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Indian Women in Doctoral Education: Some Encouraging Signs, the Path Ahead, and Lessons for Inclusivity

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Abstract

For the total doctorate awarded in India in 2013, the male-to-female ratio was 63:37. This ratio improved to 57:43 in favour of women in 2021. In absolute terms, the number of women awarded doctorates almost doubled in 2021 compared with 2013. In this study, we examine the progress made by Indian women in doctoral education based on annual reports from the All India Survey on Higher Education. The improved ratios and numbers reflect the adoption of an action-oriented approach in dealing with the concepts of equality and inclusion. The reasons for the progress and ways to improve were investigated based on secondary data and interviews with 15 expert senior female research supervisors. The interviews reveal that apart from the mandatory requirement of a PhD qualification for academic progression, other initiatives have been taken by the Government that have encouraged more women to opt for doctoral education. However, more needs to be done to make research easy for women in India, and such areas, as pointed out by the panel of experts, have been discussed. These findings can be used by other nations that want to bring more inclusivity to doctoral education.

Keywords: Doctoral Education; Women Researchers; Equality; Inclusivity; Research Scholars; Policy Goals; India

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Introduction

A reference to the All India Survey on Higher Education (AISHE) annual reports shows that the number of female candidates receiving PhD degrees steadily increased from 2013 to 2021. A summary of the results is presented in Table 1. Of the total doctorates awarded in India in 2013, the male-to-female ratio was 63:37. This ratio has improved to 57:43 in favour of women in 2021. The ratio improved, but in absolute terms, the number of women awarded doctorates almost doubled in 2021 compared to 2013. While only 8,775 women were awarded doctorates in 2013, the number has almost doubled to 14,124 in 2021 and is catching up quickly with men's doctorate awardees.

Taking these perspectives into context, our study aims to probe two objectives. First, we want to determine the reasons that have led to an increase in Indian women's doctorate awardees. This information would be useful for nations where the proportion of women doctorate awardees is low. Second, we aim to examine as to what needs to be done to improve further, so that more Indian women are attracted to join and complete academic research.

The key rationale for this study is the need to bring about more equality and inclusivity in women's doctoral education. Scholars have shown that Indian women have remained marginalised so far, not just in India but globally (Leathwood, 2017; Bozeman & Gaughan, 2011; Cidlinska, 2019). However, there is a glimmer of hope in India, which has recently witnessed significant improvement in women's participation in doctoral education. Therefore, this study investigates these improvements causes so that policymakers can understand the factors that stimulate equality and inclusion for women in PhD programmes. The study also sought further improvement in the situation through the expert opinions of 15 senior women research scholars. Both inputs are expected to contribute significantly to academia and practice. This study is indeed an attempt to suggest that the improvement in equality and inclusivity of women is not a matter of chance but a result of concerted efforts at the macro and micro levels.

Table 1: Gender-wise break-up of PhDs awarded in India

Year	Male	Female	Total	Male	Female	Total
2013	**14855**	**8775**	**23630**	**63%**	**37%**	**100%**
2014	**13252**	**8578**	**21830**	**61%**	**39%**	**100%**
2016	**16274**	**12505**	**28779**	**57%**	**43%**	**100%**
2017	**20179**	**14221**	**34400**	**59%**	**41%**	**100%**
2018	**23765**	**17048**	**40813**	**58%**	**42%**	**100%**
2019	**21577**	**17409**	**38986**	**55%**	**45%**	**100%**
2021	**18464**	**14124**	**32588**	**57%**	**43%**	**100%**

Source: Compiled from annual reports of AISHE
Note: While the data for 2015 are not available, data for 2020 were abnormal owing to the pandemic. And AISHE has not updated data after 2021

This study's novelty stems from the facts emerging from collating data on doctoral awardees over time and finding an interesting trend from the data. This study is a unique attempt to capture Indian women's development in PhD programmes, along with the causes for improvement. The senior participants of this research offered valuable suggestions for further improving women's PhD programmes.

Most existing research (Leathwood, 2017; Bozeman & Gaughan, 2011; Cidlinska, 2019) on doctoral education merely points out gender disparities. This study takes a positive stand by reflecting upon the recent improvements in Indian doctoral education, wherein gender

disparity has reduced significantly. It analyses the causes and proposes additional measures to improve the situation further. Policymakers and researchers can benefit from the insights provided in our study. The findings will help them understand the actions that lead to improved gender equality in important areas such as doctoral education. We argue that the data compiled for this study offers a launching pad for further research in the area of improving gender equality and inclusivity in doctoral education.

Our study demonstrates that equality is not just ideal but can be achieved through clear policy goals and corresponding actions. Thus, this study strengthens the literature on equality through empirical evidence.

Theoretical Foundations: Equality of Opportunity and Inclusion

The theoretical underpinnings of this study are equality of opportunity and inclusion. Different scholars have defined and discussed the concept of equality of opportunity over time (Campbell, 1974; Carter, 2011; Charvet, 1969; Frankel, 1971; Richards, 2018; Westen, 1985; Williams, 1962; and others). Similarly, inclusivity was conceptually addressed by Burner et al., 2018, Devarakonda and Powlay, 2016; Loreman et al.,2005; Eklund et al., 2012; Lundahl, 2016; McAnelly and Gaffney, 2019; Nutbrown and Clough, 2009; Gran, 2017; Solli, 2010 and others).

