

Gender Parity of Doctoral Level LIS Research in India: A Chronological and Chorological Study

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ABSTRACT

The present paper aims to examine the chronology (temporal) and chorology (spatial) dimension of doctoral-level research in Library and Information Science (LIS) in India from a gender perspective. 3643 doctoral dissertations awarded in different university departments offering LIS research in India from 1969 to 2020 have been studied from a gender perspective. The relevant data on 3643 doctoral dissertations have been accessed from the website of *Shodhganga* (UGC-INFLIBNET), a repository of doctoral dissertations. The gender parity is examined through the calculation of the Gender Disparity Index (GDI) using Kundu-Rao's method, which is a modified form of Sopher's Disparity Index. For the depiction of temporal trends and regional patterns, different cartographic techniques such as choropleth mapping and other cartograms, such as line and bar diagrams, have been used. The study result depicts large-scale gender disparity regionally, with higher disparity existing in the eastern region, moderate in the central, south, and western regions, and low disparity in the north, and north-eastern regions. It is further revealed, in this study, that the gender disparity has lessened over a period; however, the pace of decrease disparity has been steeper during the period 2005-2023 with a steeper surge in the number of Ph.D. dissertations. The scenario of high disparity during the initial years (1975-1995) and moderate during the period 1995-2005 may, however, be linked to the proliferation of Ph. D. and progressive societal change.

Keywords: Gender Disparity, Spatio-temporal Pattern, Chronological Trend, Chorological Pattern, Disparity Index.

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Received: 16-03-2026;

Revised: 06-05-2026;

Accepted: 29-06-2026.

INTRODUCTION

Library and Information Science (LIS) education in India is a relatively new discipline developed in the early 20th century with its maiden journey at the Imperial Library (now National Library) at Kolkata in the year of 1901 (Mollah, 2013). A different viewpoint prevails alongside; as per some views, education in LIS traces its original roots in the Baroda School, which was set up in 1911 (Neelamegha, 1974) in India and therefore it is augmented in scope with great popularity. Subsequently, there has been no looking back in LIS education since the establishment of LIS at Punjab University, Lahore in 1915 (Kumar & Sharma, 2009), the opening of Library schooling in Madras University in 1929 by the legendary Ranganathan (Patel & Kumar, 2001) and diploma course in Andhra University in 1935 (Kumar & Sharma, 2010). Library Science education flourished during the post-independent period when the University of Delhi introduced bachelor's and

master's degrees in 1949 and the University of Calcutta initiated the bachelor's degree in 1969 (Krishan, 1973). There is now at least one university in almost every state of India where LIS courses are being offered, hence the publication of library science is increasing day-by-day (Parabhoi *et al.*, 2020; Singh & Babbar, 2014).

Doctoral level research is not only a measure of research productivity but also of the yielding competent workforces which are indispensable for modern information communities (Andersen & Hammarfelt, 2011). Therefore, research at doctoral dissertations in various disciplines and nations has obtained quite a few interests (Anwar, 2004; Breimer, 1996; Herubel, 2007; Macauley *et al.*, 2010; Sebo *et al.*, 2021; Villarroja *et al.*, 2008; Zainab, 1999). A good number of researchers analysed the doctoral dissertations in LIS awarded in Indian universities concerning their chronological growth and state-wise, university-wise as well as supervisor-wise production pattern (Madasamy & Alwarammal, 2009; Mahapatra & Sahoo, 2004; Pandita & Singh, 2017). The methods used and topics of the LIS dissertations are extensively studied in some other studies (Finlay *et al.*, 2012; González-Alcaide *et al.*, 2008; Lahiri, 1996). Citation pattern of LIS dissertations is another important dimension of studies (Buttler, 1999; Gao *et al.*, 2009). Studies on the LIS at



DOI: 10.5530/jscires.20251834

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doctoral level research in West Bengal have been conducted by several researchers and it is explored that Jadavpur University is awarded the majority of Ph. D. dissertations (Chakrabarti *et al.*, 2020; Mondal & Roy, 2017; Sarkar *et al.*, 2013).

Parvazian *et al.* (2017), opined that higher education globally has shifted from elite to mass and there has been a booming presence of females which may be treated as an indicator of societal development. The disparity comes from the social discrimination and variations in socio-economic characteristics of a society (Nightingale & Scott, 2007). It is not easy to differentiate the discrepancy and discrimination (Dyson & Moore, 1983) that exists in higher education, including LIS research. Gender identity is often an impediment for females in the academic area, a place dominated by men for a long period (Van Arensbergen *et al.*, 2012; Zainab, 1999). The reasons for gender inequality are sometimes hard to realise and are associated with gender relationships in many different parts of the world (Baro *et al.*, 2009). Though gender inequality is a dire topic in higher education demanding immediate heed (Jacobs & Winslow, 2004; London *et al.*, 2012; Mayer & Tikka, 2008; Wolfinger *et al.*, 2009) and equality being still not attained in many cases, there is a mounting involvement of females in research activities within the western countries (Mendlowicz *et al.*, 2011). Thelwall *et al.* (2019), examined gender inequality in research publishing in India by surveying research publications from 186 research fields in 2017. Their findings revealed that there are 2.8 male first authors for every female first author, highlighting a significant gender disparity.

