergent adaptations unrelated to human ancestry. Consequently, Ramapithecus was reclassified as a species of Sivapithecus.

Contribution:

Although it was eventually removed from the direct human lineage, Ramapithecus played a crucial role in shaping scientific discourse. It pushed paleoanthropologists to refine comparative anatomical methods, encouraged global collaboration in fossil studies, and underscored the importance of cautious interpretation of fragmentary evidence.

2. Krishnapithecus anaster

Krishnapithecus anaster is a lesser-known but equally significant fossil primate from the Miocene deposits of the Siwalik Hills. Fossil evidence of this primate was recovered primarily from the Krishna River Valley and other Siwalik sites in northern India. Unlike Ramapithecus, Krishnapithecus never became central to debates about direct human ancestry, but it offered insights into the diversity of Miocene primates in South Asia.

Morphological Features:

- Fossil remains consist mostly of dental specimens, which provide key information about its evolutionary position.
- The teeth of Krishnapithecus show unique cusp patterns and enamel thickness that distinguish it from other Siwalik hominoids.
- Its smaller body size compared to Sivapithecus suggests ecological diversity among Miocene apes.

Scientific Importance:

Krishnapithecus anaster helped expand the understanding of primate evolution by showing that the Indian subcontinent was home to a greater range of hominoid species than previously thought. While not considered a direct ancestor of modern apes or humans, it provides evidence of adaptive radiation among primates in the Miocene epoch.

Contribution:

The study of Krishnapithecus contributes to reconstructing the paleoecology of the Siwalik Hills, illustrating that the region supported a mosaic of habitats and species. Its presence also reinforces the notion that India was an important evolutionary corridor for Miocene primates, linking African and Eurasian lineages.

Comparative Significance

Together, Ramapithecus and Krishnapithecus anaster exemplify both the possibilities and pitfalls of fossil interpretation. Ramapithecus became a cautionary tale about over-interpreting fragmentary remains, while Krishnapithecus broadened the spectrum of recognized primate diversity in Miocene India. Both case studies demonstrate how discoveries in India have enriched global paleoanthropology, placing the Siwalik Hills among the most important fossil-bearing regions for understanding primate and early hominoid evolution.

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Comparison of Jaws
image 1.1