Proponents of the concept of equality expect opportunities to be available to all people. They should not be restricted due to factors like gender, caste, creed, the colour of their skin, and other such factors. Notwithstanding these differences, all should have a fair chance to participate and succeed in various areas, such as education, jobs, business, politics, etc. For instance, Campbell (1974) states that equality of opportunity is a desirable social goal while disagreeing with what equality of opportunity involves and why it has moral significance. However, Carter (2011) asks what definition of equality makes treating everyone equally appropriate? Political philosophers have ignored this challenging issue. A specific understanding of respect can lead to tenable solutions. The idea that we should treat people as “opaque”, focusing only on their external characteristics as agents, is fundamental to this approach. As it excludes some equality favoured by modern egalitarians based on concepts other than respect, this proposed basis of equality has significant ramifications for the currency of egalitarian justice. Based on such notions of equality like respect, this study asserts that women should have equal opportunities to participate in and complete doctoral education. It is expected that the ratio of doctoral awardees should be the same between men and women, unlike in 2013 – 63:37, which was highly tilted towards men from India.

Similarly, proponents of inclusivity have made a case for growth that includes marginalized sections based on gender, caste, creed, colour, and other dimensions. For example, Burner et al. (2018) state that in recent years, educational research has discussed and given more emphasis to the concept of inclusivity. The use of the term at the policy level has frequently been the focus of attention. But in a slightly different context, Loreman et al. (2005) have discussed inclusivity in education for children with special needs of gifted children. Along the same lines, this research posits that women, being a marginalized segment, have special needs when it comes to acquiring doctoral education. Taking the argument forward in the context of five Nordic nations— Denmark, Finland, Iceland, Norway, and Sweden, Lundahl (2016) states that the term ‘Nordic model of education’ refers to the striking similarities between the educational systems and reforms implemented in these five nations in the second half of the 20th century. These reforms aimed to promote social justice, equality, and cohesion, among other things, by offering high-quality education to all students, regardless of their financial situation, place of origin, or resources. In a similar context, this study pitches for a better and larger inclusion of Indian women in doctoral education. It determines if the growth in doctoral awardees has been more balanced, covering a larger proportion of women in its fold than in the past.

Indeed, both the concepts of equality of opportunity and inclusion vouch for a level-playing field and a lack of discrimination or bias while providing opportunities. However, this was not the case in practice. For instance, Ganesan (2022), writing for the Times of India, has explicitly mentioned gender bias as a problem faced by the first female doctorate from India, Kamala Sohonie, who was awarded a PhD in the 1930s. Such gender bias continues to persist even in the current times. For example, Venkatagiri's (2018) account shows that women in India still struggle with issues such as discrimination when pursuing a doctorate. The concepts of equality and inclusion seem to have been taken as more of an ideology than worth implementing. However, this view contradicts the definitions of scholars such as Charvet (1969) and Frankel (1971) who believe more in implementation as compared to mere idealisation. Our study highlights how conceptual understanding is largely misplaced even today in the context of the hurdles faced by Indian women academic researchers. At the same time, it sheds light on the positive steps taken to achieve equality and inclusion. The first objective of this research is to demonstrate the practical implementation of the concept of equality, albeit only partially. While the numbers have shown impressive growth, quality still remains a concern.

By no means, it is easy for women to pursue a PhD in India. Venkatagiri (2018) narrated the story of a female research scholar, as shown in Figure 1.

We argue that women in India, given a choice, would prefer to work under the guidance of a female supervisor. However, this does not ensure that it would be a comfortable journey. On the other hand, it might be a case cited in Figure 1, where the research scholar has stated, "It is often said that women are women's biggest enemies. It proved to be true in my case." In the same article, Venkatagiri (2018) wrote that only 8-10% of the enrolled scholars eventually earned their doctorate. This means that a large portion of research scholars have dropped out for various reasons. Against this backdrop, the numbers in Table 1 are impressive and encouraging. They also speak of the resilience offered by women research scholars in pursuing their dreams of a PhD battling various odds.

The remainder of this paper is organised into four sections: literature review, methods, data analysis and interpretation, and conclusions.

Sumithramma (not her real name) is in her late 40s. It has been nine years since she enrolled for a doctoral programme and she is almost on the verge of getting disqualified from the course. She was working with a guide who was a senior faculty member in a well-known state university in south India. "I did not make proper referrals before agreeing to be her student," rues Sumithra. She recalls with horror the amount of mental torture this lady gave her. "It is often said that women are women's biggest enemies. It proved to be true in my case. In state universities you don't have much of a choice when it comes to a doctoral guide." Sumithra suffered such mental agony and depression in the last few years that her family suggested that she abandon the course, instead of allowing her health to get affected.

Figure 1: The Plight of a Typical Woman Research Scholar in India
Source: Venkatagiri, 2018: 1

Literature Review

We review the literature related to both theoretical underpinnings and practical implementation. First, we consider the theory that reflects the ideal situation and then extend it to reality by reviewing the literature on practical situations.

Equality of Opportunity and Inclusion

Campbell (1974) focuses on 'opportunity' within the concept of equality of opportunity as a form of freedom and discusses the possible causes of the various commonly held views of equality of opportunity. Equality of opportunities for Indian women to participate in doctoral education is the basic tenet of our study, which is in line with Campbell's (1974) view. However, the question of how the concept of equality should be implemented still needs to be answered. Carter (2011) examines answers to why people are equal and in terms of what they are. Carter pays special attention to the concept of respect and presents the results of the foundation of equality with fair and just treatment as a basis, which should be equal. We apply the same foundation of equality to women's participation in doctoral education. Similar to Campbell (1974), Carter (2011) did not provide a guide for the practical implementation of this concept.

Charvet (1969) states that equality of opportunity is not an idealistic concept but a goal to be achieved. Seemingly, Frankel (1971) concludes that equality of opportunity is not an ideology but a policy goal as a pursuit that brings significant results. Our research approach is strongly motivated by the works of Charvet (1969) and Frankel (1971), who view equality as the pursuit of a policy goal rather than merely an ideology. Linked with this idea, we investigated policy goals and their attainment in practice to improve gender equality in doctoral education. In this direction, our study examines specific policy initiatives that might have helped in the practical implementation of the concept of gender equality in Indian doctoral education.

