FACTORS DETERMINING HIGHER EDUCATION IN INDIA: A QUANTITATIVE STUDY ON GROSS ENROLLMENT RATE

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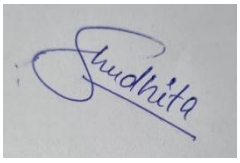
CANDIDATE'S DECLARATION

I, **Shudhita Verma,** hereby certify that the work is being presented in the thesis entitled "**Factors Determining Higher Education In India: A Quantitative Study On Gross Enrollment Rate**" in partial fulfilment of the requirement for the award of the Degree of the Doctors of Philosophy, submitted in the Department of **USME, Delhi Technological University** is an authentic record of my work carried out during the period from **June 2024 to June 2025** under the supervision **of Dr. Ratnam Mishra.**

The matter presented in the thesis has not been submitted by me for the award of any other degree of this or any other institute.



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This is to certify that the student has incorporated all the corrections suggested by the examiner in the thesis, and the statement made by the candidate is correct to the best of our knowledge.

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Certified that **Shudhita Verma (23/MAE/49)** has carried out their search work presented in this thesis entitled "**Factors Determining Higher Education In India: A Quantitative Study On Gross Enrollment Rate**" for the award of **Master of Arts in Economics** from the Department of USME, Delhi Technological University, Delhi, under my supervisor. The thesis embodies results of original work, and studies are carried out by the student herself and the content of the thesis do not form the basis for the award of any other degree to the candidate or to anybody else from this or any other University/institution.

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Abstract

India has suppressed Japan. India’s enrollment in higher education is lower compared to the other G20 nations, despite showing significant increase; however, it is still lower than countries like the United States, South Korea, and Canada. Higher education is the driving force of a country's economy. Higher education enables a country to transform its youth into resourceful individuals who can meet the nation's future demands. In India, the factor used to measure the growth in higher education is Gross Enrollment Rate (GER). An indicator of a country’s social, economic and intellectual development is its tertiary education. The global and regional development patterns highlight receiving tertiary education as vital for fostering creativity, accelerating economic growth, and ensuring equal socioeconomic progress in a society. It has ceased being only a matter of individual self-actualization. India boasts an increased institutional framework, raised enrollment figures, and enhanced investment in higher education. Still, there is a striking disparity in participation and access between states and areas even with all of these efforts. The proportional enrollment in a given level of education relative to the population of the officially recognized age range for that education (in this case, 18–23 years) is referred to as the Gross Enrollment Rate (GER). This dissertation intends to analyze the major factors affecting Gross Enrollment Ratio (GER) in India with special emphasis on state-level data. The primary goal of the study is to identify and evaluate the determinants of GER in Indian states and comprehend how well these determinants explain the differences in enrollment rates across various regions. The purpose of this study represents a response to the wish for better research-driven understanding of the factors that shape access to higher education – so as to design more sensible policies and more equitable distribution of educational resources.

The study is based on secondary data collected from the sources such as the All India Survey On Higher Education (AISHE) reports 2010-2022, Ministry of Education to get expenditure data , the University Grant Commission UGC for the the data on the variables. Variables such as total enrollment in higher education, public expenditure on higher education, number of colleges within staes and number of universities. The process of chossing these variables is on the basis of the exsiting literature and the there impact on higher education. To know the relationship between the GER and the selected independent variables in the model. The regression results indicate that there exits a statistically significant relationship between GER and variable: public expenditure on higher education. Stating the importance of financial and infrastructure development promotes higher education. Still disparities can be seen in GER across states such as Kerala, Tamil Nadu, when compared to states like Bihar, Jharkhand, Rajasthan, shows the presence of disparities. It particularly emphasizes the policy’s “one-size-fits-all” strategy driven by the disparity of institutional frameworks, regional diversity, geo economy, and system resources. , this dissertation is guided by or focuses on the issue of systematically inadequate public funding for diverse infrastructures as well as the need to enhance these investments. I

suggest here that state planners and education policymakers should pay special attention to increasing the number of tertiary education institutions in rural and semi-urban localities. The primary aim of the policies designed to increase GER has to target the better accessibility of women, backward classes, and economically weaker sections. More active measures should also be taken for thorough evaluation and documentation of setting policies to ensure studies identify the effectiveness of new strategies. This work offers practical solutions to the design of context-sensitive, comprehensive, and efficient educational policies by determining the most influential factors of GER in different Indian states.

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Introduction

Higher education plays a crucial role in shaping the intellectual and economic future of a country. In India, where a significant portion of the population falls within the age group eligible for higher studies, the role of universities and colleges becomes even more vital. The Indian higher education system is one of the largest in the world, with a rapidly growing number of institutions and students. Despite this quantitative growth, challenges related to quality, regional imbalance, affordability, and access continue to affect the overall development of this sector. One of the most widely used indicators to assess the reach of higher education is the Gross Enrollment Ratio (GER), which measures the percentage of individuals in the age group of 18–23 years who are enrolled in institutions offering higher education. While the national GER has improved over the years, disparities between states, rural and urban areas, and different socio-economic groups persist. This situation calls for a closer examination of the factors influencing GER across Indian states, especially in the context of recent educational reforms.In recent years, the Government of India has undertaken several initiatives to promote inclusive and equitable access to higher education.

The introduction of the National Education Policy (NEP) 2020 is a significant milestone in this journey, aiming to bring a transformative shift in how education is delivered and accessed. One of the key goals of NEP 2020 is to increase the GER in higher education to 50% by the year 2035. However, achieving this target requires not only infrastructural expansion but also a data-backed understanding of what drives enrollment at the state level. The number of universities and colleges, total enrollments, and public expenditure on higher education are some of the major components that influence a state's ability to improve access. It becomes imperative to assess whether these inputs are effectively contributing to enrollment growth, or if deeper structural issues are at play.The role of public funding in expanding higher education opportunities cannot be understated. States that allocate higher resources toward education are generally expected to perform better in terms of GER. However, the relationship between financial investment and actual outcomes may not always be linear. Some states may spend more yet fail to improve their GER due to inefficiencies, lack of targeted schemes, or other socio-economic barriers. On the other hand, some regions might show better outcomes even with limited spending, possibly due to better governance or higher private participation.

Therefore, a quantitative analysis of this relationship is essential. By focusing on key indicators like the number of institutions, enrollment numbers, and financial outlays, this study attempts to explain the variations in GER across states using secondary data from the year 2021–22.The Indian higher education system is also characterized by diversity in institutional distribution. States with higher urbanization and economic development tend to have a higher density of colleges and universities, leading to better access for their youth. Meanwhile, educationally backward regions still struggle with a shortage of institutions and qualified faculty. This disparity directly affects enrollment patterns, as students in less developed areas may face physical, financial, and social obstacles in pursuing higher education. In this context, analyzing the number of colleges and universities as variables influencing GER becomes crucial. Similarly, the total number of students already enrolled can indicate the existing capacity of the system

and its ability to absorb new aspirants. These factors, when studied together, provide a clearer picture of the structural health of the Indian higher education ecosystem.While many discussions around education reform in India focus on qualitative improvements such as curriculum design, research quality, and faculty development, it is equally important to assess the quantitative side of the sector.