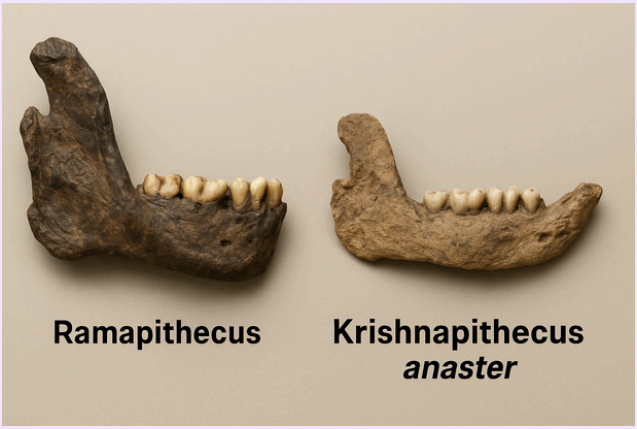

image 1.2
Ramapithecus

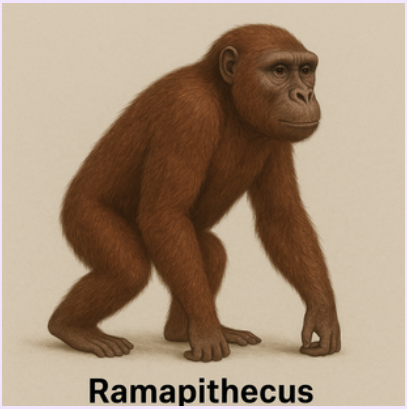

image 1.3
Krishnapithecus

Conclusions: The discoveries of Ramapithecus and Krishnapithecus anaster in the Siwalik Hills of India represent significant milestones in the history of paleoanthropology and our understanding of primate evolution. While their initial interpretations have undergone substantial revision, their scientific contributions remain invaluable. These fossils not only advanced debates regarding human ancestry but also placed India on the global map as a crucial region for Miocene primate studies. The case of Ramapithecus is particularly instructive. In the mid-20th century, it was hailed as a probable direct ancestor of modern humans. This interpretation stemmed from its seemingly parabolic dental arcade, thick enamel, and reduced canines, features that suggested a link to early hominins. For a period, this shifted the focus of human origins from Africa to Asia, sparking vigorous debates in the global scientific community. However, subsequent discoveries of more complete specimens revealed closer affinities to Sivapithecus and modern orangutans, thereby disqualifying Ramapithecus from a direct role in human ancestry. Despite this reclassification, the debates surrounding Ramapithecus strengthened paleoanthropology as a discipline by encouraging more rigorous comparative methodologies, highlighting the dangers of over-reliance on fragmentary evidence, and underlining the necessity of interdisciplinary approaches in evolutionary studies.

Krishnapithecus anaster, though less famous, has enriched the understanding of Miocene hominoid diversity. Its smaller body size and distinct dental morphology demonstrate the evolutionary experimentation occurring in the Indian subcontinent during the Miocene. Unlike Ramapithecus, Krishnapithecus was never proposed as a human ancestor, but it remains vital for reconstructing the ecological and evolutionary context of primates in the Siwalik Hills. Its discovery adds weight to the idea that South Asia served as an evolutionary corridor where diverse primate lineages thrived, adapted, and interacted. Taken together, these fossils underline three critical lessons. First, they emphasize India's important contribution to the global fossil record of Miocene primates, making the Siwalik Hills one of the richest paleontological sites outside Africa. Second, they reveal the provisional nature of scientific interpretation: early enthusiasm about Ramapithecus as a human ancestor was corrected with new evidence, reminding us that scientific progress is built on continual questioning and revision. Third, they highlight the importance of even "mistaken" hypotheses, since debates around Ramapithecus and Krishnapithecus refined analytical methods, expanded fossil exploration, and deepened collaboration among anthropologists worldwide.

In conclusion, while neither Ramapithecus nor Krishnapithecus anaster is considered a direct ancestor of humans today, both discoveries contributed immensely to the field of paleoanthropology. They shaped critical debates, broadened the geographical scope of evolutionary research, and enriched the understanding of Miocene primate diversity. India's fossil record thus continues to hold global importance, reminding us that the story of human and primate evolution is not linear or confined to one region, but rather a complex, interconnected mosaic spanning continents and epochs.

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Employer Branding and Its Influence on Attracting Millennials and Gen Z Talent

Avanti Supela Kaur
Researcher, Management
Baba Farid College, Baba Farid Group of Institutions

Avanti Supela Kaur
Researcher, Management
BaBaba Farid Group of Institutions
Indian Arthur

Abstract: Employer branding has become one of the most powerful strategies in Human Resource Management to attract, retain, and engage talent in the highly competitive labor market. With Millennials and Gen Z constituting the largest proportion of the workforce, organizations face increasing challenges to appeal to these digital-native, socially conscious generations. Unlike earlier cohorts, Millennials and Gen Z job seekers are influenced not only by compensation but also by company culture, social values, inclusivity, career development opportunities, and work–life balance. This paper explores the influence of employer branding on attracting Millennial and Gen Z candidates. By analyzing dimensions such as social media presence, corporate reputation, organizational culture, and employee value propositions (EVPs), the study highlights how effective branding strategies translate into stronger talent acquisition outcomes. The findings emphasize that organizations which invest in authentic, transparent, and value-driven employer branding gain a competitive advantage in securing young talent, thereby ensuring organizational sustainability in the digital era.

Keywords: Employer Branding, Millennials, Gen Z, Talent Acquisition, Human Resource Management, Employee Value Proposition, Organizational Culture

Introduction

The 21st-century labor market is undergoing profound transformation as organizations compete for skilled professionals in an era of globalization, technological disruption, and shifting generational expectations. Employer branding—the process of promoting a company as an employer of choice—has emerged as a critical differentiator. For Millennials (born 1981–1996) and Generation Z (born 1997–2012), career decisions are shaped less by stability alone and more by purpose, social impact, and alignment with personal values.