Richards (2018) introduced equality of opportunity as a term offered in many different perspectives and used examples from the educational context to show that many of the policies that are associated with equality of opportunity do not have the same elements. Westen (1985) provided a formula for thinking about equal opportunities, such as relationships between agents, barriers, and goals. However, in 1962, Williams identified the problem with creating decent equality of opportunity, which requires highly qualified individuals to secure social positions at the expense of equal access to qualifications. As we further probed the concept of equality, we came across studies that indicate the complexity associated with defining the equality of opportunity.

All three studies (Richards, 2018; Westen, 1985; Williams, 1962) are proponents of idealistic theoretical situations without factoring in practical implementation difficulties. Hence, we focus more on implementation to lend plausibility to the concept of equality.

Inclusion is associated with diversity (Burner et al., 2018; Devarakonda & Powlay, 2016; Loreman et al., 2005), equity (Eklund et al., 2012; Lundahl, 2016), citizenship (McAnelly & Gaffney, 2019; Nutbrown & Clough, 2009), and the universal right to adequate and transformed education (Gran, 2017; McAnelly & Gaffney, 2019). This concept is defined as the belongingness of a student who is part of a professional, social, and cultural community, and inclusion also affects the quality of participation, democracy, and educational benefits (Solli, 2010). The concept of inclusion is applied to our work by positing that women should be included in the process of doctoral education in equal numbers, notwithstanding their gender. In doing so, we focused on policy measures that have encouraged and facilitated the inclusion of Indian women in doctoral education. Thus, our study adopts a pragmatic approach to dealing with inclusion.

The theoretical foundations of this study are based on the concepts of equal opportunities and inclusion. Women are expected to have equal opportunities to pursue their doctoral studies. Moreover, practices should reflect an inclusive approach that provides adequate participation and success for women in academic research. This study examines equal opportunity and inclusion concepts through the lens of policy goals for achievement against pure idealisation, as posited by Charvet (1969) and Frankel (1971). Most of the researchers barring Charvet (1969) and Frankel (1971) have looked at the concept of equality and inclusion as mere idealisation, which is a gap in terms of actual

implementation vis-à-vis idealisation. There is a need for more literature in the direction of the actual implementation of measures towards inclusion and equality.

We therefore argue that there is a major conceptual gap in that the literature is more prescriptive and theoretical, leaving the implementation aspect unaddressed. It is precisely this gap that we attempt to address in our study.

Position of Women in Doctoral Education

Leathwood (2017) writes that in the UK, research is a highly gendered arena in which white men hold the majority of top positions and are also judged as excellent researchers compared to their female peers. Interestingly, even in a developed country such as the UK, the situation is similar to that in developing countries such as India. Wager (1998) writes that men have dominated the sphere of research, but there have been women who have emerged as successful researchers, even though they had to do this often at the cost of their personal lives. This study supports the growth story of Indian women researchers, whose participation in research has increased in recent times. Bozeman and Gaughan (2011) found that female researchers have more collaborators than male researchers when carrying out research projects.

Another study found three reasons for excluding women as research subjects (Soderstrom, 2001): scientific, historical, and economic. Bagenstos (1988) found that the number of females who earned doctorate degrees has gone up considerably over time. McComas (2010) found that research tools and positive support from the community were the main factors that helped women complete their research at the American Speech-Language-Hearing Association (ASHA). These pieces of literature go hand in hand with the recent growth of Indian women researchers. However, it is pertinent to note that none of these studies were from India, and most were from developed countries. Therefore, this work fills the contextual gap because India has a very large population of doctoral educational scholars.

Cidlinska (2019) stated that female researchers are grossly underrepresented in all research fields. Thus, discrimination is observed in all research fields. Holley et al. (2007) have emphasised the need to remove fear in women researchers' minds and motivate them to undertake more research projects. Being in a minority, it is logical to expect that female researchers would be fearful. Bettachy et al. (2009) state that despite progress in Morroco about gender equity, women are still largely underrepresented in science and research. This study reiterates the universal presence of gender bias in the research. Blair-Loy and Cech (2016) and many other studies find that female researchers struggle to maintain a work-life balance. This is a practical problem that women face on a larger scale. All these studies were conducted in a non-Indian contextual setting, a gap filled by our study.

Bell et al. (2003) conducted a unique experiment and found that black and white women researchers failed to trust each other and failed to collaborate. These are some added dimensions of complexity, where colour further adds to discrimination. Further, in their research Aksnes et al. (2011) found that women have fewer research publications than men; they also have fewer citations than men. Thus, discrimination is not just restricted to doctoral awardees; it also extends beyond that into areas such as research publications and citations. However, decades ago, Rong et al. (1989) found that articles written by women researchers and those dealing with gender issues have steadily increased in the major journals from the sociology stream since 1974. This issue has attracted more attention over time. In a similar context, Ioannidou et al. (2019) reviewed five critical areas of gender inequality in oral health academics and research: economic inequality, workforce pipeline, harassment at the workplace, work-life balance, and gender bias in scholarly productivity. Things such as harassment in the workplace are noteworthy, and they are strong barriers to gender equality. The International Association for Dental Research (IADR) has created a strong pipeline of female leaders by offering networking and

training opportunities through efficient mentorship and coaching for female researchers. It has also promoted gender equality for women in dental academics through a cultural transformation. The IADR has acknowledged that more research is necessary because there are still knowledge gaps regarding the degrees of conscious and unconscious bias and sexist culture that hinder women's advancement in academia, as well as the intersectionality of gender with race, gender identity, ability status, sexual orientation, and cultural backgrounds. Hartley and Dobele (2009) state that personal factors influence women's research performance. Reynolds et al. (2018) observed that, despite the high participation rates of women in a highly gender-biased academic sector, it has not translated into equal career progressions with men. These articles confirm that gender equality remains a highly theoretical subject. Amorosi et al. (2021) have confirmed that gender bias is still a topic in doctoral education, especially in science and technology. Thus, even today, gender bias is a reality.