Enrollment numbers, institutional growth, and government spending offer measurable indicators that can help in policy evaluation and reform design. This research aims focusing specifically on the statistical relationships between these indicators and the GER across Indian states. The goal is to understand whether states with more institutions and better funding are actually achieving higher enrollment rates, or if other hidden factors are contributing to this outcome.In doing so, this study draws upon data from reliable secondary sources, including government reports and educational databases, to conduct a state-wise analysis. The findings are expected to be useful for policymakers, educational planners, and researchers interested in designing interventions that can improve access and reduce inequality in higher education. While the scope of this study is limited to a few key variables, the approach provides a framework that can be expanded in future research with more data and a broader range of indicators. Though the study offers valuable insights, it also acknowledges certain limitations. As it relies entirely on secondary data, the accuracy of results is subject to the reliability of sources used. Additionally, the use of cross-sectional data restricts the analysis to a single time point, limiting the ability to assess long-term trends or establish causality. However, despite these constraints, the research serves as an important step toward a more data-driven understanding of higher education access in India. It also highlights the importance of state-level planning and investment strategies in achieving national education goals. The results can guide future policies aiming to enhance not just enrollment, but also equity and quality in India's higher education system. This will require a concerted effort from various stakeholders, including government agencies, educational institutions, and civil society organizations.

This dissertation is going to analyse how gross enrollment rate, which is studied as an indicator of education in India, is impacted and known by factors like the number of colleges per million of pollution, the number of universities, expenditure by public instituions and average total enrollment. By exploring the interplay between these determinants, the research seeks to uncover the extent to which infrastructural availability and financial investment contribute to variations in enrollment across Indian states. The findings are expected to offer valuable insights into policy effectiveness and help identify gaps or opportunities in India's efforts to expand access to higher education.

Literature Review

Gross Enrollment Rate is an indicator of Education for India. GER of higher education means the participation done by students from 18-23 years of age in higher education. Attainment of Higher education enables an individual to convert the youth of the country to be turned into useful resources that can be turned into professionals in the future and can cater for the future demand of the nation. This literature review systematically examines over two dozen scholarly articles, institutional reports, and government documents to access the economic, environmental, policies, technological, and social implications of gross enrollment rate in education sector of India.

Organized thematically, this review presents a critical synthesis across education domain for gathering analysis for dissertation.

Education leading to Economic Growth

Education is a major indicator of the education of a country. People with higher education levels of education are better able to innovate, adjust to changes in technology, and help ensure that resources are used efficiently. People can earn more money as they grow more knowledgeable and skilled, which increases demand and investment in the economy as a whole. Additionally, education promotes social growth and well-informed decision-making, two things that are critical to long-term economic advancement. By empowering India, education lays the groundwork for long-term economic growth. By investing in education, a country builds human capital, which is a critical driver of productivity and economic resilience in a rapidly changing global environment.

As shown in Table 1,

TABLE 1: "Analysis of Enrollment Growth in Higher Education"

YEAR	TOTAL ENROLLMENT (IN MILLION)
2010	27.5
2011	29.2
2012	30.2
2013	32.3
2014	34.2
2015	34.6
2016	35.7
2017	36.6
2018	38.5
2019	41.3
2020	43.3
2021	43.2
2022	45.3

As observed from table 1, Table 1 shows data pertaining to the total enrollment in higher education institutions in India from 2010 to 2022 in million. The table captures the enrollment patterns over a span of 13 years, revealing critical changes in the opportunities available for and the participation levels in higher education. The figures account for the total enrollment in all disciplines at both undergraduate and postgraduate levels.

The data illustrates that there was a steady and consistent increase in enrollment over the years, which shows increment by 27.5 million in 2010 to 45.3 million in 2022. The uptrend demonstrates the availability of higher level education in India, owing to policy implementation, expansion of educational institutions, and eagerness for elevated learning. Interestingly, during

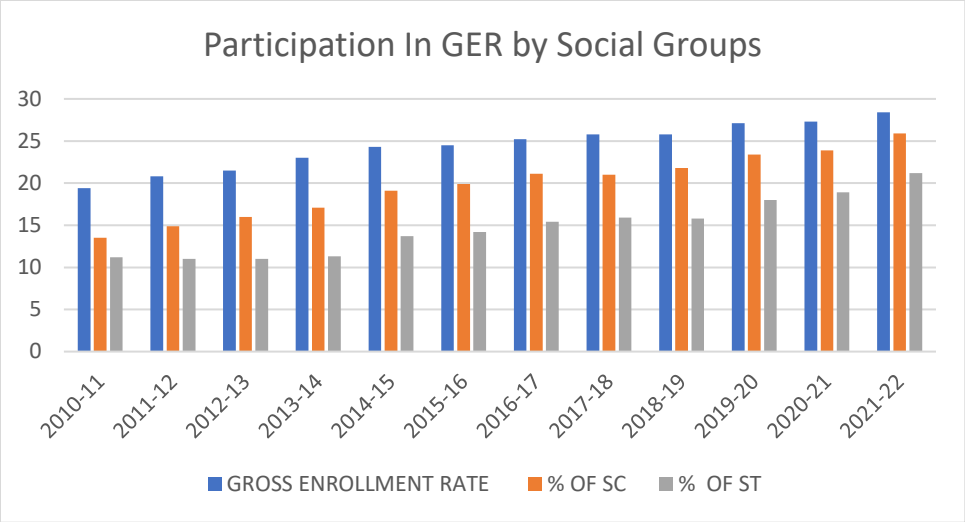
the decade from 2010 to 2020, there was an increase of roughly 15.8 million which suggests greater strides toward educational inclusivity.

The table provides an optimistic picture, however, there are some periods of slower growth or stagnation that can also be observed. For instance, there was a marginal increase in enrollment from 34.2 to 34.6 million from 2014 to 2015. Likewise, there is a recording of a slight decrease from 43.3 to 43.2 million in 2020 and 2021 which can be associated with the impact of COVID-19 on educational institutions and student admissions. These fluctuations indicate the need of having consider external factors.

growth is often hindered by many other factors present in the economy. These factors are spread across the country, as the manifestation of these results leads to a gap in achieving economic growth through education. These education standards are not meet by the standards required for the current needs of the nation. So, there should be increased assessment for the quality of education of a country, assesment ensures the quality is meet by the demand standards of the economy. Previously the quality of education used to be know by the faculty, no of years of experience and the degree, infrastructure of the institutions, library of the college, campus, and placement of students from the institution. But here the question arises is these factors are able to define the quality of education provided by the institution.

These facilities vary from institution to institution, which leads to an inequality gap. This gap arises due to the unequal distribution of these facilities. Universities located in rural areas have higher chances of accessing these facilities in urban area. Schools present in the rural areas are going to face more issues of having facilities, which will lead to inequalities among the students of both these areas, This inequality is the result of accumulated internal disparities. The basic role of enrollment rates is to tell the participation of 18-23 years students in higher education and disparities in the enrollment rate reflect that there is gap between the participation of students this gap could be due to several internal factors.

Figure 1: Share of SC and ST in the Gross Enrollment Rate



The graph marked *"Participation in GER by Social Groups"* depicts the trends in Gross Enrollment Rate (GER) in higher education for the entire population, Scheduled Castes (SC), and Scheduled Tribes (ST) from 2010–11 to 2021–22. It depicts the milestones in inclusiveness and access to higher education across different social groups in India. GER measures the number of people in a given population aged 18-23 years enrolled in higher education as a percentage of the total population, and this data is in many ways allocative efficiency over the years, serving as a gauge to measure economic growth and the social groups residing in the region.