Several research studies have highlighted the higher level of research productivity of males, much higher than the female researchers (Abramo *et al.*, 2009; Ebadi & Schiffauerova, 2016; Fox, 2005; Leahey, 2006; Peñas & Willett, 2006; Sotudeh & Khoshian, 2014; Stack, 2004; Xie & Shauman, 1998). On the other hand, there are some studies where there is no difference in the research productivity of males and females or witnessed a very slight disparity in their performances (Borrego *et al.*, 2010; Carr *et al.*, 1993; Van Arensbergen *et al.*, 2012). During a span of a little over one century of LIS education in India and around a half-century of doctoral-level research, a considerable gender gap and gender disparity have been noted in the field. It showed a spatio-temporal variation as well, which has been noticed for overall gender parity in India (Government of India, 2018). The AISHE (2018) depicts gender disparity to such an extent that around 100 thousand men have enrolled to PhDs, contrary to only 65,000 women in the 2017-18 academic year.

This study, intended to study inequality and disparity between groups, is an important dimension in social science. A problem crops up when we wish to compare the magnitude of inequality among pairs of groups. Sopher (1974) in his work calculated the disparity between two groups of population based on the percentages of their populations having a particular property. But gender disparity is not always localised in a selected part of the

world but is conspicuous in all sections of societies with varying magnitude (Eloy *et al.*, 2013; Franklin & Jaeger, 2007; Larivière *et al.*, 2011, 2013). If it is believed that publications are closely associated with research activities, then the more research work, the more publications there will be. Golub (2010) and Scarman (2013) assumed that LIS education is much more accepted by females as an academic discipline, but curiously enough, in the case of research publications, males are dominating the females (Baro *et al.*, 2009; Gul *et al.*, 2016). Sampath Kumar *et al.* (2018), examined gender disparity in LIS research productivity and found that the overwhelming majority, nearly three-fourths of the research products, are the contribution of males during the period 2008 to 2017. Vinay and Sampath Kumara (2022), on the other hand, studied women's authorship in Indian LIS journals and found that when it's female-male authorship combination, it's 60% and only female authorship and female-female combination of authorship, respectively, 22% and 18% exhibiting a large-scale gender disparity. Further, a bibliometric study conducted by Vinay *et al.* (2019), on gender divergence in two Indian LIS Journals revealed that as high as 73.33% papers are contributed by male authors, whereas only 26.67% of the articles are published by female authors.

A review of relevant literature clearly exhibits prevailing gender disparity in LIS research; however, there is no credible publication revealing a spatial pattern and temporal trend in this context. Even the subject area-wise and university-wise gender disparity in LIS research is quite inconspicuous. Under such circumstances, the present study is designed to fill the research gap. This study, thus, fills the gap in the existing literature in terms of gender equity, regional gender imbalances, and highlights gender inclusive academic participation.

Significance of the study

This study has immense significance as it deals with a comprehensive gender-based investigation of doctoral research trends in the field of Library and Information Science (LIS) in India over the last five decades. The study explores the chronological and chorological dimensions of doctoral-level research in Library and Information Science (LIS) in India from the perspective of gender through analyzing as many as 3,643 doctoral dissertations completed between 1969 and 2020, which is sourced from *Shodhganga*. By tracing temporal shifts and regional disparities with the help of the Gender Disparity Index (Kundu-Rao's Disparity Index) and cartographic techniques such as line graph and choropleth, etc., the research marvels at the evolving role of women in LIS academia. It emphasises the impact burgeoning of education and socio-cultural change on gender parity, especially post 2005. The findings point to valuable intuitions for policymakers and planners, educators and educational planners, and institutions to address gender disparities and imbalances, promote inclusiveness in higher education, and embolden the participation of women in research and academic governance within the LIS domain. This

has, therefore, significant value to the policymakers desiring to reduce gender disparity.

OBJECTIVES

The present study is designed to bring out the development and trend of doctoral-level research works in LIS in Indian universities through bibliometric studies with special emphasis on the gender perspective. The following are the objectives of the present study:

1. To examine temporal (chronological) trends of gender parity among LIS researchers.
2. To find regional (chorological) patterns of gender parity among LIS researchers.
3. To assess gender parity among LIS researchers in different universities and states.
4. To evaluate the subject area-wise distribution of LIS dissertations with gender parity in it.

METHODOLOGY

The data used for the present study are taken from the *Sodhganga* website (<https://shodhganga.inflibnet.ac.in/>) which is a reservoir of Indian dissertations, a project under the UGC-INFLIBNET. The list of LIS doctoral dissertations with their bibliographic details is available on the same website. It was noticed that some of the entries were of master's projects but included in the list of doctoral dissertations, some other dissertations that are not LIS dissertations even then included in the LIS list, and in some other cases, the same doctoral dissertation has multiple entries. Rigorous screening and filtering were carried out to weed out such misplaced and irrelevant entries. In spite of all efforts, the data for the period 2020-23 is incomplete due to the time lag to upload dissertations in the *Sodhganga* website. Moreover, this period is only 3 years, unlike 5 years for the other periods, which may give a wrong impression as the number of dissertations is substantially low during 2020-23.

Gender inequality is measured using the Kundu-Rao (1986) disparity Index derived from the one Sopher devised in 1980. It calculates the disparity between two groups, males and females.

Sopher's Disparity Index is expressed, as per the 1974 version, as:

$$DI = \left[\frac{p(1-q)}{q(1-p)} \right]$$

where p and q are the probabilities of the two groups, male and female $p \geq q$.