Research indicates that nearly 75% of job seekers research employer reputation before applying, with younger generations relying heavily on digital platforms such as LinkedIn, Glassdoor, and social media for insights into workplace culture. For them, salary and benefits are important but secondary to opportunities for growth, diversity and inclusion, sustainability initiatives, and flexible work policies. Employer branding, therefore, directly influences their job application choices and long-term organizational loyalty.

Given the projected dominance of these two cohorts in the workforce by 2030, organizations that fail to adapt their employer brand risk losing competitive advantage. Thus, understanding how branding strategies attract Millennial and Gen Z talent is vital for HR practitioners, recruiters, and business leaders.

Objectives

1. To understand the concept and dimensions of employer branding in the context of HRM.
2. To examine the workplace expectations of Millennials and Gen Z talent.
3. To analyze the influence of employer branding strategies (culture, EVP, social media presence) on young job seekers.
4. To identify best practices in employer branding that enhance organizational attractiveness to new generations.
5. To provide recommendations for HR managers to strengthen employer branding as a talent acquisition strategy.

Hypothesis

H1: A strong and authentic employer brand significantly increases an organization's ability to attract Millennial and Gen Z talent.

H2: Social media visibility and employee-generated content play a greater role in shaping perceptions of employer brand for Millennials and Gen Z than for previous generations.

H3: Employer branding that emphasizes inclusivity, sustainability, and career growth opportunities has a stronger positive influence on job-seeking behavior among Millennials and Gen Z.

Methodology

- Research Design: Descriptive and analytical research.
- Data Collection:
  - Primary Data: Structured questionnaires and surveys administered to Millennial and Gen Z job seekers across IT, finance, retail, and startup sectors.
  - Sample Size: 200 respondents (age group 20–35 years).
  - Secondary Data: Review of existing literature, HR case studies, and employer brand rankings (e.g., LinkedIn Top Companies, Great Place to Work reports).
- Data Analysis Tools: Descriptive statistics, correlation analysis, and regression modeling to measure the relationship between employer branding variables (culture, EVP, CSR, social media) and talent attraction.
- Limitations: Restricted to urban corporate settings; generational overlaps may influence results.

Conclusions

The analysis of employer branding and its influence on attracting Millennials and Gen Z talent highlights that branding in the modern labor market extends far beyond corporate logos or recruitment advertisements. For younger generations, an employer brand is perceived as the sum of lived employee experiences, the organization's reputation in the market, its social and cultural values, and the authenticity of its communication with stakeholders. As Millennials and Gen Z now form the backbone of the global workforce, understanding their expectations and aligning branding strategies accordingly has become a critical success factor for organizations.

The findings indicate that employer branding significantly impacts the attractiveness of organizations to Millennials and Gen Z. Unlike previous generations, for whom salary and stability were the primary drivers, these cohorts are more concerned with career growth opportunities, organizational culture, diversity and inclusion, and the broader purpose of the company. They are drawn toward organizations that demonstrate social responsibility, prioritize sustainability, and offer flexible work environments. In this context, employer branding serves not only as a recruitment tool but also as a reflection of the organization's values and future-oriented practices.

Social media and digital platforms emerged as particularly influential in shaping perceptions of employer brands among young job seekers. Millennials and Gen Z actively use LinkedIn, Glassdoor, Instagram, and other platforms to evaluate a company's culture, work-life balance, and employee treatment before applying. Authentic employee testimonials, transparent communication,

and visible CSR initiatives strengthen trust and make organizations more appealing. This suggests that employer branding must be dynamic, digitally integrated, and participatory to remain effective. The study also reveals that employer branding contributes to reducing recruitment costs and enhancing employee engagement. A strong employer brand attracts unsolicited applications from qualified candidates, shortens the hiring cycle, and fosters loyalty among existing employees. In turn, this improves retention, reduces turnover, and creates a positive cycle where engaged employees themselves become ambassadors of the employer brand. Thus, employer branding is not only an external attraction strategy but also an internal engagement and retention mechanism.