Lhotska and Stepankova (2022) highlighted that many senior female researchers have led research projects involving Artificial Intelligence (AI) in the Czech Republic. Such exceptions are rare in doctoral education. Kameny et al. (2013) have highlighted that despite efforts, women researchers in the field of behavioural sciences in the US remain in the minority for several decades, which is a matter of concern. The literature highlights that even one of the most advanced countries, like the US, is not an exception to gender bias in research. Holdcroft (2007) has pointed out the problems due to gender bias by not including women as subjects in medical experiments and clinical trials. For example, research funding for coronary artery disease in men is greater than for women, although women suffer more morbidity and mortality. Smith and Watchorn (2020), in their analysis of the impact of the coronavirus pandemic on research, found that while the pandemic has made research tough, it is more so for female researchers. Thus, women suffered more than men during the pandemic, indicating the influence of gender bias. However, it is surprising to note that the Indian research fraternity has failed to attract the attention of researchers despite being quite large in number.

Ion and Duran Belloch (2013) indicated some of the reasons for the success achieved by female researchers in social sciences in Catalan public universities, such as the provision of opportunities for employment, effective management of research programs, development of educational strategies, and effective management of time. Such studies support the positive view of improvements in gender equality seen in India in recent times. Davis et al. (2021) have written that the general perception of black women is that they are not intelligent, and they produce work that is superfluous and can be ignored. Hence, the research is not an area for black women. It is ironic to note that colour adds to the discrimination faced by women based on gender. However, discrimination on account of race and colour is not a characteristic of Indian doctoral education, where discrimination is largely based on gender. Similar to the arguments stated above, Hosseini and Sharifzad (2021), in their analysis of publications between 2013 and 2018, revealed that women researchers had fewer publications than men, got fewer citations, and participated less often in collaborations at the international level. Alrashidi (2017) found that the position of women in doctoral education is far from impressive. Thus, there is a problem with gender-biased fathoms across several dimensions of research.

Garcia-Gonzalez et al. (2019) state that men and women differ in their perception of gender bias in research institutions. While women from the UK perceived greater inequality than men, women from Spain felt that men and women were treated equally. Cui et al. (2022) found that while overall research productivity rose by 35 per cent in the ten weeks following the US lockdown, the productivity of female researchers fell by 13.2 per cent compared to their male counterparts. Casad et al. (2021) found that there is underrepresentation of

women in higher education in STEM faculty due to three reasons: (a) stereotypes and underrepresentation in numbers, (b) a dearth of social networks that provide support, and (c) cold academic environments.

Begeny et al. (2020) state that employing more women is a priority for traditionally male-dominated fields as a way to advance equality and eliminate gender bias. In the future, would the strong representation of women in professions signify the attainment of equality? Has the bias been addressed? Biases continue even if women are well represented, as shown by two studies, one of which was a randomized, double-blind trial (evaluated in veterinary medicine). Managers assessing randomly assigned male employees as more competent than female employees and suggesting a $3475.00 higher wage, or an 8% pay disparity, were among the evidence. Crucially, the people who believed that bias did not exist in their profession were the main perpetrators of it; these individuals comprise a high-risk group, which includes both men and women and can be easily identified and evaluated. Therefore, even if women's presence in other fields increases, it is critical to acknowledge that discrimination may still exist and even be encouraged by people who believe it does not.

Thun (2020) concludes that academia is an organisation characterised by avarice, ambiguity, and "blind spots" that expose gender bias about gender and parenting status, particularly among mothers. The paper highlights "gender blindness" in academic organisation with attempts to legitimise gender inequality.

Recent reviews indicate that gender bias is prevalent in academics (higher education) even today, and the situation has not improved significantly. However, even from recent studies, we notice that the studies in Indian context are relatively low as compared to their foreign counterparts.

Gupta (2007) shows that while the challenges faced by Indian women researchers seem to be similar to those faced by women in science in the West, there are differences in the specific types of biases and that the cultural environment shapes the kinds of discrimination.

Our reviews of the literature suggest multiple dimensions of gender bias in doctoral education. There are additional issues like racism compounding the problem of gender bias. that there is a gender bias in doctoral education, which extends to areas such as research publications, the number of citations, and the extent of international collaborations. It is disheartening to note that, along with gender in some places, racism is also an issue, and it compounds the problem for a category like black women (Davis et al., 2021). Gender bias has also been a feature of research subjects, and women have not been fairly represented as subjects in clinical trials. Very few positive pieces of literature mention women researchers' achievements as they lead AI research projects (Lhotska and Stepankova, 2022).

Overall, the bias towards women in doctoral education is a global phenomenon, and India is no exception. However, no specific study on doctoral education from a gender perspective has been carried out in an Indian context thus far, even though the size of the Indian research fraternity is quite large in absolute numbers (except for Gupta, 2007). Enrolment for Ph.D. over five years from 2014-15 to 2018-19 in India has shown a Compounded Annual Growth Rate (CAGR) of 7.6 per cent (All India Survey for Higher Education, 2020). The number of research scholars who enrolled in Ph.D. programmes during this period was around 714,000, with an average of approximately 143,000. This number appears phenomenal compared to some of the top PhD-producing OECD nations. The US in 2017 was the top producer of PhD graduates with 71,000 candidates, followed by Germany and the UK, producing 28,000 PhD graduates (OECD, 2019). The top three-nation producing Ph.D. graduates in 2017 totalled 127,000, which is less than the Indian five-year average enrolment of 143,000. This study endeavours to fill this gap. In doing so, the study also seeks to contribute to the theory of equality of opportunity by describing positive actions, even though in part, towards achieving

a policy goal rather than idealisation (Charvet, 1969; Frankel, 1971). Taking these arguments into context, the following research questions were addressed by the study:

- What recent actions have led to higher participation and success among Indian women in doctoral education?
- What can be done further to encourage more Indian women to join and complete doctoral education?