David Sopher (1980) subsequently provided an alternative and improved formula for calculating the disparity index, which is written as follows:

$$DI = \log \left[\frac{p(1-q)}{q(1-p)} \right]$$

where p and q are the probabilities of two groups, male and female $p \geq q$.

Alternatively, he also used

$$DI = \log \frac{x_1}{x_2} + \log \left\{ \frac{(100 - x_2)}{(100 - x_1)} \right\}$$

Where x_1 and x_2 are the percentages of these by male and female researchers, respectively, and also $x_1 \geq x_2$.

Kundu and Rao^[61] have found that the above index devised by Sopher^[62] fails to satisfy the additive monotonicity axiom. They have, to overcome the problem, proposed a modified index as given below:

$$DI_{KR} = \log \left[\frac{p(2-q)}{q(2-p)} \right]$$

where p and q are the probabilities of two groups and $p \geq q$.

Alternatively, it can be written as:

$$DI_{KR} = \log \frac{x_1}{x_2} + \log \left\{ \frac{(200 - x_2)}{(200 - x_1)} \right\}$$

Where $x_1 \geq x_2$ and x_1 and x_2 are the percentages of dissertations by male and female researchers respectively.

RESULTS AND DISCUSSION

Chronology of gender disparity

The overall temporal trends of total doctoral dissertations completed during the period 1969 to 2023 show a very slow start during the initial one-third period (1969-1990) where only a few doctoral dissertations were completed. Thereafter, slowly the number of doctoral dissertations started increasing in the next fifteen years with a moderate growth rate where it grew to a humble figure of 241 in 2005 from only 33 in 1990. During the period of 2005 to 2020, it witnessed a very sharp increase in the number of dissertations recording a growth of 241 in 2005 to a staggering 1306 in 2020 registering approximately 442% growth.

The temporal trends in gender disparity in doctoral-level research in LIS in India may be shown through a percentage of research scholars (M-F) as well as research guides (M-F) over the years. Temporal trends in the share of scholars and the changes that have been caused by the several socio-economic and cultural environments as well as administrative decisions, may be examined using temporal data. It has been observed through the analysis of data related to this dimension that three well-defined periods can be identified with an initial period (1969-1990) of very high disparity where female researchers were even less than one-fourth of the total researchers followed by a second period (1990-2005) of moderate disparity (24.99% females) and a comparatively low disparity in the 2005-2020 period (Figure 1) with 33.45% female researchers. However, there is a record of further decline of gender disparity with 38.83 per cent females in the period 2020-23 where the full data is not available.

Gender Disparity in Productivity over the Period

Gender disparity in productivity in doctoral-level dissertations calculated using the Kundu-Rao disparity index over the period 1969 to 2023 shows a steep upward movement during the initial stage. In the period 1969-1990, where there has been an increase in the disparity index from 0.00 to 1.24. The inconspicuousness of female researchers in the initial stage is in concurrence with the overall trend of other disciplines during the period. Gender disparity in productivity is found to be sliding down to a very low of 0.50 during the period 1990-1995 with a slight up in the period 1995-2000 reaching a figure of 0.73. Subsequently, there is a slow but steady downward trend in gender disparity in productivity during the period 2000-2020. However, the last stage of the 8-year period (2015-2023) witnessed a flattening of the curve showing a gender disparity with figures of 0.31 and 0.26. This phenomenon indicates enhanced productivity of female researchers, which may have been caused by reclaiming their space and greater participation. Certain Govt and UGC policies such as age relaxation and relaxation on duration etc., might have encouraged female researchers.

It's quite interesting to note that the gender gap and the total number of doctoral dissertations completed have a reverse relationship over the study period. It can be seen from Figure 2 that over the period, the gap has reduced with an increasing number of dissertations. This trend has a direct relationship with changes in society and attitudes towards members of fair sex. Over the period, society has significantly opened up, and

has made space for females to join doctoral-level research which worked behind such a trend depicted in Figure 2. Thus, it can be easily deciphered that societal change in attitude has played an important role in women's participation as a researcher.

Regional gender disparity

The regional dimension of gender disparity may form an important aspect of the investigation of the bibliometric study of doctoral dissertations in LIS. Regional patterns based on the percentage of research scholars (M-F) over the years may be used to assess the rudimentary form of the chorological scenario of gender disparity in doctoral dissertation. As such the temporal change in spatial dimension in gender disparity is the reflection of overall gender disparity during the study period. Several studies of regional patterns of gender disparity in education have been conducted to assess the impact of gender on educational achievement (Husain, 2010; Kundu & Rao, 1986; Larivière *et al.*, 2011; Ramotra, 1988). Husain (2010) examined regional patterns in gender disparity in school education, where he divided India into three regions, namely, North, East, and South.

For the study, we have divided India into the following six regions:

- Northern Region: Uttar Pradesh, Uttarakhand, Delhi, Haryana, Punjab, Chandigarh, J & K, Ladakh, and Himachal Pradesh.
- North-Eastern Region: Sikkim, Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Meghalaya, and Tripura.