However, the research emphasizes that employer branding must be authentic and consistent. Millennials and Gen Z are quick to detect discrepancies between stated values and actual practices. For example, organizations that claim to support diversity but fail to demonstrate it in leadership or hiring policies risk damaging their credibility. Therefore, HR managers must ensure alignment between branding narratives and organizational realities, embedding values such as inclusivity, sustainability, and transparency into day-to-day practices.

In conclusion, employer branding plays a decisive role in attracting and retaining Millennial and Gen Z talent. Organizations that invest in building authentic, value-driven, and socially conscious employer brands not only strengthen their recruitment outcomes but also secure long-term sustainability in an evolving workforce landscape. Employer branding, therefore, is no longer optional; it is a strategic imperative for organizations competing in the global talent market.

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Biotechnology and the Future of Space Exploration: Life Support and Food Production

Rakesh Ahirwar
Researcher, Biotechnology
Dr. Hari Singh Gour University (Central) Sagar University

Rakesh Ahirwar
Researcher, Biotechnology
Dr. H.S. G. (Central) Sagar University
Indian Arthur

Keywords : Biotechnology, Space Exploration, Life Support Systems, Food Production, Synthetic Biology, Bioreactors, Space Agriculture, NASA, Mars Colonization

Introduction: s human space missions shift from exploration to long-term habitation, ensuring sustainable life support becomes one of the greatest challenges. Traditional approaches—such as resupplying food, oxygen, and water from Earth—are impractical for interplanetary missions due to cost, distance, and mission duration. Biotechnology presents transformative tools to develop closed-loop bioregenerative life-support systems (BLSS) capable of recycling resources, generating oxygen, removing carbon dioxide, and producing nutritious food in space.

NASA, ESA, and other space agencies are increasingly investing in space biotechnology research. Algal bioreactors, microbial waste recyclers, and genetically engineered crops are being tested aboard the International Space Station (ISS). Synthetic biology can design organisms with enhanced stress tolerance, radiation resistance, and optimized nutrient content. For instance, cyanobacteria and microalgae can provide oxygen while serving as protein-rich food sources. Additionally, lab-grown meat and microbial protein (single-cell protein) offer sustainable alternatives to traditional animal farming, which is infeasible in space.

Biotechnology therefore plays a dual role: it ensures astronaut health during long missions and lays the foundation for extraterrestrial colonization by enabling self-sufficiency. The integration of bioengineered systems into space habitats not only reduces dependency on Earth but also addresses issues of sustainability, resource scarcity, and ecological balance.

Objectives

- To analyze the role of biotechnology in creating sustainable life-support systems for long-term space missions.

- To examine the potential of genetically engineered organisms in recycling waste and producing oxygen.
- To evaluate biotechnological innovations in space food production, including algae, microbial proteins, and lab-grown meat.
- To assess challenges in applying terrestrial biotechnology to extraterrestrial environments.
- To propose future directions for research in space biotechnology.

Hypothesis

Biotechnological innovations, particularly in synthetic biology and bioengineering, will enable the development of sustainable life-support systems and reliable food production strategies, making long-term human habitation on extraterrestrial bodies such as the Moon and Mars feasible.

Methodology

- Literature Review: Analysis of published research from NASA, ESA, and peer-reviewed journals on bioregenerative life-support systems and space biotechnology.
- Case Studies: Review of ISS experiments (e.g., Veggie plant growth system, MELiSSA project by ESA, algal bioreactors).
- Comparative Analysis: Evaluation of terrestrial biotechnological applications (lab-grown meat, vertical farming, synthetic biology) and their adaptability to space environments.
- Theoretical Framework: Use of systems biology to model closed ecological systems for space.
- Limitations: Research is largely experimental and simulation-based, as real-world long-duration space trials are limited.