As noticed from the graph, the overall GER marked with blue bars certainly has a rising trend with respect to the period observed. It was approximately 19% in 2010-11 and it reached almost 28% by 2021-22. This rise is in line with the moves in the country to develop the higher education system, facilitate understanding of the need and usefulness of higher education, and establish enabling conditions to improve enrollment levels. The gradual increase in GER in general points to growing efforts to ensure that people from different social strata have access to higher education. As shown by the orange bars, the Scheduled Castes' involvement has also improved greatly over the years. For SC pupils, the GER was approximately 13% in 2010–11, and by 2021–22, it had increased to roughly 26%.

Education and Gender Participation

Table 2: The Gender wise Distribution Boys and Girls in Total Enrollments

YEAR	TOTAL ENROLLMENT (in million)	BOYS Share	GIRLS Share
2010-11	27.5	15.5	12
2011-12	29.2	16.2	13
2012-13	30.2	16.6	13.6

2013-14	32.3	17.5	14.8
2014-15	34.2	18.5	15.7
2015-16	34.6	18.6	16
2016-17	35.7	19	16.7
2017-18	36.6	19.2	17.4
2018-19	36.9	19.2	17.4
2019-20	38.5	19.6	18.9
2020-21	41.3	21.2	20.2
2021-22	43.3	23.3	20

Table 2 shows the gender-wise distribution of total higher education enrollments in India from the year 2010–11 to 2021–22. It also provides the total number of enrolled students in millions and the respective proportions of boys and girls for each year. This information is most important to decipher gender trends in access to higher education and the achievement towards gender parity over the last decade. The rising numbers also indicate total growth in enrolment, driven by policy changes, institutional expansion, and growing societal focus on schooling.

In the first few years of the period studied, boys outnumbered girls in higher education enrolments consistently. For example, in 2010–11, among 27.5 million total enrolments, boys numbered 15.5 million whereas girls comprised only 12 million. This differential, however, slowly came down over time. By 2014–15, there were 15.7 million girls enrolled against 18.5 million boys, showing persistent progress in narrowing the gender gap. The increased participation of girls is a pointer to the effect of focused interventions like scholarships for women students, awareness drives, and initiatives to render campuses safer and more friendly.

Year by year, the trend is one of persistent growth in the number of girls taking degrees in higher education. Significantly, between 2010–11 and 2020–21, girls' enrollment rose by over 8 million, to 20.2 million in 2020–21, against 21.2 million boys. This near-equal representation points to great strides towards gender equality. Although the boys maintained a slim larger proportion, the disparity reduced significantly, indicating a shift in social attitudes and better access for women to education.

Interestingly enough, the figures for 2021–22 indicate a reversal of this trend. As boys' enrollment increased to 23.3 million, the enrollment of girls fell slightly to 20 million, a decrease by a minor margin from last year. External factors like the effects of the COVID-19 pandemic may have caused this, as female students were disproportionately impacted by added responsibilities at home, issues of digital access, and financial shortages in some homes. This slight decrease warrants deeper examination of gender-specific issues that could inhibit continued improvement.

Overall, the trend in the data of Table 2 is a strong increase in the participation of males and females in higher education with a strong trend toward gender balance. The reduction of the gap between boys and girls in total enrollment indicates positive trends in the area of educational equity. Nonetheless, the decline in the number of girls enrolling during the most recent year indicates the importance of maintaining assistance and gender-sensitive policies so that the achieved advancement in female schooling is not only attained but also maintained in the long run.

Figure 2: EXPENSE ON HIGHER EDUCATION AND TRAINING AS % OF GDP

Public expenditure on higher education and training as a percentage of GDP is a critical indicator of a country's commitment to developing its human capital. In the Indian context, the allocation towards higher education has historically remained modest compared to global benchmarks, often falling short of the 6% of GDP target recommended by the Kothari Commission. Investment in higher education plays a pivotal role in fostering innovation, enhancing employability, and improving national productivity. An increase in expenditure reflects the government's priority in building a knowledge-driven economy. Conversely, limited investment can constrain infrastructure, research, faculty development, and student access, particularly for marginalized groups. Therefore, monitoring and improving the share of GDP spent on higher education and training is essential to support inclusive growth and long-term economic development.

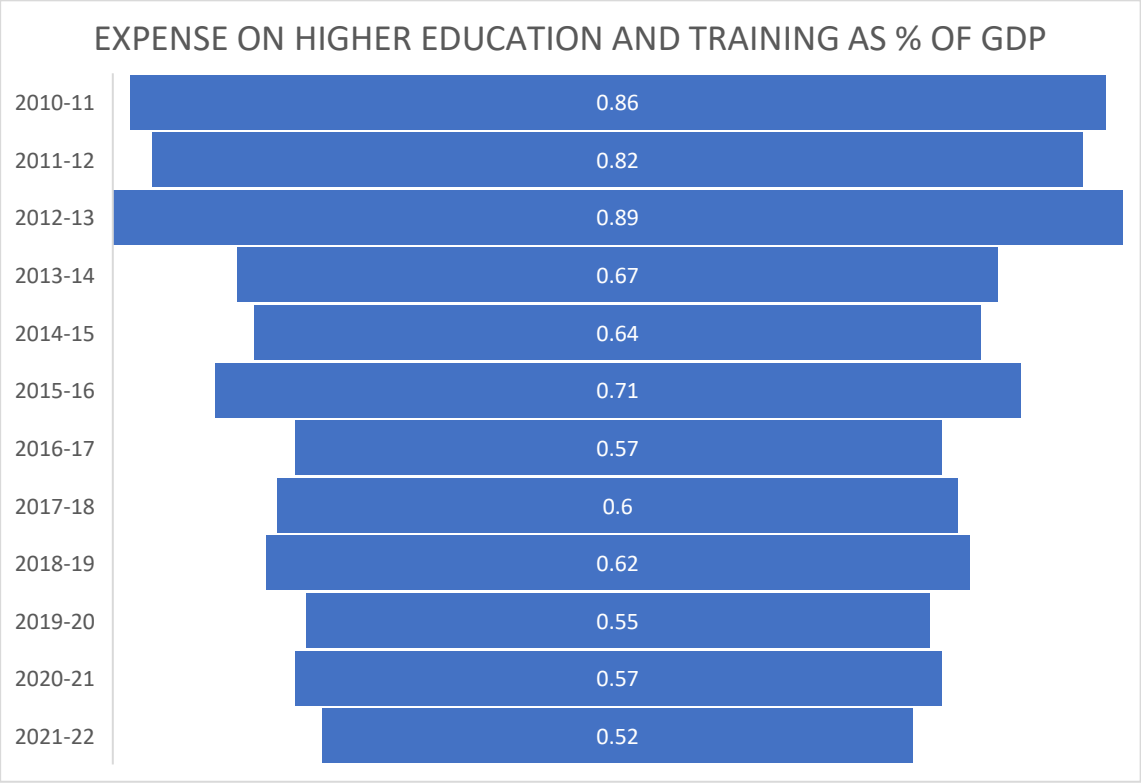


Figure 2, The chart "Expense on Higher Education and Training as % of GDP" shows the trend in government spending on higher education and training in India from 2010-11 to 2021-22. The percentage of the nation's GDP spent on the sector per annum is shown, offering an indication of how high education has been prioritized financially. The horizontal bars indicate year-on-year fluctuations, with each bar marked with the respective percentage figure. This makes it easy to visually compare over the 12-year period.

It can be seen from the data that the highest spending was in 2012-13, with the spending amounting to 0.89% of GDP. The years 2010-11 to 2012-13 overall depict a high rate of commitment towards funding higher education, with rates consistently over 0.8%. From 2013-14 onwards, though, there is a perceptible decrease in expenditure, with some minor upturns in the following years. The rate fell sharply in 2013-14 to 0.67% and remained on a downward slope, reflecting a change of budget priorities or perhaps economic pressures on the expenditure for education.