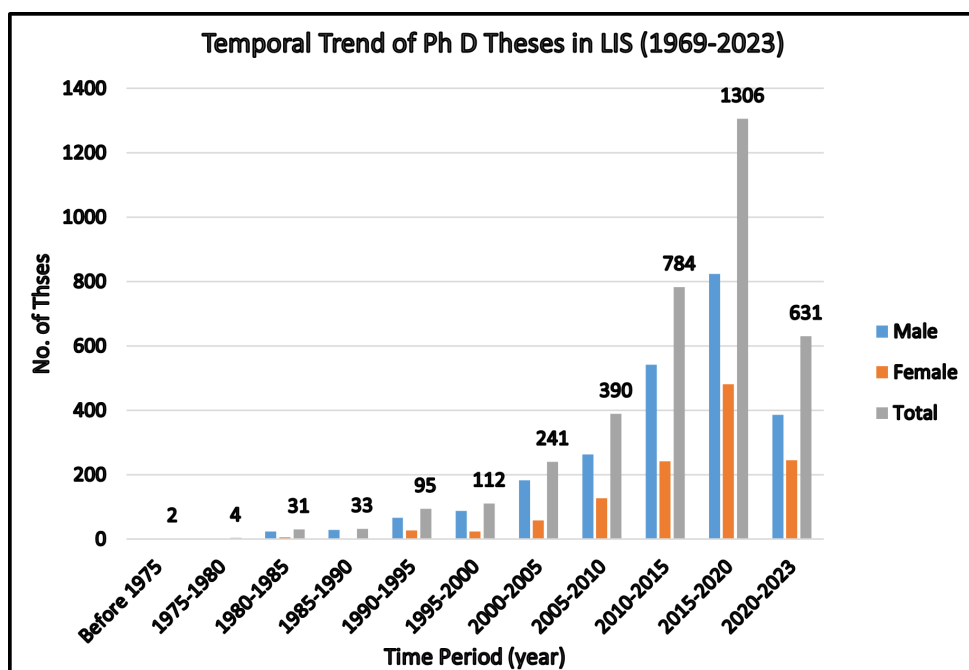


Figure 1: Chronological trend of LIS dissertations produced in Indian universities.

Note: The period 2020-2023 is not a 5-year period and the problem of incomplete uploading of the thesis is also there.

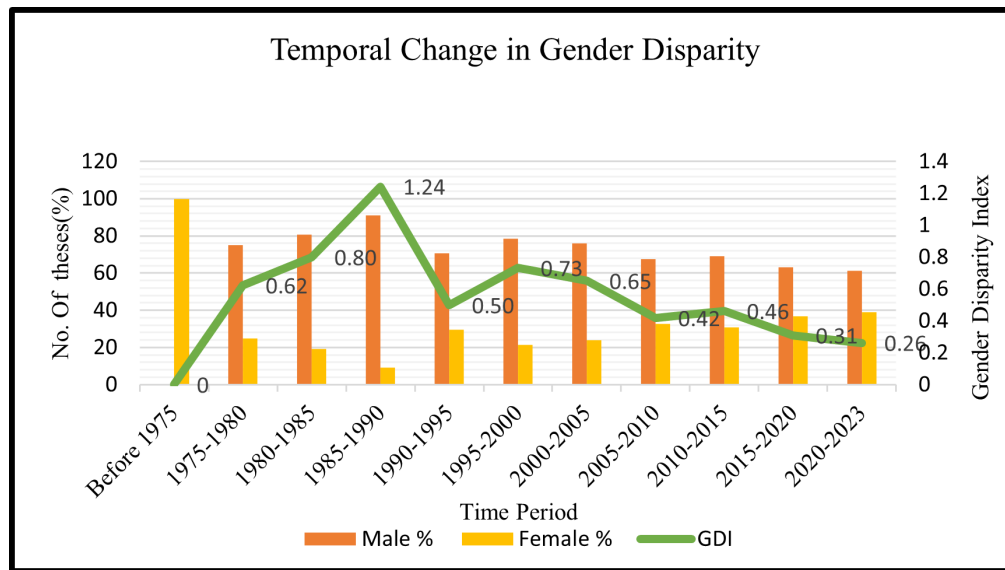


Figure 2: Temporal trend in gender disparity in dissertation productivity.

- c) Eastern Region: West Bengal, Bihar, Jharkhand, Odisha, and Andaman & Nicobar Island.
- d) Southern Region: Karnataka, Andhra Pradesh, Tamil Nadu, Kerala, Pondicherry, and Lakshadweep.
- e) Western Region: Maharashtra, Goa, Gujarat, Rajasthan, Lakshadweep, Daman & Diu, and Dadra & Nagarhaveli.
- f) Central Indian Region: Madhya Pradesh, Chhattisgarh, and Telangana.

*14 dissertations are included in Table 1 as the name of the university is available but the year of submission is missing, hence excluded in the case of Figures 1 and 2.

While examining the regional pattern closely, one may find that the regional pattern also has a somewhat grouping tendency where two regions, namely the southern and western regions, have produced the highest number of doctoral dissertations, with a tally of 1587 and 744, respectively (Figure 3). The northern and eastern regions are in the moderate group, with a tally of 552 and 380 doctoral dissertations completed during the study period. Similarly, the north-eastern and central regions, with a tally of 211 and 169 dissertations, occupy the lowest position as a group. So far, the regional pattern of gender disparity in the number of doctoral dissertations is concerned, it has been found that the disparity is the highest in the eastern region, with a Kundu-Rao Disparity Index of 0.52 and a gender gap of 42.63 percent. The lowest disparity is observed in the northern region with a Disparity Index of 0.28 and a gender gap in terms of percentage point of 23.56. It may be noted here that the regions with a large number of doctoral dissertations in LIS such as southern and western regions have recorded relatively higher gender disparity (DI=0.30-0.45) as compared to the regions with a relatively smaller number of doctoral dissertations such as north-eastern (0.30 and

central (0.37) regions which have the lower gender disparity (DI=<0.3) in terms of dissertation production by research scholars. On the other hand, the eastern region has the highest disparity index (DI=0.52) with the all-India disparity index of 0.39.

