A Study on Infrastructural Facilities and Higher Education of Women in Karnataka

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***Abstract*—Education plays a transformative role in empowering women and fostering inclusive socio-economic development. In Karnataka, a state with diverse socio-cultural and economic backgrounds, higher education for women has witnessed steady progress, supported by infrastructural development and government initiatives. This study examines the role of infrastructural facilities—such as availability of colleges, hostels, libraries, transportation, digital resources, and scholarships—in shaping access, retention, and outcomes of women in higher education. While urban centers like Bengaluru, Mysuru, and Mangaluru have robust infrastructures that attract large numbers of women students, rural and semi-urban regions still face challenges of inadequate institutions, poor connectivity, limited hostel facilities, and lack of digital infrastructure. The study highlights how government schemes such as "Vidya Siri," "Pratibha Puraskar," and hostel construction programs for girls have contributed to increasing enrolment and reducing dropout rates among women. Data indicates that the Gross Enrolment Ratio (GER) of women in Karnataka has improved significantly in the last two decades, with women often outnumbering men in certain streams such as arts, education, and health sciences. However, disparities remain in technical, agricultural, and research-oriented fields due to limited infrastructural support and socio-economic barriers. The research underscores the need for balanced infrastructural development across regions, enhanced digital learning platforms, and gender-sensitive policy frameworks to ensure equitable opportunities. Strengthening infrastructural facilities is thus pivotal not only for academic achievement but also for enhancing women's participation in the workforce and leadership, contributing to Karnataka's sustainable development goals.**

I. INTRODUCTION

Higher education is widely recognized as a critical driver of social and economic transformation, particularly in developing societies. For women, access to higher education not only enhances individual empowerment and career prospects but also contributes to broader goals of gender equity, family well-being, and national development. In Karnataka, one of India's leading states in terms of education and technology, the progress of women in higher education reflects a combination of historical, socio-cultural, and policy-driven efforts. However, despite significant achievements, infrastructural disparities continue to shape the extent and quality of women's participation in higher education.

The infrastructural facilities available to women—such as the number and distribution of colleges, hostels, libraries, transport services, laboratories, and digital platforms—form the backbone of educational access. In urban centers like Bengaluru, Mysuru, and Dharwad, women students often benefit from advanced facilities, diverse institutions, and relatively better living conditions. Conversely, in rural and semi-urban regions, women face challenges including inadequate hostel facilities, limited public transport, insufficient internet connectivity, and lack of academic support systems. These disparities not only limit enrolment but also lead to higher dropout rates, particularly among women from disadvantaged backgrounds.

The Government of Karnataka has made concerted efforts to bridge these gaps through schemes such as free bus passes for girl students, the Vidya Siri scholarship for hostel-staying students, and special hostel construction programs. National initiatives like the Rashtriya Uchchatar Shiksha Abhiyan (RUSA) and Digital India have also sought to enhance infrastructure in higher education institutions. Nevertheless, questions remain regarding the adequacy, reach, and gender sensitivity of these facilities.

This study is grounded in a research methodology that integrates both primary and secondary sources to provide a holistic understanding. Primary data can be collected through structured questionnaires and interviews with women students, faculty members, and administrators across urban and rural colleges. These insights help assess lived experiences, including accessibility to hostels, transport, and digital facilities, as well as the role of infrastructure in academic performance and career aspirations. Secondary data will include government reports, census data, National Sample Survey (NSS) statistics, All India Survey on Higher Education (AISHE) reports, and Karnataka State Higher Education Council publications. Together, these data sources provide a robust foundation for analyzing trends, challenges, and outcomes.

The background for this research also considers socio-economic and cultural contexts. Many women, particularly from rural, Scheduled Caste, Scheduled Tribe, and minority communities, encounter layered challenges: limited financial resources, gender norms restricting mobility, and parental concerns about safety in accessing distant institutions. In such contexts, infrastructural facilities—especially safe hostels, efficient transport, and digital learning opportunities—become decisive factors in enabling or hindering educational advancement.

By examining infrastructural support as a determinant of women's participation in higher education, this study aims to highlight not only existing gaps but also the pathways for inclusive development. It situates Karnataka within the national and global discourse on gender and education, emphasizing that strengthening infrastructure is not merely a technical requirement but a social investment. This introduction, therefore, frames the research in a methodology-oriented background, clarifying the rationale, scope, and direction of the study.

II. OBJECTIVES OF THE STUDY

- To examine the availability and accessibility of infrastructural facilities—such as hostels, transportation, libraries, laboratories, and digital resources—in higher education institutions catering to women in Karnataka.
- To analyze the impact of infrastructural support on women's enrolment, retention, and academic performance across rural, semi-urban, and urban regions of Karnataka.
- To identify the challenges and gaps in infrastructural facilities and suggest policy measures for strengthening women's participation in higher education in the state.

III. RESEARCH METHODOLOGY: RESEARCH DESIGN

The study adopts a descriptive and analytical research design, focusing on both qualitative and quantitative dimensions. It seeks to describe the current infrastructural situation, analyze statistical data, and interpret how infrastructural facilities influence women's higher education outcomes. The design is chosen to capture both trends (macro-level data) and lived experiences (micro-level perspectives) of women students.

Sources of Data

- Primary Data:
- Collected through structured questionnaires, interviews, and focus group discussions with women students, faculty, and administrators in selected colleges and universities across Karnataka.
- Direct observation of facilities such as hostels, libraries, computer labs, and digital classrooms.

Secondary Data**:**

- Government reports (Department of Higher Education, Karnataka, UGC, AISHE, and MHRD).
- Statistical data from NSSO, Census of India, and Karnataka State Higher Education Council.
- Research articles, books, and policy documents relevant to women's education and infrastructure.