Years 2015-16 and 2018-19 reflect significant but short-lived spikes to 0.71% and 0.62%, respectively, indicating short-term attempts to restore levels of funding. These notwithstanding, the overall trend still indicates a decreasing pattern. By 2019-20, the allocation had decreased to 0.55%, and while there was a minor increase to 0.57% in 2020-21, the expenditure was lowest in 2021-22 at a mere 0.52% of GDP. This sustained fall during the decade emphasizes increasing unease about the sufficiency of public investment in higher education and training.

Such a decline can have far-reaching implications for the quality and availability of higher education in India. Reduced government expenditure could lead to a lack of proper infrastructure, lower research and innovation budgets, and greater reliance on private colleges, perhaps exacerbating the gap in educational opportunities. For a nation with a high population of young people and increasing demand for skilled man and woman power, continued investment in higher education is essential for economic development and social progress.

In summary, the graph highlights a definitive decline in the share of GDP spent on higher education and training in India during the past decade. While early years indicate a high level of commitment, the declining trend indicates a call for policy reflection. Increasing funding for higher education is critical to achieve national objectives in terms of skill development, innovation, and global competitiveness. The information provided acts as a serious pointer to the difficulties involved in India's higher education with regard to public investment.

Education Availability of teachers

Table 3: Pupil-Teacher Ratio (in universities & college**)**

Year	**Pupil-Teacher Ratio**
2010-11	**26.4**

2011-12	**24**
2012-13	**24**
2013-14	**25**
2014-15	**21**
2015-16	**21**
2016-17	**22**
2017-18	**30**
2018-19	**29**
2019-20	**28**
2020-21	**27**
2021-22	**28**

Here table 3 explains statistics on student-teacher ratio in India's higher education from 2010-11 to 2021-22 provide significant trends regarding the availability and allocation of teaching faculty in terms of student enrollment. The student-teacher ratio (PTR) explains the number of students per teacher within a particular educational environment; smaller ratios typically suggest improved individual attention and quality of instruction. In 2010-11, PTR was 26.4, which marginally went up in subsequent years to stand at 24 in 2011-12 and remained constant up to 2012-13. Such an early trend indicates attempts at keeping the class size under control and improving teaching strength.

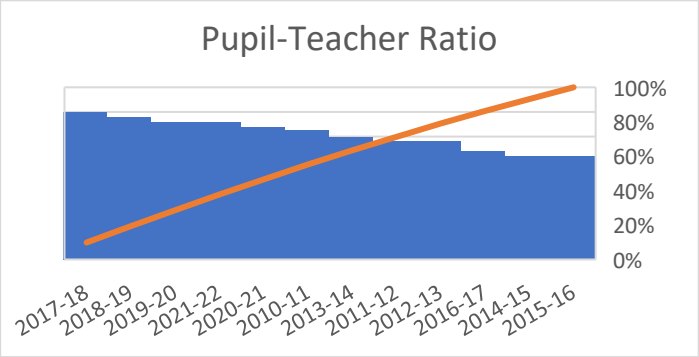
Between 2013-14 and 2016-17, the ratio also continued to be comparatively favorable, the numbers moving between 21 and 25. The PTRs of 21, which were witnessed in 2014-15 as well as 2015-16, reflect a period of being favorable in terms of teacher-pupil ratios. Such a low PTR indicates that institutions might have recruited more teachers or seen a controlled expansion in student admissions, both of which favor better academic achievement and guidance. But this improvement phase was not consistent throughout the following years.

There is a precipitous increase during 2017-18, when the PTR soared to 30—its highest in the series—reflecting a sudden skew in teacher-student ratio. This may be attributable to strong student enrollment expansion without a corresponding increase in teaching personnel, or attributable to vacancies and attrition at faculty ranks. Even though the ratio decreased marginally to 29 during 2018-19 and further to 27 in 2020-21, it continued to be above the desirable levels experienced hitherto. The ratio rose once more to 28 in 2021-22, indicating inconsistency and that perhaps the system is finding it difficult to hold optimal faculty strength among institutions.

Generally, though there were instances of encouraging development in pupil-teacher ratios between 2011 and 2016, the pattern over recent years indicates a challenge to maintain suitable faculty strength in the wake of growing student populations. This variation in PTR may affect educational quality, with increased ratios tending to result in overwhelmed teachers, less

academic attention per student, and a compromise in educational achievements. Redressing this imbalance by early faculty hiring and policy-level corrections is important to promote effective teaching and enhanced higher education quality in the long term.

Figure 3: Pupil-Teacher Ratio 2010-22



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Gross Enrollment Rate as Indicator of Education Of India

The Gross Enrollment Rate (GER) in India from 2010 to 2022 is thoroughly examined in the literature review. GER, which represents the proportion of people between the ages of 18 and 23 enrolled in higher education institutions, is a crucial indication of educational growth. In order to evaluate how educational enrollment trends interact with economic, social, and policy aspects in the Indian setting, this review gathers information from a variety of academic publications, official reports, and data sources. A thematic examination demonstrates that by promoting economic growth, social mobility, and the development of a skilled labor force, higher education not only improves individual skills but also promotes national development. Thus, education is viewed as a public and personal good that is essential to sustainability and long-term prosperity.

The number of enrolled students increased steadily over time, from 27.5 million in 2010 to 45.3 million in 2022. This increase is the result of building educational infrastructure, promoting government initiatives, and raising public awareness of the value of higher education. However, certain differences are noticeable, such as a slight decline in 2020–21 and a pause between 2014–15 and 2015–16, perhaps due to disruptions caused by the COVID-19 epidemic. Despite these sporadic periods of slow growth, the overall picture indicates a promising path toward inclusive access and the democratization of education. This ongoing expansion is essential to a thriving knowledge economy and meeting the aspirations of a youthful population.

Despite encouraging trends in enrollment, challenges remain in terms of educational quality and funding. Public expenditure on higher education, measured as a percentage of GDP, shows a declining pattern, falling from over 0.8% in the early part of the decade to just 0.52% in 2021–22. This decrease suggests a shift in fiscal priorities and raises concerns about the adequacy of investment in academic infrastructure, faculty development, and research. Without sufficient funding, it becomes difficult to maintain quality standards or accommodate the growing student base. In a country aiming to be globally competitive and innovation-driven, this underinvestment may limit progress and widen inequalities in educational outcomes.

Over the past ten years, there have also been notable advancements in gender parity in higher education. In terms of enrollment numbers, guys initially routinely outnumbered girls. But the gender disparity has shrunk considerably over time. Female enrollment increased from 12 million to 20.2 million between 2010–11 and 2020–21, nearly equal the male numbers. The influence of scholarships, awareness programs, and safer campus activities is reflected in this nearly equal representation, which indicates progress toward gender equality. Nonetheless, a minor drop in female participation in 2021–2022 suggests potential pandemic-related difficulties, like more domestic duties and less access to the internet for girls. This emphasizes the necessity of gender-sensitive strategies to guarantee that recent advancements are maintained and that strong support for female education is maintained.