Table 2 outlines the regional pattern of gender disparity in doctoral-level research work in LIS using state-level data. States like Tamil Nadu (21.47%), Karnataka (11.20%), and Maharashtra (12.65%) dominate in the total number of dissertations. Gender-wise, men consistently outnumbered women, with Telengana, Odisha, Pondicherry, Gujarat, and Karnataka reflecting the largest gender disparities (GDI values of 1.05, 67, 0.58, 0.54, and 0.59). Conversely, states like New Delhi (GDI = 0.04), Chhattisgarh (GDI = 0.11) and Mizoram (GDI = 0.13) indicate relatively smaller disparities, demonstrating a closer balance in male and female contributions. It's only Bihar that recorded perfect parity among both genders, having a Disparity Index of 0.00, as the state has returned only two entries, one in favour of males and another in favour of females.

University-wise gender disparity

University-wise study of gender disparity based on the number of doctoral dissertations by male and female researchers may form an important segment of a bibliographic study. Out of a total of 3643 doctoral dissertations completed in LIS in different Indian universities during the study period, the top 20 universities in terms of production of dissertations have been analysed in view of viability within the scope of the study (Table 3).

It has been observed in the gender disparity of the top 20 universities (Figure 4) that the Swami Ramanand Teerth Marathwada University (GDI = 1.07), Karnatak University (GDI = 0.93), Dr. Babasaheb Ambedkar Open University (GDI 0.76), and University of Mysore (GDI = 0.66) exhibit significantly higher male dominance. Conversely, universities like Panjab

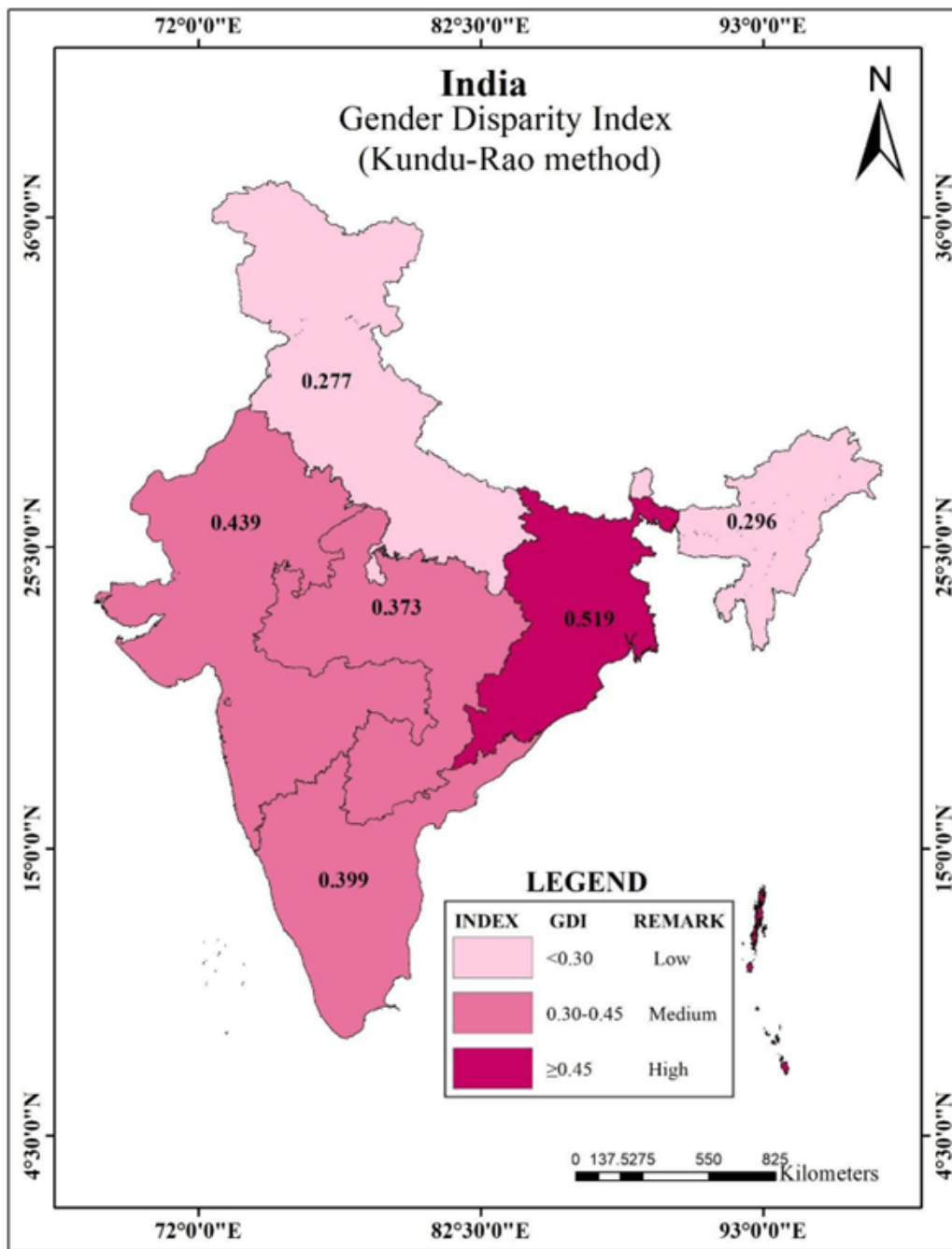


Figure 3: Region-wise gender disparity indices of LIS doctoral dissertations in India.