While the first research question attempts to identify recent policy initiatives that have led to an improvement in the male-female ratio of 57:43 in favour of women in 2021 from 63:37 in 2013, the second question seeks suggestions for further improving this ratio and higher enrolment and success for Indian women in doctoral education.

Methods

As stated in the introduction section, this study had two objectives: to determine the reasons that have led to the increase in Indian women's doctorate awardees (see Table 1) and what needs to be done to improve further, that is, to make more Indian women join and complete research.

Both secondary and primary data were used to achieve these objectives. Secondary data were accessed from sources in the knowledge of the authors like compulsion of doctoral qualification for getting 6th pay-scale benefits. Primary data was collected using qualitative research methodology to probe the following:

- Why has there been an increase in women doctorate awardees?
- How can things improve further.

In the case of qualitative interviews with experts, a sample size of 15 was fixed. The sample size was based on the opinion of expert researcher Dworkin (2012), who said, "[w]hile some experts in qualitative research avoid the topic of "how many" interviews are "enough", there is indeed variability in what is suggested as a minimum. Many articles, book chapters, and books recommend guidance and suggest anywhere from 5 to 50 participants as adequate (p.1319)." The 15 experts selected were senior women research guides associated with different universities in Maharashtra. All these 15 research participants had rich experience guiding many research scholars, including women. We intended to choose female supervisors instead of research scholars as participants because of the idea that a female supervisor possesses the experience of her PhD as a doctoral student. She also offers a much broader perspective, as she has guided other female and male research scholars. Fifteen senior supervisors offered the experience of fifteen research scholars and provided rich expertise in the overall research environment. Their input was considered more valuable than that of research scholars, which, in any case, was obtained as the supervisors were also doctoral students in the past. Since supervisors have interacted with many research scholars, it was expected that they would provide an opinion to reflect a holistic experience considering different research dynamics. This could not have been possible for individual female research scholars.

The World Health Organization (WHO) has listed two Indian National Ethics Committees for ethical approval for research studies, namely, the Indian Council of Medical Research and the Ministry of Science and Technology, the Department of Biotechnology, and the National Bioethics Committee (World Health Organization, 2015). Both ethics committees accord with ethical approval for medical or biotechnology research. As our study was not clinical or biotechnological research, local ethics committee approval was not applicable.

The selection of the 15 experts was based on the inclusion criteria of a minimum of 20 years of experience as research supervisors and guidance of a minimum of 20 research scholars, out of which at least 10 must be women.

Four of the 15 experts were from Northern Maharashtra, three from Eastern Maharashtra, five from Western Maharashtra, and three from Southern Maharashtra. While ten participants worked as Professors, five worked as Principals/Directors. Four participants were in the age group 40-49 years, seven were in the age

group 50-59 years, and four were in the age group >=50 years. Seven participants had up to 25 years of work experience, whereas eight had more than 25 years of work experience. Three supervisors guided 20-24 research scholars, eight had guided 25-30 research scholars, and four had guided more than 30 research scholars. All 15 supervisors guided research scholars who were female in a large majority. Six supervisors were from the Arts and Humanities faculty, five were from Commerce and Management, and four were from the STEM faculty.

The experts were contacted via email (sent in the English language) after obtaining consent to participate via phone. As background information, the data in Table 1 (showing the recent increase in Indian women's doctorate awards) were shared with them. Two specific questions were posed:

- Why has there been an increase in Indian women's doctorate awardees in recent times?
- How can more Indian women be encouraged to enter and complete doctoral education?

Responses to the interview questions were received as replies to our email. Standard steps followed in qualitative data analysis were employed to process the primary data received from experts (De Hoyos and Barnes, 2012). The process is illustrated in Figure 2.

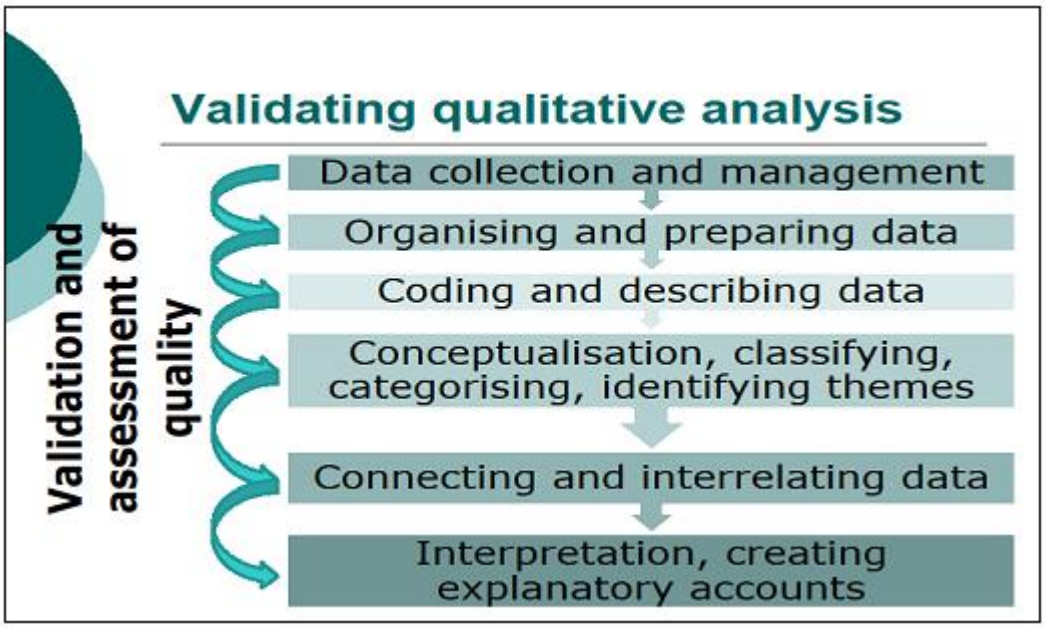

Figure 2: Steps in Qualitative Analysis of Data
Source: de Hoyos & Barnes, 2012: 6