The variation in the student-teacher ratio (PTR), which has a direct impact on the quality of instruction, is another urgent issue. PTRs stayed within the desirable range of 21–26 students per teacher from 2010 to 2016. The ratio, however, increased dramatically to 30 in 2017–18, suggesting a potential discrepancy between faculty recruitment and enrollment growth. The ratio has stayed comparatively high and erratic, despite a minor improvement in later years. Greater class sizes, less individualized attention, and more strain on teachers are all indicators of a high PTR, and they can all undermine the efficacy of learning. In order to address this issue and guarantee equal and balanced academic involvement, a strategic focus on faculty hiring, better working conditions, and improved administration of educational resources is necessary

These factors are spread across the country, as the manifestation of these results leads to a gap in achieving economic growth through education. These education standards are not meet by the standards required for the current needs of the nation. So, there should be increased assessment for the quality of education of a country,assesment ensures the quality is meet by the demand standards of the economy. Previously the quality of education used to be know by the faculty, no of years of experience and the degree, infrastructure of the institutions, library of the college, campus, and placement of students from the institution. But here the question arises is these factors are able to define the quality of education provided by the institution.

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more issues of having facilities, which will lead to inequalities among the students of both these areas, This inequality is the result of accumulated internal disparities. The basic role of enrollment rates is to tell the participation of 18-23 years students in higher education and disparities in the enrollment rate reflect that there is gap between the participation of students this gap could be due to several internal factors.

The literature study concludes by emphasizing that although India has achieved sign of success in increasing access to higher level and fostering inclusion, there are still issues with upholding quality, equity, and sustainable growth. The success of focused initiatives and changes is evidenced by the improved gender parity, good enrollment trends, and increased engagement from underrepresented communities. However, immediate legislative attention is required to address the problems of shifting student-teacher ratios and dwindling public investment. A balanced strategy that integrates growth, quality, and inclusivity in higher levels is crucial to accomplish future developmental fully use the potential of its youth.

Research Gaps

While extensive research exists on education and economic growth, and how it participates in the economic growth of India but there is a few gaps which was noticed during literature review.

Limited Integration of GER with Quality Indicators:

While there are ample studies that show the GER of India is increasing across all the states, but often the quality of education is not given the emphasis needed, like quality of education, which can be studied through investment by public and private institutions, pupil-teacher ratio,collgese and universities. Focusing on the quantitative aspect of the study.

Lack of Post Pandamic Study Analysis:

The majority of research on GER end before or soon after the COVID-19 epidemic, thus they don't account for the pandemic's long-term consequences on enrollment trends, particularly for underrepresented groups like women,(SC), (ST). The ways in which social upheavals, digital access problems, and economic shocks have affected higher education enrollment in the years following 2020 have not been thoroughly examined.

Regional and Socio-Economic Disparities:

Current studies frequently aggregate data at the national level, ignoring state-specific and regional variations in GER. The ways that regional policy initiatives, wealth levels, and urban-rural differences affect access to higher education are not given enough attention. This makes it challenging to comprehend regional obstacles or achievements in attaining growth in education that is equitable.

Lack of study on Gender Wise Participation:

Despite the availability of gender-based data, little is known about the underlying causes of variations in girls' enrollment, particularly the slight dip seen in recent years. The majority of the research describes gender patterns rather than analyzes them, which leaves out important aspects of how social norms, digital divisions, and financial limitations specifically impact female college students.

Underrepresentation of Intersectional Analysis:

Few studies examine intersectional factors, such as how GER differs for SC/ST girls or for marginalised females from rural versus urban environments. The complex character of educational marginalizations is often obscured, and the lack of disaggregated information limits the effectiveness of focused interventions.

Research Methodology

This dissertation employs a **Quantitative Study** based on **secondary data** approach to investigate the factors that determine the GER of India. a quantitative approach to investigate the changes and patterns in India's higher education sector's Gross Enrollment Ratio (GER) between 2010 and 2022. The research relies on secondary data analysis, using data from credible sources such as the **Ministry of Education, University Grants Commission reports and data, All India Survey on Higher Education (AISHE),** and other official publications.

Microsoft Excel and STATA tools have been used to analyse the secondary data, with initial data entry, graphical representation, and trend visualisation all done using Excel. To find the correlation between GER and influencing factors such as university, number of colleges per million population, expenditure by public bodies and average enrollment in colleges, using **time series analysis,** to explore relationship between GER and influencing factors, study of 12 years period, having quantitative data driven approach in universities, colleges, average enrollments and investment in education.

Time series analysis and comparative evaluation are used in this study to track changes over the course of twelve years. Key indicators like the number of universities, the number of colleges, expenditure and average enrollment in colleges.

Quantitative study will help us gain a better comprehension of the differences and growth patterns among various factors.

Main Secondary Sources of Data:

- All India Survey on Higher Education (AISHE)

- Ministry of Human Resource Development
- Ministry of Education
- Analysis of Budget Expenditure on Education Report

Tools used for the Study:

- **SPSS**
- **Microsoft Excel**

Table 4: State-Wise Growth in Higher Education and Institutions:

STATES	ENROLLMENT (2020-21)	GER (2020-21)	NO OF UNIVERSITIES (2020-21)	NO OF COLLEGE PER MILLION (2020-21)
ALL INDIA	41,380,713	27.3	113	31
UTTAR PRADESH	6,651,067	23.2	84	32
MAHARASTRA	4,546,149	34.9	71	34
TAMIL NADU	3,336,439	46.9	59	40
MADHYA PRADESH	2,598,561	27.1	74	40
KARNATAKA	2,440,437	36	72	29
RAJASTHAN	2,432,790	26.1	92	62
BIHAR	2,360,941	15.9	37	40
WEST BENGAL	2,215,536	21.3	52	8
ANDHRA PRADESH	1,987,618	37.2	45	13
GUJRAT	1,653,130	22.2	83	49
TELEGANA	1,573,786	39.1	31	31
KERALA	1,364,536	43.2	23	53
DELHI	1,106,271	47.6	28	50
HARYANA	1,029,159	31.1	56	8
ODISHA	1,007,022	20.7	36	34
PUNJAB	833,335	26.3	34	9
JHARKHAND	786,687	17	32	16
ASSAM	697,093	17.5	28	27
CHATTISGARH	653,405	19.6	32	40
UTTARAKHAND	620,151	45.7	37	29
JAMMU & KASHMIR	398,854	25	15	50
HIMACHAL PRADESH	289,585	38.7	29	33
MANIPUR	138,499	37.8	9	12
CHANDIGARH	110,465	66.1	3	23
MEGHALAYA	97,584	25.8	11	13
TRIPURA	92,660	19.2	5	81
PUDUCHERRY	91,253	60.8	4	32
GOA	60,285	33.8	3	27
ARUNACHAL PRADESH	59735	33.7	10	28
NAGALAND	46,954	17.3	5	31
MIZORAM	38,710	26.8	3	30
SIKKIM	34,774	39.9	8	17
ANDOMAN & NICROBAR ISLAND	11,965	24.3	0	14

Table 4, Key data on higher education in each Indian state for the 2020–21 academic year is shown in the table. Total enrollment, the Gross Enrollment Ratio (GER), of colleges per million , and the number of universities are all included. With a GER of 27.3, India had over 41 million higher education enrollments nationwide, meaning that slightly more than 25% of the eligible population (18–23 years old) was enrolled in higher education. There were, on average, 31 colleges per million people nationwide.

With 6.6 million students enrolled, Uttar Pradesh had the most, followed by Tamil Nadu and Maharashtra. Nonetheless, states such as Tamil Nadu, Delhi, and Chandigarh recorded noticeably higher GERs, indicating that a more culstured of the eligible youth were in college. For example, Chandigarh had the highest GER (66.1), followed by Delhi (47.6) and Puducherry (60.8), indicating greater access to or involvement in higher education in relation to the population.