Table 1: Regional pattern of gender disparity index of LIS doctoral dissertations in India.

Region of India	Male	Female	Total	Male (%)	Female (%)	Gender Disparity Index (GDI)
Northern Region	341	211	552	61.78	38.22	0.28
North-Eastern Region	132	79	211	62.56	37.44	0.30
Eastern Region	271	109	380	71.32	28.68	0.52
Southern Region	1059	528	1587	66.73	33.27	0.40
Western Region	508	236	744	68.28	31.72	0.44
Central India Region	111	58	169	65.68	34.32	0.37
Total	2422	1221	3643*	66.48	33.52	0.39

Table 2: State-wise production of LIS dissertations and gender disparity.

States	Male	Female	Total	Male (%)	Female (%)	Percent to grand total	Disparity Index (DI)
(1)	(2)	(3)	(4)	(5)=(2)/(4)*100	(6)=(3)/(4)*100	(7)=(4)/Grand Total*100	(8)
Andhra Pradesh	141	62	203	69.46	30.54	5.57	0.47
Assam	54	31	85	63.53	36.47	2.33	0.32
Bihar	1	1	2	50.00	50.00	0.05	0.00
Chhattisgarh	34	28	62	54.84	45.16	1.70	0.11
Gujarat	115	45	160	71.88	28.13	4.39	0.54
Haryana	17	8	25	68.00	32.00	0.69	0.43
J&K	22	16	38	57.89	42.11	1.04	0.18
Karnataka	301	107	408	73.77	26.23	11.20	0.59
Kerala	102	77	179	56.98	43.02	4.91	0.16
Maharashtra	315	146	461	68.33	31.67	12.65	0.44
Manipur	18	13	31	58.06	41.94	0.85	0.19
Meghalaya	35	15	50	70.00	30.00	1.37	0.48
Mizoram	25	20	45	55.56	44.44	1.24	0.13
MP	43	25	68	63.24	36.76	1.87	0.31
New Delhi	42	39	81	51.85	48.15	2.22	0.04
Odisha	65	20	85	76.47	23.53	2.33	0.67
Pondicherry	11	4	15	73.33	26.67	0.41	0.58
Punjab	76	49	125	60.80	39.20	3.43	0.25
Rajasthan	78	45	123	63.41	36.59	3.38	0.32
Tamil Nadu	504	278	782	64.45	35.55	21.47	0.34
Telangana	34	5	39	87.18	12.82	1.07	1.05
UP	184	99	283	65.02	34.98	7.77	0.36
West Bengal	205	88	293	69.97	30.03	8.04	0.48
Grand Total/ Overall	2422	1221	3643	66.48	33.52	100.00	0.39

University (GDI = 0.13), Manonmaniam Sundaranar University (GDI = 0.23), University of Calicut (GDI = 0.25), and Bharathiar University (GDI = 0.26) display narrower gender gaps, reflecting better female representation. Out of the top 20 universities, only 6 returned a Kundu-Rao Index of more than 0.50. It is of immense interest to note that more than half of the universities in the list have recorded less than 0.5 Disparity Index (DI) which means gender fairness is mostly maintained.

Broad subject field-wise gender disparity

Table 4 categorizes doctoral dissertations based on broad subject areas, revealing variations in gender disparities. As far as the popularity of subject areas to the LIS the researchers for doctoral-level research is concerned, it is found that ICT Applications, Library Automation & Digitization; Bibliometrics/ Scientometrics/ Webometrics/ Citation analysis; Users' Study & Information-seeking Behaviour are the most popular subject

areas where 560, 374, and 347 number of dissertations have been completed during the study period.

Gender disparity is noticeably high in technical and quantitative areas, such as Library Cooperation and Networks (GDI = 0.63), Academic Library Systems (GDI = 0.62), and Information Sources, Systems, and Services (GDI = 0.56) as females are often less interested in quantitative. However, domains like Personnel and Positions (GDI = 0.02), Maintenance and Preservation of Collection (GDI = 0.09), and Study and Teaching of LIS (GDI = 0.15) show minimal gender disparity, suggesting greater inclusivity in these areas. Based on DI, the subject areas can be classified into three groups namely, low disparity with DI below 0.3 where Personnel and Positions, Maintenance and Preservation of Collection, Study and Teaching of LIS, Institutional Repositories/ digital repository, Information literacy, and Users' Study & Information Seeking Behaviour are found to be clubbed together.

Table 3: Gender disparities in the top 20 Indian universities.