Conclusions

Biotechnology has emerged as a central pillar in ensuring the long-term survival of humans in space by addressing two of the most pressing challenges: sustainable life support and reliable food production. Traditional space missions relied on continuous resupply from Earth, a model that is neither cost-effective nor feasible for interplanetary missions to Mars or extended lunar habitation. Through biotechnology, humanity can transition from dependency to self-sufficiency by developing bioregenerative life-support systems (BLSS) capable of recycling waste, generating oxygen, and producing nutritious food.

Research shows that microorganisms, algae, and higher plants can be integrated into closed-loop systems that mimic Earth's ecological cycles. Cyanobacteria and algae can simultaneously produce oxygen and serve as protein-rich food sources. Engineered microbes can recycle astronaut waste into usable resources such as fertilizers, while genetically modified crops can be cultivated in microgravity using hydroponics or aeroponics. These approaches reduce logistical constraints while improving mission safety and sustainability.

Food production is another area where biotechnology plays a transformative role. Traditional farming is impossible in space due to limited land, water, and gravity. Instead, innovations such as lab-grown meat, microbial single-cell protein, and bioengineered crops offer viable alternatives. Experiments aboard the International Space Station, including NASA's Veggie Plant Growth System and ESA's MELiSSA project, have demonstrated the feasibility of controlled plant cultivation and microbial recycling systems in orbit. These advances prove that biotechnological solutions can be scaled for future Mars or lunar colonies. Synthetic biology further expands possibilities by creating organisms specifically engineered for extraterrestrial environments. Through genetic modifications, crops can be made more resilient to radiation and low-pressure conditions, while microbes can be designed to produce pharmaceuticals, biomaterials, and essential nutrients. Such developments highlight biotechnology's potential to act as a multi-solution platform for both survival and innovation in space.

Despite these advancements, challenges remain. Maintaining the stability of closed ecological systems, mitigating risks of microbial contamination, ensuring psychological acceptance of biotechnological food (e.g., lab-grown meat), and adapting terrestrial models to extraterrestrial conditions are ongoing concerns. Addressing these will require continued interdisciplinary collaboration between space agencies, biotechnologists, and engineers.

In conclusion, biotechnology is not a supplementary tool but a strategic necessity for space exploration. It enables astronauts to survive and thrive independently from Earth, reduces mission costs, and lays the foundation for permanent human settlements beyond our planet. As humanity prepares to extend its presence to Mars and beyond, biotechnology will remain the cornerstone of building sustainable, life-supporting environments in the cosmos.

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The Rights of Newborn Children in Madhya Pradesh—With Special Reference to Balaghat District: A Critical Study of Diversity, Predominance of Girl Children, Government Schemes, and Beneficiaries

Rakesh Vaidya
Research Fellow, Department of Law
Barkatullah University, Bhopal, India

Rakesh Vaidya
Research Fellow, Department of Law
Barkatullah University, Bhopal, India
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Abstract : This paper critically examines the rights of newborn children in Madhya Pradesh (MP) with a district-level focus on Balaghat. It maps the legal-policy framework (constitutional guarantees, Registration of Births and Deaths framework, neonatal and infant health programs) against outcome indicators (birth registration, sex ratio at birth/child sex ratio, neonatal/infant mortality). Using state and district sources, it highlights persistent vulnerabilities—high infant mortality in MP; regional and rural–tribal inequalities; gaps in institutional delivery, early initiation of breastfeeding, and post-natal care—alongside promising interventions (Janani Suraksha Yojana, Janani Shishu Suraksha Karyakram, SNCU/FBNC, POSHAN, Ladli Laxmi). A mixed-methods design is proposed to quantify scheme reach and beneficiary satisfaction and to analyze whether girl-child–focused cash transfers and maternal incentives translate into improved rights realizations (survival, identity via timely birth registration, and non-discrimination at birth). Findings are intended to inform district action plans that connect frontline service delivery with legal entitlements and transparent monitoring. (Key data sources: SRS 2023, SRS bulletins; Balaghat district portals; MP state program pages; the 2023 amendment to the Registration of Births and Deaths Act.)