The information demonstrates regional differences in infrastructure and access to higher education. While larger northern states continue to lag in GER and college density despite enrolling large numbers of students, southern and union territory regions generally performed better in these areas. With an emphasis on building infrastructure and enhancing access in underserved states, these disparities highlight the need for more equitable education planning.

Regression Model:

$$GER = \beta_0 + \beta_1 \times University + \beta_2 \times Colleges + \beta_3 \times Expenditure + \epsilon$$

$GER = \beta_0 + \beta_1 \times University + \beta_2 \times Colleges + \beta_3 \times Expenditure + \epsilon$ is a multiple linear regression model created to examine the factors that influence the Gross Enrollment Ratio (GER). The number of colleges, universities, and public spending on education are the three main variables that this model seeks to quantify both individually and collectively. Since GER is the dependent variable, it is the result that we are trying to forecast or explain. In educational research, the model is especially helpful for figuring out how differences in investment and infrastructure relate to access to higher education.

When all independent variables (University, Colleges, and Expenditure) are zero, the model's intercept term, β_0, represents the expected value of GER. This provides a baseline reference even though it might not have any practical significance. The regression coefficients for the independent variables, University, Colleges, and Expenditure, are denoted by the terms β_1, β_2, and β_3, respectively. Assuming all other variables remain constant, these coefficients calculate the average change in GER for a one-unit increase in each independent variable. For instance, if β_1 is 0.016, it means that, all other things being equal, GER rises by 0.016 units for every extra university.

The variation in GER that cannot be calculated with the variables included is captured by the error term (ϵ). This covers any omitted variable that might affect GER, including policy differences, cultural attitudes, educational quality, socioeconomic status, and others. The inclusion of ϵ recognizes that no model is flawless and that measurement errors, randomness, and

unintended consequences can affect real-world data. In terms of statistics, it is assumed that the error term is normally distributed.

This model's primary goal is to determine whether and to what extent each independent variable influences GER. A significant relationship between that variable and GER is implied if the estimated coefficients . For example, we can conclude that greater public investment is linked to higher enrollment in higher education if expenditure has a significant positive coefficient. By demonstrating which levers—funding or infrastructure—are most successful in enhancing enrollment outcomes, the model also aids in the evaluation of policies.

This equation gives policy recommendations a quantitative basis when used in empirical research. It helps researchers to draw conclusions that are supported by evidence rather than relying solely on descriptive or anecdotal observations. Additionally, the model's goodness of fit, which is typically determined by the R-squared value, shows how much of the variation in GER can be explained by the model. A high R-squared indicates that the model fits the data quite well (for example, 0.96 in your results). In conclusion, this regression equation helps stakeholders make well-informed decisions to increase enrollment and is a useful analytical tool for researching the dynamics of higher education in India.

Table 5: Results from Regression Analyses

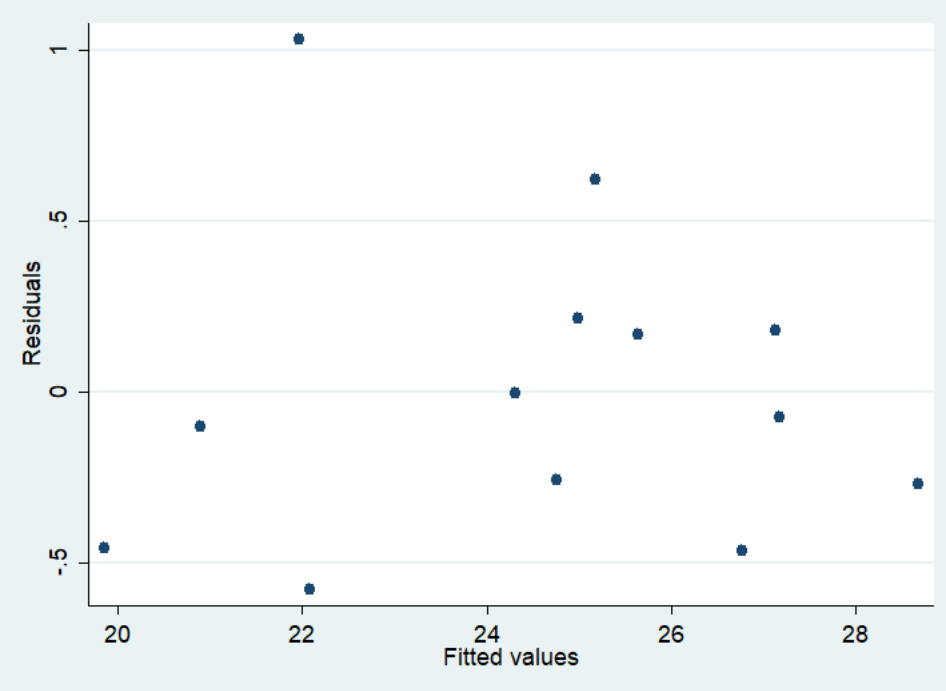
```
. regress GER UNIVERSITY COLLEGES EXPENDITURE

      Source |       SS           df       MS      Number of o
> bs    =        13
-------------+----------------------------------   F(3, 9)
>       =     82.66
       Model |  84.7711583         3  28.2570528   Prob > F
>       =    0.0000
    Residual |  3.07653354         9   .34183706   R-squared
>       =    0.9650
-------------+----------------------------------   Adj R-squar
> ed    =    0.9533
       Total |  87.8476918        12  7.32064099   Root MSE
>       =    .58467

------------------------------------------------------------------------------
> -----------------
         GER |      Coef.   Std. Err.      t    P>|t|     [95%
>  Con
>     f. Interval]
-------------+----------------------------------------------------------------
> -----------------
  UNIVERSITY |   .0164438    .001079    15.24   0.000      .014
> 0029
>          .0188847
    COLLEGES |   1.80e-06   1.82e-06     0.99   0.348    -2.32
> e-06
>          5.92e-06
 EXPENDITURE |   1.090976   .2876669     3.79   0.004     .440
> 2278
>          1.741723
       _cons |  -6.151987   4.824122    -1.28   0.234    -17.0
> 6491
>          4.760934
```

The regression model examines the effects of education spending, the number of colleges per million population, and the number of universities on the Gross Enrollment Ratio (GER) in each Indian state. The overall F-statistic is highly significant ($F = 82.66$, $p < 0.001$), indicating a strong model fit, and the model explains 96.5% of the variation in GER with an R-squared value of 0.965.

The number of universities ($\beta = 0.0164$, $p = 0.000$) and education spending ($\beta = 1.09$, $p = 0.004$) are statistically significant among the predictors. This shows that there is a correlation between GER and increases in these variables. However, the number of colleges per million ($\beta = 1.80e\text{-}06$, $p = 0.348$) is not significant, indicating that enrollment may not be impacted by quantity alone unless quality or accessibility are also present.

the findings show that while merely adding more colleges might not have the same impact without strategic support, growing universities and raising educational spending are both efficient methods to increase GER.