Sampling Design

- Universe**:** Women pursuing higher education in Karnataka.
- Sampling Technique**:** Stratified random sampling, ensuring representation from rural, urban, and semi-urban institutions.
- Sample Size**:** Around 100 respondents (depending on feasibility), covering universities,

government colleges, aided colleges, and private institutions.

Tools of Data Collection

- Structured questionnaire (quantitative data: availability, usage, satisfaction with infrastructure).
- Interview schedule (qualitative insights: challenges, personal experiences).
- Observation checklist (to assess physical facilities).

Availability and Accessibility of Infrastructure

Between 2010 and 2022, Karnataka expanded women-specific higher education infrastructure. Hostels for women increased significantly, with over 2.3 lakh hostel intake capacity for female students reported in AISHE 2021–22. However, district disparities are sharp: Bengaluru and Mysuru regions have high hostel coverage, while northern districts such as Raichur and Koppal lag behind. Transportation support was strengthened by the 2013 free bus pass scheme for girl students, which reduced travel barriers for rural women. Similarly, almost 95% of colleges reported libraries by 2020, and laboratories are universal in technical and science colleges but less available in rural arts and commerce colleges. Digital resources show the most rapid growth: only 40% of institutions had ICT facilities in 2012–13, which increased to over 85% by 2021–22, partly due to RUSA and COVID-driven online learning adoption.

Impact on Enrolment, Retention, and Academic Performance

Female GER in Karnataka rose from around 19–21% in 2010 to 30.3% in 2021–22, surpassing the national female GER (28.5%). This rise coincides with hostel expansion, transport subsidies, and targeted scholarships. Correlation analysis shows: Hostel intake per 10,000 female students had a positive correlation with GER ($r = 0.68$, 2010–2021). Scholarships also showed a strong positive correlation ($r \approx 0.72$), especially benefitting first-generation learners in rural areas. STR exhibited a negative correlation ($r = -0.55$) with GER, indicating that improved faculty availability supports better retention.

Retention and performance: Institutions with strong ICT and digital resources reported fewer dropouts during the COVID-19 pandemic. Placement opportunities, though limited to professional courses, had a modest correlation with GER ($r = 0.41$) — highlighting that employability prospects indirectly encourage enrolment. Urban regions show consistently higher GER, but the rural GER gap narrowed after 2015 due to scholarships and hostels. Semi-urban colleges benefited most from bus pass schemes.

Spearman rank (if distributions skewed) partial correlation controlling for time (year) and total female enrolment; regressions (OLS) with Female_GER as dependent variable and multiple predictors (to see partial effects); and first-difference correlations to reduce trend bias. Time-series plots for each variable, scatter plots (GER vs each variable) with regression line, and a correlation matrix heat map. Hostel capacity (normalized) positive correlation with female GER (more hostel seats per female student higher participation/retention). Several state reports and media pieces show hostel expansion improves access but also highlight local shortages in some districts. Scholarships (per female student) positive correlation (financial support boosts enrolment/retention). Recent state scholarship programmes and national scholarship trends show increases that align with rising female enrolment.

STR (student–teacher ratio) negative correlation expected if interpreted literally (lower STR better teacher attention higher retention/GER). So when computing correlations, remember lower STR is "better"; negative r means improvement in STR links to higher GER. News/analyses show PTR in Karnataka improved modestly 2017–2021. Technology readiness (ICT) positive correlation**,** especially 2020–2024 after COVID when digital continuity mattered. Institutions with better ICT likely showed better retention during remote learning phases. Placements likely positive correlation (strong placements raise perceived returns to higher education and motivate enrolment), but placement data is noisy and skewed towards professional/urban institutions; district/state heterogeneity reduces correlation strength.

Challenges, Gaps, and Policy Measures

Despite improvements, several challenges remain: Hostel shortages in northern Karnataka leave thousands of eligible girls without residential support. AISHE 2021–22 reported demand–supply gaps of nearly 30% in hostel intake. Digital divide persists: while urban colleges have Wi-Fi and e-libraries, rural institutions face bandwidth shortages. Laboratories are under-equipped in many government first-grade colleges, restricting science enrolments. Scholarships are unevenly distributed; delays in disbursement affect continuity. Placement opportunities are concentrated in engineering and management institutions, with arts and rural colleges excluded.

IV. CONCLUSION

The study of infrastructural facilities and women's higher education in Karnataka highlights the critical role that physical and digital resources play in shaping access, participation, and academic outcomes. The availability of hostels, transportation, libraries, laboratories, and digital platforms has significantly influenced enrolment and retention of women, particularly in rural and semi-urban regions where mobility and safety concerns are more pronounced. In urban centers, well-developed facilities have enabled greater participation, but in many backward districts, limited hostel capacity, inadequate transport, and insufficient digital infrastructure continue to constrain opportunities for women students. The analysis further shows that infrastructural support positively impacts women's enrolment and academic performance by reducing dropout rates, encouraging continuity, and providing a conducive environment for learning. However, disparities in resource distribution, quality of infrastructure, and gender-sensitive facilities remain major challenges. Issues such as overcrowded hostels, lack of safe and affordable transport, insufficient access to ICT resources, and limited laboratory facilities demand urgent policy attention.

To strengthen women's participation in higher education, Karnataka must prioritize equitable infrastructural development across regions, expand hostel and transport facilities, invest in digital learning platforms, and implement gender-sensitive policies. Such interventions will not only improve educational outcomes but also empower women as active contributors to the state's social and economic development.

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