Sl. No.	Name of the universities	Male	Female	Total	Male (%)	Female (%)	GDI
1	Bharathiar University	90	57	147	61.22	38.78	0.26
2	Madurai Kamraj University	99	39	138	71.74	28.26	0.53
3	Manonmaniam Sundaranar University	79	53	132	59.85	40.15	0.23
4	Karnatak University	101	19	120	84.17	15.83	0.93
5	Aligarh Muslim University	72	45	117	61.54	38.46	0.27
6	Dr. Babasaheb Ambedkar Open University	85	22	107	79.44	20.56	0.76
7	Bharathidasan University	62	34	96	64.58	35.42	0.35
8	Alagappa University	61	34	95	64.21	35.79	0.34
9	Andhra University	58	32	90	64.44	35.56	0.34
10	Savitribai Phule Pune University	60	30	90	66.67	33.33	0.40
11	Jadavpur University	59	29	88	67.05	32.95	0.41
12	University of Mysore	67	21	88	76.14	23.86	0.66
13	Sri Venkateswara University	61	21	82	74.39	25.61	0.61
14	Annamalai University	50	29	79	63.29	36.71	0.31
15	University of Calicut	46	30	76	60.53	39.47	0.25
16	Swami Ramanand Teerth Marathwada University	64	9	73	87.67	12.33	1.07
17	University of Calcutta	46	25	71	64.79	35.21	0.35
18	Panjab University	34	27	61	55.74	44.26	0.13
19	Gauhati University	40	19	59	67.80	32.20	0.43
20	Sant Gadge Baba Amravati University	41	17	58	70.69	29.31	0.50

The moderate disparity is found in the case of Information processing and retrieval, Subject Analysis and Control, Libraries and Community, Library Administrations, Acquisition and Collection Development, ICT Application, Library Automation & Digitization, Library management software, Bibliometrics/ Scientometrics/ Webometrics/ Citation analysis, Public Library System, and Special Library with GDI value of 0.3-0.45. At the same time, relatively high GDI is found in 5 subject areas in the range of 0.45 to 0.63.

DISCUSSION ON THE RESULT

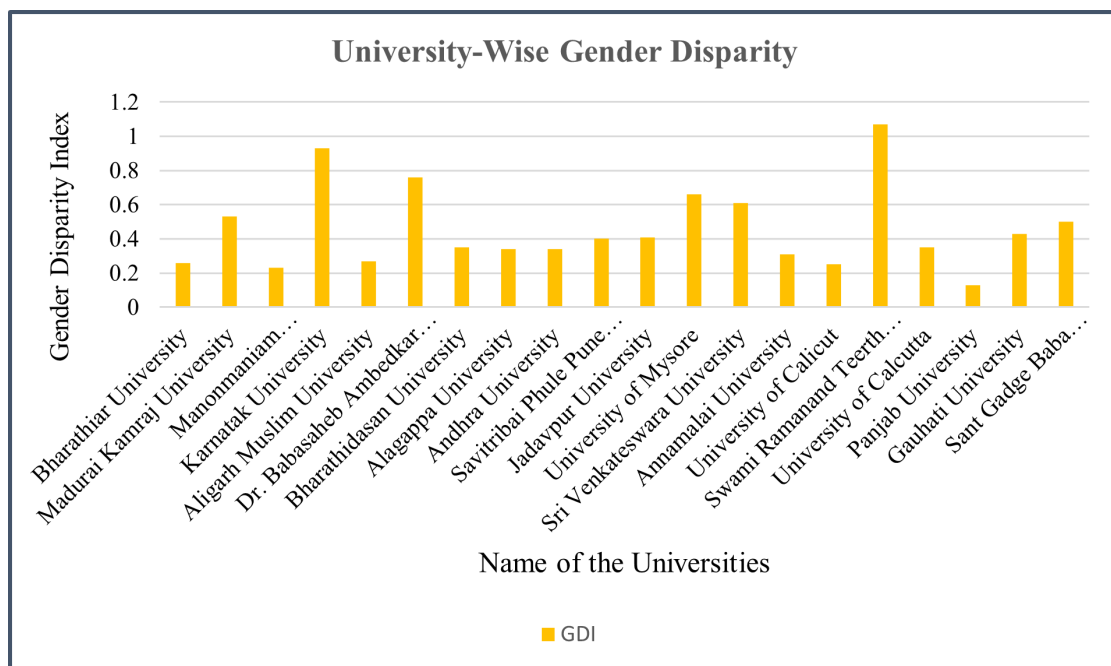
This paper examines the temporal and spatial trends and patterns in doctoral research in Library and Information Science (LIS) in Indian universities from a gender perspective, analyzing as many as 3,643 dissertations completed from 1969 to 2020. Using data from Shodhganga (UGC-INFLIBNET), the study applies the Gender Disparity Index (GDI) devised by Kundu and Rao to measure gender imbalance. The study applies cartographic techniques such as choropleth maps and bar diagrams to depict regional/chorological and temporal/chronological disparities. Results show considerable regional gender disparity, the highest

in the east and the lowest in the north and northeast, with an overall declining trend in disparity over time. A sharper decrease in disparity is, however, observed post-2005, in correspondence with both an increasing number of Ph.D. outputs and broader societal progress resulting in the upliftment of women. The outcome of this study addressing the question of gender equity and highlighting the existing regional imbalances, helps to advocate promotion of gender inclusivity in academic participation, especially for women, in the realms of higher education and research in general and LIS education in particular in the years to come.