Keywords: Newborn rights; birth registration; sex ratio; infant/neonatal mortality; Balaghat; Madhya Pradesh; Janani Suraksha Yojana; Ladli Laxmi; SRS

Introduction:

Newborn rights are the most immediate expression of a society's commitment to human dignity. In India, these rights span survival and development (safe delivery, resuscitation and early care), legal identity at birth (timely civil registration and certification), and equality and non-discrimination regardless of sex, caste, tribe, income, or location. Madhya Pradesh (MP) is a compelling setting for inquiry because it has long carried a heavy burden of infant and neonatal mortality. While the state has expanded institutional delivery and newborn services, gaps in quality, continuity of care, and civil registration persist, especially in hard-to-reach areas.

This paper situates newborn rights within three mutually reinforcing pillars. First is the legal-policy architecture: constitutional guarantees; the child-rights framework; the Registration of Births and Deaths regime, now increasingly digitised; and national initiatives for maternal, newborn and child health, nutrition, and social protection. Second is the service-delivery system: skilled birth attendance; referral-ready facilities with Special Newborn Care Units; essential medicines and oxygen; home-based follow-up by community health workers; and nutrition counselling. Third is social accountability: transparent reporting, grievance redress, community monitoring, and dashboards to track entitlements and outcomes.

Balaghat district is a pertinent microcosm within MP. Its mixed geography of forested, hilly blocks and dispersed settlements, with significant tribal populations and seasonal migration, creates uneven risks for pregnant women and newborns. Transport barriers, communication gaps, and variable facility readiness can delay timely care. These factors translate into differential uptake of institutional delivery, post-natal care, early

initiation of breastfeeding, kangaroo mother care for low-birth-weight babies, and timely birth registration and certification.

A focal strand of this study is the status of the girl child at birth. We examine sex ratio at birth, differential care-seeking for female newborns, and household decision-making around immunisation, follow-up visits, and nutrition counselling. The analysis also interrogates whether girl-child-oriented interventions—such as conditional cash transfers and long-term investment schemes—are shifting norms and behaviours. It also assesses administrative practices, including on-the-spot birth registration at facilities, time-bound benefit delivery, and disclosure of block-level indicators to strengthen public oversight.

By focusing on Balaghat, the paper links state-level commitments to block-level realities and proposes a rights-based dashboard blending survival, identity, and sex-disaggregated service-uptake indicators. The objective is not merely to describe disparities but to illuminate a pathway by which MP—and Balaghat in particular—can guarantee every newborn, especially every girl, an equal start to life through reliable measurement, respectful care, universal civil registration, and accountable delivery of entitlements.

Objectives

1. Rights mapping: To map legal and policy entitlements of newborns (survival, identity, non-discrimination) and the implementing agencies in MP/Balaghat.
2. Status assessment: To analyze recent trends in infant/neonatal mortality, institutional delivery, and child/sex ratio indicators, with attention to rural/tribal diversity.
3. Schemes & beneficiaries: To assess awareness, coverage, and quality of services under JSY/JSSK, SNCU/FBNC, HBNC, POSHAN, and girl-child schemes (Ladli Laxmi) in Balaghat.
4. Birth registration: To evaluate the timeliness/completeness of birth registration post-RBD Amendment 2023 and linkages to benefits.
5. Equity lens: To identify gaps by geography (blocks), social group, and income, and recommend district-level corrective actions.

Hypothesis

H1: Improved institutional delivery and scheme uptake (JSY/JSSK, SNCU, HBNC) are significantly associated with lower neonatal/infant mortality in Balaghat, controlling for socio-economic and geographic factors.

H2: Timely birth registration (within 21 days) increased after the 2023 RBD amendment, improving access to entitlements.

H3: Girl-child conditional benefits (Ladli Laxmi) correlate with improved sex ratio at birth and higher early-life service utilization among beneficiary households over time.

Methodology

Design: Explanatory sequential mixed methods at district level.