Fifteen responses from the experts were copied from email to an MS Word file. Each of the replies was read over again and again. Common themes were identified from the responses, which are discussed in the next section. Themes related to the first question emerging from at least ten expert responses were coded as C1, C2, C3, and C4 (C indicated causes). Causes mentioned by only a few experts were coded as C5 and have been stated under the heading "Others." For the second question, common themes emerging from at least ten expert answers were coded as I1, I2, I3, and I4 (I indicated improvement). Improvements mentioned by only a few experts were coded as I5 and have been stated under the heading "Others." After identifying the themes, the 15 experts' responses were read again to connect and interrelate them. Finally, they were interpreted, and short explanatory accounts were created for the causes and improvement sections. This is discussed in the next section.

Data Analysis and Interpretation

In this section, we first present the information accessed from secondary sources that have

contributed to the recent increase in women's doctorate awardees. While implementing the sixth pay commission for higher education teachers, the All India Council for Technical Education (AICTE) made PhD a mandatory qualification for Associate Professor and Professor ranks (AICTE, 2010). The University Grants Commission (2010) has fixed similar norms mandating PhD qualifications. However, this was not the case earlier. Thus, with the implementation of the sixth pay commission, there was a big increase in the enrolment for PhDs, and after some years, it was reflected in the doctorate awardees.

Interestingly, the pay scales for Associate Professor and Professor ranks were made quite attractive in the sixth pay commission, and they provided a considerable impetus to teachers in higher education to earn a doctorate. Features such as the Academic Grade Pay (AGP) were added to the sixth pay scale, which was not the case with the earlier pay scales. At the minimum, an Academic Grade Pay (AGP) of INR 6,000/- month was provided to an Assistant Professor, while the maximum Academic Grade Pay (AGP) of INR 10,000/- month was provided to a Professor. Further, there was a provision to place 10 per cent of the posts of Professors in a university in a higher Academic Grade Pay (AGP) of INR 12,000/- per month. These substantial monetary incentives led to an overall increase in enrolment and completion of doctorates. Teaching salaries became comparable with industry, and academics attracted a talent pool ready to undertake a doctoral program to earn lucrative sixth pay scales. This was particularly the case with the Associate Professor and Professor ranks, where salary hikes were substantial but linked to a PhD qualification.

Taking a step further, the University Grants Commission (UGC) in 2018 announced that the PhD qualification would be mandatory for the entry-level rank of Assistant Professor for all appointments in the University Departments from 1st July 2021 (UGC, 2018). Therefore, a PhD has become a must for entry into the field of academics as a teacher, and this has been one of the crucial reasons for the significant increase in the number of women doctorate awardees in recent years.

In 2016, the UGC, through the University Grants Commission (Minimum Standards and Procedure for Award of M.PHIL./PhD Degrees) Regulations, 2016 (UGC, 2016), allowed female candidates to complete their PhD. in eight years instead of the earlier stipulation of six years. Further, it provided a maternity leave of 240 days to female candidates pursuing a PhD. Additionally, the UGC 2016 rules provided easy relocation of women research scholars for marriage or other reasons. Thus, the Government has been doing its bit to create more favourable conditions for women researchers so that they can take up research in more numbers and complete it comfortably.

Next, we present the findings of the primary data collected from 15 experts. First, we present a thematic summary of the causes the experts believed were responsible for increasing the number of women doctorate awardees.

The findings in the form of themes identified as significant causes for recent improvement are as follows:

C1 - Streamlining of the research environment,

C2 - A safer work environment,

C3 - The quality push at the educational institutions and

C4 - Women are good at academics

These themes are discussed below:

Causes

Streamlining of the Research Environment

The experts thought the research environment had been relatively streamlined over the last decade compared to the ambiguous and disorderly state in the prior period. All universities now regularly conduct a PhD entrance test (PET) and admit students properly. This is followed up with some structure with progress reports submitted every six months, coursework, etc. All of these factors had a positive impact on the overall research environment. Women now feel more confident

when entering the PhD system. They are also evident in this process. The experts opined that this was a critical macro factor for the growth of women's enrolment and doctorate awardees.

A Safer Work Environment

Another macro factor that has helped women is the implementation of the Prevention of Sexual Harassment Act (The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013) following the Vishaka judgment.[1] All educational institutions, research centres, and universities have implemented the Act, and women feel quite safe and secure working now compared to earlier. They are more comfortable enrolling themselves under male supervisors, which has increased women's enrolment and, also women's earning a doctorate qualification. The experts highlighted that female supervisors are quite limited in number, and unless female research scholars opt for male supervisors, they will not be able to proceed further.

The Quality Push at Educational Institutions

Experts also highlighted that over the last ten years or so, academic institutions have been pushed hard to achieve quality through accreditation by agencies such as the National Assessment and Accreditation Council (NAAC) and the National Board of Accreditation (NBA). "Colleges are after their staff, including women faculty members, that they should do PhD and do it quickly," said one of the research participants. Some colleges provide monetary incentives to their staff to obtain PhD qualifications. This has brought more women into doctoral education, and quite a few are quickly earning their doctorates.

Women are Good at Academics

Women are good at academics, and most participants of our research mentioned that women are naturally inclined towards academics and do well in their studies. They are sincere, hard-working, and intelligent. Women are bright scholars and would generally perform better than men do. "That day is not far off when the women doctorate awardees in India would outnumber the men doctorate awardees", said a confident participant.