A comparison of trends and patterns in a different but comparable discipline, at this stage, may be imperative to understand how gender disparity in LIS is different from other disciplines. The gender parity in ICT may be closely comparable to LIS, and hence, a comparative study is attempted in this section. With respect to enrolment and degree awards, AISHE data revealed that women's Ph.D. enrolments in the disciplines of science, engineering technology remain considerably low. A study by Warpade *et al.* (2024), reveals that in 2018–19, of the total registered PhDs in science only 3% are women and a slightly

Table 4: Subject area-wise male-female disparity in the doctoral dissertation.

Sl. No.	Broad Subject Areas	Male	Female	Total	GDI
1	Study and Teaching of LIS	35	27	62	0.15
2	Libraries and Community	48	26	74	0.35
3	Library Cooperation and Networks	98	32	130	0.63
4	Personnel and Positions	36	35	71	0.02
5	Information Sources, Systems, and Services	130	49	179	0.56
6	Information Processing and Retrieval	57	33	90	0.31
7	Library Administrations	161	87	248	0.35
8	Acquisition and Collection Development	8	4	12	0.40
9	Documentation & Bibliographical Control	50	21	71	0.50
10	Subject Analysis and Control	190	106	296	0.34
11	Users' Study & Information Seeking Behaviour	216	131	347	0.29
12	Maintenance and Preservation of Collection	20	17	37	0.09
13	Special Library	76	36	112	0.43
14	Public Library System	160	77	237	0.42
15	Academic Library System	216	73	289	0.62
16	ICT Application, Library Automation & Digitization	376	184	560	0.41
17	Bibliometrics/ Scientometrics/ Webometrics/ Citation analysis	252	122	374	0.42
18	Institutional Repositories/ Digital Repository	99	72	171	0.18
19	E-resources and Open Access Initiatives	133	56	189	0.49
20	Library Management Software	39	19	58	0.41
21	Information Literacy	22	14	36	0.26
	Total	2422	1221	3643	

**Figure 4:** University-wise gender disparity indices (K-R).

better 6% in engineering/technology, depicting a substantial gender gap in doctoral research (Sharma, 2021). In spite of the substantial growth of Ph.D. intake from 77,800 in 2010–11 to 161,412 in 2017–18, men always outnumbered 65 females for 100 males in 2017–18 (Banchariya, 2019). However, study shows that during 2013 to 2021, some progress in terms of the male: female ratio in doctorates was recorded from 63:37 in 2013 to 57:43 in 2021 (Warpade *et al.*, 2024). A comparison of gender disparity between LIS and ICT / Engineering and Technology reveals that the strongest gender gap is recorded in engineering and ICT. The News Minute (2018) reports an unusually high (91.3%) male Ph.D. candidates in mechanical engineering and 91.3% computer engineering in 2016–17. Though ICT-specific gender divisions on Ph.D. figures are limited, worldwide data points out that only 3% of ICT doctoral students are women, a very similar reflection is expected in India too.

In recent years, there are a number of Government and institutional schemes, viz. DST's INSPIRE, Vigyan Jyoti, CURIE, and GATI programmes that extend support to female STEM aspirants and researchers (British Council, n.d.), aimed at mitigating gender gaps. A noticeable progress has been recorded in the study of Warpade *et al.* (2024), where female PhDs have nearly doubled during 2014–2021, as a result, women now hold 43%–44% of doctoral degrees in India. Scholarship for single girl children, 6-month maternity period and one-year extra period allowed for female research scholars work as incentive to attract female scholars.

CONCLUSION

Spatio-temporal study of doctoral-level dissertations in LIS in India from the perspective of gender disparity during the study period 1975–2020 shows an initial slow growth in the number of dissertations, and slowly picked up during the transitional decades of the present and the previous centuries. While the gender disparity in terms of the number of dissertations completed by male and female researchers has been examined, there has been an initial high disparity and then went through a moderate to low disparity transition over time. Overall, higher participation of females in higher education and research, with the progress of society, has resulted in relatively better parity in the number of dissertations completed by researchers of both genders. The regional pattern of gender disparity, on the other hand, shows a better picture in the northern, the northeastern, and the central regions; whereas the eastern, the southern, and the western regions have recorded higher disparity. Interestingly, the regions with high disparity also have a higher number of dissertations completed. Even the records of individual universities too show similar outcomes which have also impacted overall results, viz. Karnataka University, Dr. Babasahab Ambedkar Open University, Mysore University, Madurai Kamraj University, Sri Venkateshwara University, and Swami Ramanand Teerth

Marathwada University have recorded relatively high disparities. The trend shows an overall improvement in gender disparity over time and thus it may be projected that with the opening up of society and creating better scope for females in higher education, the disparity shall disappear in future. An initiative of incentivization for female researchers in terms of scholarship/fellowship and cross-subsidization as a measure of positive discrimination will encourage more and more female researchers to help ensure gender parity in research.

The findings of research add value to the existing body of knowledge as it reveals long-term gender inequality in LIS doctoral research across India, using a robust spatial and temporal analysis technique. It brings out the question of gender equity, highlights existing regional imbalances, and advocates for promoting gender inclusive academic participation, especially for women, in the realms of higher education and research in the years to come.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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Cite this article: Mollah N, De T. Gender Parity of Doctoral Level LIS Research in India: A Chronological and Chorological Study. *J Scientometric Res*. 2026;15(2):685-95.