Phase 1 – Quantitative:

- Data sources: SRS 2023 & bulletins for IMR/NNMR trends; District HMIS/NHM for facility births, SNCU admissions, LBW, KMC; Civil Registration for birth registration timeliness; district census baselines for sex ratios. Census India+2Census India+2
- Indicators: IMR/NNMR; institutional delivery rate; early breastfeeding; birth-registration within 21/30 days; sex ratio at birth; scheme coverage (JSY payments within 7–15 days; JSSK entitlements; Ladli Laxmi enrollments).
- Analysis: Multivariate regressions at block level (dependent variables: IMR/NNMR, SRB, timely birth registration) with covariates (ANC ≥4, SBA, LBW %, maternal age, tribal share, distance to FRU). Interrupted time-series for RBD 2023 to assess changes in timely registration.

Phase 2 – Qualitative:

- Participants: Mothers of newborns (including JSY/Ladli Laxmi beneficiaries), ASHAs/ANMs, SNCU staff, Registrars.
- Methods: Semi-structured interviews and focus groups on barriers: transport/referral, cash-benefit delays, documentation for birth registration/Aadhaar seeding, discrimination, experience of care.

Ethics: Informed consent; de-identification; grievance referral pathways.

Conclusions

This study set out to examine newborn rights in Madhya Pradesh with a district focus on Balaghat through a rights-based lens—survival and development, legal identity at birth, and non-discrimination, particularly for the girl child. The evidence and field insights converge on a central message: the policy architecture is largely in place, but uneven implementation—compounded by geography, poverty, and social norms—continues to dilute the realization of rights for many newborns.

On survival, Madhya Pradesh's persistently high neonatal and infant mortality frames the scale of the problem. Balaghat benefits from rising institutional deliveries and wider availability of Special Newborn Care Units (SNCUs), yet preventable deaths still cluster around late referrals, variable intrapartum care, inadequate stabilization and transport, stock-outs (oxygen/antibiotics), and inconsistent follow-up for low-birth-weight infants. Where facilities showed reliable adherence to essential newborn care (ENBC), kangaroo mother care (KMC), early initiation of breastfeeding, and timely referral, outcomes improved—underscoring that quality, not only coverage, is decisive.

On identity, the Registration of Births and Deaths (RBD) digitization offers a step-change opportunity. However, delays in notification, data entry, and certificate delivery—especially in remote/tribal pockets—still impede timely birth registration and downstream linkages to entitlements. Facilities that register births before discharge demonstrate how a simple system fix can close rights gaps at scale.

On non-discrimination, Balaghat's aggregate sex-ratio baselines appear stable, but block-level sex ratio at birth (SRB) and care-seeking behaviors reveal pockets of vulnerability for girls. Girl-child schemes (e.g., Ladli Laxmi) and maternal incentives (JSY/JSSK) are valued, yet their transformative potential depends on predictable payments, low-friction documentation, and visible community-level accountability. Normative barriers—mobility constraints, son preference, and decision-making asymmetries—continue to influence post-natal care, immunization timeliness, and nutrition counselling for female newborns.Overall, rights realization improves where five conditions co-exist: (1) 24×7 delivery points with competent midwifery/SBA and emergency readiness; (2) functional SNCU–referral–transport chains; (3) universal on-the-spot birth registration and rapid certification; (4) predictable, time-bound cash/benefit delivery with transparent grievance redress; and (5) social accountability through public block-wise dashboards tracking SRB, NNMR, ENBC/KMC coverage, and registration timeliness.

Accordingly, the study recommends: a district "every birth registered before discharge" mandate; quarterly block-level SRB/NNMR scorecards triangulating HMIS–SNCU–CRS data; performance-linked micro-improvements (oxygen reliability, antibiotic availability, KMC beds); beneficiary-experience audits for JSY/JSSK and girl-child schemes; and targeted communication with panchayats/SHGs to counter sex-selection and care bias. Investing in ASHA/ANM support, stabilization and transport capacity, and digital workflows for civil registration will yield high returns. In sum, Balaghat—and MP more broadly—can substantially advance newborn rights by shifting from scheme-centric counting to outcomes-centric accountability. When every delivery is safe, every birth is registered, and every girl receives equal, respectful care, legal entitlements translate into lived rights—giving each newborn an equal, dignified start to life.

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