Other Reasons

Some of the other reasons stated by the participants included the opening of more research centres, increasing the number of women guides, and an increased need for women to do well in their teaching jobs, particularly in urban places to support their spouse's income, and increased access to research resources through the internet.

Before moving on to the second question, an important aspect that the majority of the research participants invariably highlighted was the quality of the research (including the one done by women researchers). "There are hardly any checks to control the quality of research being carried out. All were just after increasing the PhD numbers. Research is not simple and requires a methodological approach and dedicated effort. However, this is compromised to a great extent to obtain a PhD. There are serious question marks regarding the knowledge of even some of the PhD supervisors", complained a participant.

Further Improvement

The findings, in the form of themes identified as significant suggestions for further improvement, are as follows:

I1 - Provide additional women research scholar quota for women supervisors,

I2 - Tackling the question of data collection,

I3 - Addressing the knowledge gaps and

I4 - Provision of a research hour

These themes are discussed below:

[1] In 1997, the Supreme Court delivered a landmark judgment laying down guidelines to be followed by establishments in dealing with complaints about sexual harassment. *Vishaka Guidelines* were stipulated by the Supreme Court of India, in *Vishaka and others v State of Rajasthan* case in 1997, regarding sexual harassment at the workplace. The court stated that these guidelines were to be implemented until legislation was passed to deal with the issue.

Provide an Additional Women Research Scholar Quota for Women Supervisors

This was a legislative change the participants sought. They wanted female supervisors to have a special quota for female research scholars. "Already there is a reservation system wherein the vacancies under a supervisor are reserved for different castes and categories. To encourage women to take up research, women supervisors should be given an additional quota of guiding only women research scholars over and above their normal eligibility," proposed by a participant. This will pave the way for women from a conservative background who would like to work only under another woman's supervisor.

Tackling the Question of Data Collection

The participants then pointed out the problem of data collection by female researchers. Approaching and collecting primary data from hundreds of samples or subject sizes is daunting for women. "For a typically large population, the sample size at a 95 per cent confidence level and 5 per cent confidence interval is approximately 400. Women researchers are often clueless about how to approach 400 unknown people and collect data from them. Very few of them are used to things like Google Forms," said one participant. This practical problem discourages many women from taking up or completing research. They should be officially allowed to help their students collect data under supervision. Research centres should make special provisions to help women research scholars collect primary data.

Addressing the Knowledge Gaps

Another teething problem with women researchers, especially from rural and semi-urban places, is their poor understanding of the research methodology and data analysis. For different reasons, they are uncomfortable dealing with things such as statistics and testing hypotheses. Many female researchers believe that this is not just their cup of tea. Therefore, even after collecting data, they simply quit the research or struggle with data analysis. Many do not conduct research because of the fear of statistics and data analysis. It is ironic to note that not many supervisors are in a position to guide research scholars properly on this matter. Again, the research participants felt that research centres should play an important role. Either they should help women research scholars with the data analysis or allow them to approach other experts in the field of statistics and get the data analysis done. This is one of the major pain areas for female researchers and needs to be addressed.

Provision of a Research Hour

Women researchers should be given a special facility to dedicate one hour of their working time to daily research activities. This is because they are not in a position to devote time to research at home because of their household responsibilities, unlike men, who can spend time after work on research. Work-life balance is a serious problem for women; hence, they need special assistance from the workplace to overcome time constraints. This can be done by allowing women to work for an hour on research daily during their working hours.

Others

Other suggested methods include charging lower fees, providing higher monetary incentives for those who complete their PhD and providing scholarships.

Discussion

Streamlining the research environment, a safer work environment, the quality push at educational institutions, and the proficiency of women in academics were cited as important causes for the rise in women's doctorates in India.

Environments affect learning and academic achievement (Davis, 1994). A conducive environment characterised by supporting the researcher's autonomy, relatedness, and competence positively affects research activity (Weinstein et al., 2021). A culture that reflects equal access, work-life balance, freedom from gender biases, and supportive leadership helps women achieve academic success (Westring et al., 2012). In India, such an environment was largely missing until recently. However, reforms

in the research process have contributed to creating an environment with clarity, certainty, and confidence. A definite structure has been lent to the doctoral course through initiatives such as the PhD entrance test (PET), six-month progress reports, and other measures. This has drawn more attention in recent academic research.

Women's safety in the workplace is an essential enabler of increased participation and success. Problems such as sexual harassment have been countered by various safety measures (Sathyasri et al., 2019; Mandapati et al., 2015; Khandoker et al., 2019). As discussed above, India has taken a major step in this direction by introducing the Prevention of Sexual Harassment at the Workplace Act, 2013. Legislation to some extent, has acted as a deterrent to sexual harassment. Women now have a platform for voice complaints. Guilt is severely punished. The regulations have increased the safety levels for women, and they are more willing to participate in the research.

Another reason, although gender-neutral, has been a significant reason for more Indian women joining and completing their doctorates. Push for measures, such as accreditation, positively influences quality processes (Espinoza and González, 2013). Accrediting systems tend to increase academic productivity (Celis & Veliz, 2022). Recently, Indian educational institutions have increased their focus on quality. Earlier, a PhD degree was considered an option. However, in the current accreditation-driven environment, faculty must have a doctorate. This has led to more female teachers enrolling in and completing doctoral education.

Women are naturally good academicians. They have better learning abilities. Women often outperform men in academia (Lewin, 2006; Hillman and Robinson, 2016). Women have a higher appetite for education. They are hard-working and sincere. These qualities make them eligible for a degree such as a doctorate, which demands higher-order cognitive skills. Indian women have shown that they can do well in academics, and the results have been shown in doctorate programs.