Figure 4: Residual VS Fitted Values

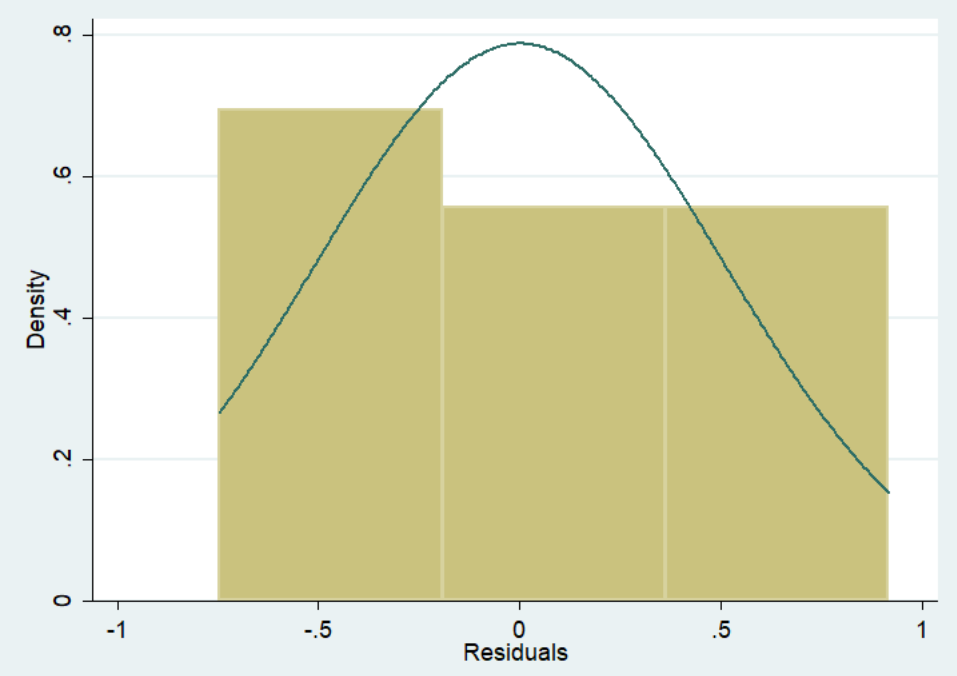


This Residuals vs Fitted Values plot

serves to evaluate the quality and assumptions of the regression model. Ideally, the residuals is the (the differences between actual and predicted GER should be randomly distributed around the zero line, without exhibiting any distinct pattern. In this plot, the residuals are relatively evenly spread across the fitted values, indicating no significant evidence of Variance (i.e., the variance of the errors does not seem to increase or decrease systematically with the predicted values).

Moreover, the absence of any curved or funnel-shaped patterns in the graph suggests that the relationship between the independent variables and GER is linear, which is a fundamental assumption for linear regression. Therefore, the residuals vs fitted plot reinforces that the predictions generated by the model are generally dependable across the spectrum of fitted GER values.

Figure 5: Residuals Follow a Normal Distribution

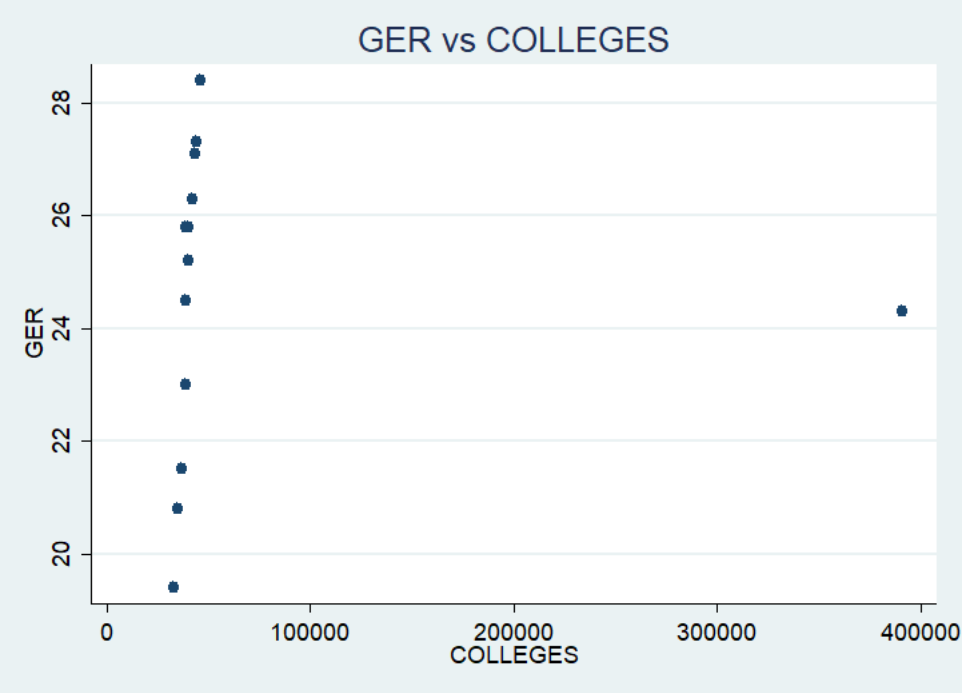


ϵ in the model adheres to a normal distribution, which is a crucial assumption for the integrity of hypothesis tests (such as the significance of coefficients). In your graph, the residuals seem to approximately conform to the bell-shaped curve, suggesting that the deviations from the predicted GER values are distributed randomly and symmetrically. This reinforces the reliability and validity of the regression coefficients derived from your model.Consequently, this plot enhances your model's credibility by demonstrating that the regression errors do not exhibit significant deviations from normality, indicating that the predictors (University, Colleges, and Expenditure) maintain a consistent and interpretable relationship with GER (Gross Enrollment Ratio).

DW test:

The Durbin-Watson statistic for the regression model is 2.47, indicating that the errors are predominantly independent of each other. The lack of autocorrelation supports a fundamental assumption of the CLRM the reliability of the estimated relationships between the Gross Enrollment Ratio (GER) and the explanatory variables—namely, the number of universities, colleges, and expenditures.

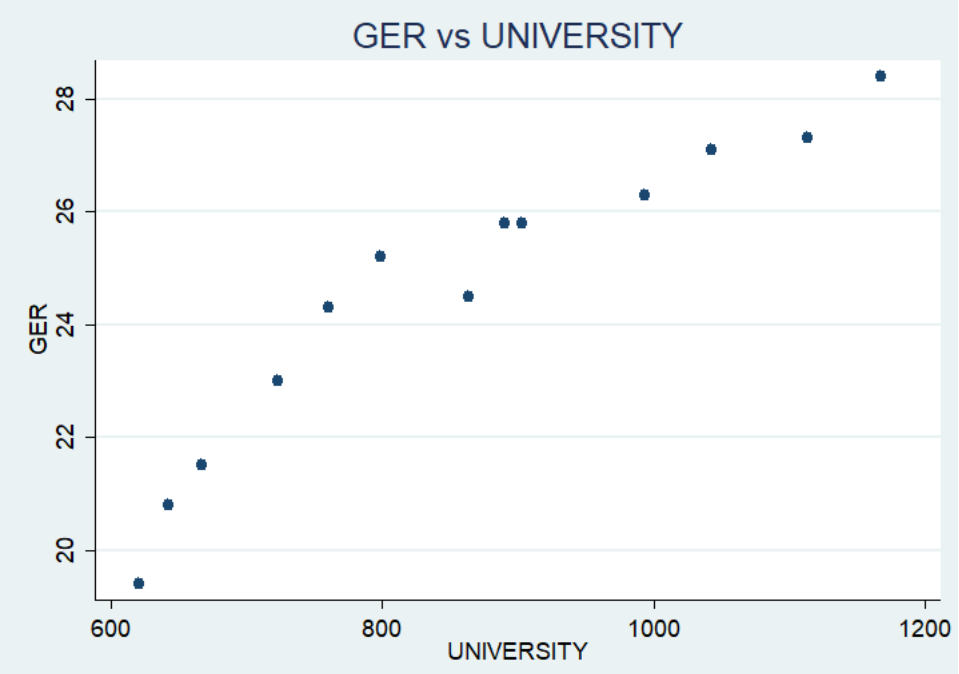
Figure 6: GER vs Colleges



The scatterplot illustrating the relationship between GER and the number of colleges reveals a significantly skewed distribution, characterized by a prominent outlier that indicates an unusually high count of colleges. The majority of data points cluster within a considerably narrower range of college numbers, implying that this outlier could be associated with states such as Uttar Pradesh or Maharashtra. This skewness results in a weak or distorted perception of the relationship between GER and the number of colleges, complicating the ability to establish a direct conclusion regarding any positive or linear correlation.