Notwithstanding the positive growth, concerns about the quality of research are high. Mandatory measures are often counterproductive. Indian academic research has a share of concerns about quality fronts. Tendencies of earning a doctorate are seen, and women are no exception to this. Poor quality of supervision, inexperienced supervisors, and more such factors lead to substandard quality research (The Hindu, 2019). The concerns raised by the expert group regarding low-quality standards in Indian research were genuine. Experts warned that the increase in the number of women's doctorates could be at the cost of quality.

Providing additional women research scholar quotas for women supervisors, addressing the question of data collection, addressing knowledge gaps, and providing a research hour were the suggested steps for improvement.

It is a well-accepted fact that female research scholars are more comfortable working with female supervisors. Hence, they should have a higher and special quota (more than what is allowed in general by the University Grants Commission based on seniority) to guide female scholars. The caste-based quota system is already in place in India. The same should be extended to women as well. Women supervisors should have a better understanding of the problems faced by women scholars. They can supervise and support women scholars better than men.

Fake data is a serious problem in research (Reddy et al., 2019). Women have their own set of problems when it comes to collecting primary data for research. Support systems in this direction are important to enable more female research scholars to succeed. Our research participants have suggested that female researchers should be allowed to help their students collect primary data. This is a practical solution and is better than working with fake data.

Due to the barriers that women face, they may have knowledge gaps (Roth et al., 2019). Research requires specialised knowledge. The researcher should have a good understanding of

the methods used for data analysis. They are expected to have reasonable knowledge of statistical tools. However, it was found that this is a grey area, especially for female researchers. Hence, it is important to provide special support to this area. The research centres where women scholars are enrolled should take the lead in providing this assistance.

A novel suggestion from our participants is the provision of a special research hour for women research scholars. This suggestion is logical, as it is a well-known fact that women face a problem in achieving work-life balance (Vasumathi, 2018; Pace & Sciotto, 2021). Therefore, experts feel women research scholars should be given special facilities to relieve them from their regular duties. If they are allowed to dedicate one hour of their office time to research, this will help them in several ways. This will allow them to make more efforts, ensure continuity in work, and conduct quality research work.

Conclusion

Our study had two main conclusions based on the findings. The first was related to conducive factors that have increased equality and inclusivity in Indian doctoral education. The important reasons for the improved position are streamlining the research environment, a safer work environment, the quality push at educational institutions, and women being good at academics. It is noted that some of these causes are macro and institutional, such as streamlining of the research environment, a safer work environment, and the quality push at educational institutions, while women being good at academics are micro-level personal causes.

Second, there are recommendations that, if implemented, can further improve the performance of Indian women's doctoral education. These recommendations include providing additional female research scholar quotas for female supervisors, tackling the question of data collection, addressing the knowledge gaps, and providing a research hour for female teachers. Thus, our findings lead us to conclude that while the steps already taken need to be appreciated for the improvement achieved, there are still some specific areas where actions are required to improve the situation further.

From a male-to-female ratio of 63:37 for doctorates awarded in 2013, improving to a ratio of 57:43 in favour of women in 2021 is some progress in eight years. At the same time, the number of Indian women's doctorate awardees almost doubled over the same period, from 8,775 to 14,124, which is also a commendable performance. The improved ratio and numbers reflect the adoption of an action-oriented approach to dealing with the concepts of equality and inclusion (Charvet, 1969; Frankel, 1971). Ideal goals often fail to materialise. However, if they come along with a specific guide for action, they stand a high chance of achievement.

The findings of our study are based on empirical evidence from interviews with 15 expert senior female research supervisors.

These findings, based on an Indian contextual setting, provide important insights into the implementation of equality and inclusion theories. The concepts of equality and inclusion can easily be rhetorical and remain on paper. However, if these concepts are defined as policy goals, they are likely to translate into action. We draw upon works like those by Lu et al. (2015), which have argued that in the case of UN Sustainable Development Goals (SDGs), instead of using ambiguous words like 'sustainable', 'efficient', and 'substantial', it is a better approach to define them quantitatively so that they are achieved. Other developing nations willing to achieve equality and inclusivity in doctoral education can consider the actions taken by the Indian Government and educational institutions and redefine equality and inclusivity in terms of specific actions.

The implications of our study are for apex agencies such as the UGC, universities, and educational institutions to implement the recommendations given by experts in the larger interest of female researchers. At the same time, female researchers should also work with more rigour, given that the environment is more research-friendly and safe than it was earlier.

In sum, this study is a novel attempt to understand the issues of equality and inclusivity among women in doctoral education in India. This study makes a significant contribution to the extant literature by pointing out three things:

- there has been an improvement in women's participation in Indian doctoral education,
- a set of macro-level and micro-level causes led to this improvement, and
- the current situation can be further improved by implementing more initiatives.

Besides, specialised studies can be carried out to understand the specific problems faced by women research scholars in the fields of science, technology, and social sciences. Moreover, studies can be carried out by applying a quantitative methodology.

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Ethical Approval and Conflict of Interest

The local Research Committee of Dr D Y Patil University (Deemed University) has approved the research. We declare that we do not have any conflict of interest (both financial and non-financial) with any individual or organisation, arising out of this research.

Author Contribution Statement

Dr Satish Warpade contributed to conceptualisation, guidance and supervision. Dr Atul Kumar worked on conceptualisation and ethics approval. Dr Arun Ingle and Dr Rajesh Gade managed the data collection. Dr Vishwas Pendse took care of the data analysis. Dr Jaiprakash Paliwal contributed to the literature review. Dr Mahesh Singh contributed to developing the methodology. Dr Vinodkumar Pathade developed the first draft. Dr Shirish Raibagkar reviewed the final draft and editing.

Informed Consent

Consent for participation in interviews was obtained orally over the telephone.

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Data Availability Statement

Data relating to the fifteen interviews is available with the authors and can be supplied on request.

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