Factors including accessibility, educational quality, and regional inequalities may exert a more significant influence. This also indicates the necessity to either normalize the variable (for instance, colleges per lakh population) or to take into account more qualitative dimensions of higher education infrastructure.

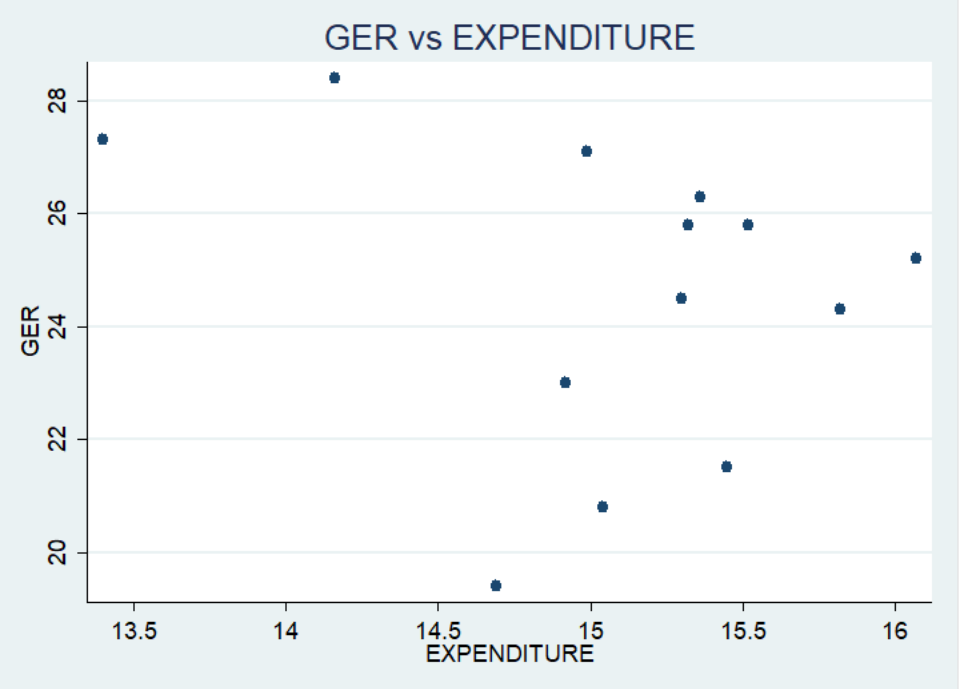
Figure 7: GER vs University



This scatterplot illustrates a significantly clearer positive trend, where the (GER) rises in conjunction with the number of universities. The data points are more evenly distributed, suggesting a relatively stable relationship. States that possess a greater number of universities generally exhibit higher GERs, indicating that the enhancement of university-level infrastructure directly influences student enrollment in higher education.

this supports the hypothesis that institutional capacity, especially regarding universities, is vital for improving access to colleges, the appreciation in the number of universities may signify broader investments in quality, research, and administrative management — all of which can lead to enhanced enrollment. Consequently, the number of universities serves as a robust and dependable explanatory variable in your regression model for GER.

Figure 8: GER vs Expenditure



The scatterplot that compares GER with education expenditure reveals a scattered array of points without a distinct or strong trend. While a few states exhibiting higher GER appear to cluster around similar levels of expenditure, the variation in GER within nearly identical expenditure ranges suggests that expenditure alone does not dictate enrollment results. Certain states with comparable public education spending demonstrate markedly different GERs, indicating potential inefficiencies or varying policy priorities.

This finding supports the argument presented that merely allocating resources is insufficient; the effective use of funds is equally crucial. States may possess similar budgets yet differ significantly in their implementation efficiency, governance, and policy design, which subsequently influences the GER. These findings highlight the necessity of supplementing financial investment data with qualitative assessments of policy and efficiency metrics when analyzing enrollment outcomes in higher education.

Limitations and Considerations

- **Statistical Insignificance of College:**

The variable "colleges" was found to be statistically insignificant, which may be attributed to the presence of outliers or the application of absolute figures rather than normalized data (for instance, colleges per lakh population).

- **Exclusions of Qualitative Factors:**

The expenditure data may not accurately represent the efficiency or effectiveness of spending, potentially diminishing its explanatory power regarding GER.

- **Limited Scope of Variable:**

The model comprises only three variables: universities, colleges, and expenditure. However, the Gross Enrollment Ratio (GER) is affected by numerous other factors, including the quality of education, access to digital resources, gender inequalities, and socioeconomic conditions.

Policy Implications

- **Enhance University Infrastructure**

indicates that expanding university infrastructure is a crucial strategy to enhance access to higher education. Policies should prioritize the establishment of universities in underserved areas, particularly in states with lower GER and fewer higher education institutions

- **Emphasize Quality over Quantity**

The analysis revealed that the number of colleges does not significantly impact GER, potentially due to uneven distribution, quality concerns, or redundancy. Rather than merely increasing the number of colleges, policies should concentrate on enhancing their quality, accreditation, faculty standards, and accessibility.

- **Ensure Effective Use of Public Expenditure**

Although education expenditure shows a positive correlation with GER, the scatterplot indicates that similar spending levels can yield varying outcomes. Policies must not only aim to increase funding but also ensure effective planning, implementation, and monitoring mechanisms for the optimal utilization of resources.

Conclusion

Universities have a significant and positive impact on GER, indicating that expanding university infrastructure increases higher education access.

The number of Colleges did not show a statistically significant effect, suggesting that quality and equitable distribution matter more than just quantity.

Public Education Expenditure positively affects GER, but efficiency in utilisation varies across states.

Outliers and data skewness (e.g., in colleges) can distort interpretations, highlighting the need for normalised or per capita metrics.

Model diagnostics confirm a good fit ($R^2 = 0.965$), normal distribution of residuals, and no autocorrelation (DW = 2.47), validating the reliability of the regression.

Policy focus should shift toward quality, equity, and efficient governance rather than just infrastructure expansion.

In consideration of these findings, the dissertation concludes that merely increasing educational infrastructure is insufficient. Rather, focus should be directed towards the establishment and upkeep of high-quality institutions—particularly universities—and ensuring that financial resources are utilized effectively. Consequently, policymakers must embrace a strategic and evidence-driven approach that emphasizes equitable access, institutional efficiency, and educational quality. Future research should delve deeper into these aspects, incorporating longitudinal studies and qualitative assessments of educational success, to further bolster India's higher education development objectives.

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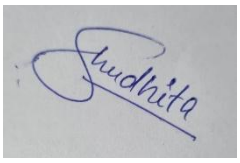

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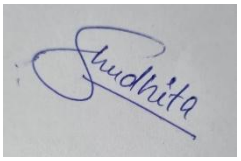

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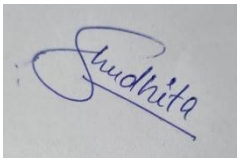

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