An Examination of Gender Disparities: An Analytical Study of the Differences and Inequalities Between Genders Across Various Contexts

Vinay Tomar
Dept of Chemistry
Jiwaji University
Gwalior, India
chemistry.scholar2022@gmail.com

Dowlath Nisha S
Dept. of Psychology
Meenakshi A.H.E.R
Chennai, India

Umamaheswari Kandasamy
Dept. of Business Administration
Dhanalakshmi Srinivasan college of Engineering
Coimbatore, India
umasashwini@gmail.com

Mohd Nouman
Dept. of Management
J.S. University
Shikohabad, Country
noumskhan50@gmail.com

Sanskriti Mehta
Dept. of CSE (AIML) CSE-APEX
Chandigarh University
Chandigarh , India
sanskriti210801@gmail.com

Saurabh Pratap Singh Rathore
Dept. of Management
ICAPSR
New Delhi, India
rathoresaurabhsingh@gmail.com
https://orcid.org/0000-0002-8390-7569

Abstract—The Gender Gap Analysis Report provides a comprehensive evaluation of gender disparities across key sectors, highlighting their impact on individuals, society, and the economy. It identifies significant gender gaps in education, employment, political representation, and socio-cultural norms, including unequal access to education, the gender pay gap, underrepresentation in leadership roles, and entrenched stereotypes. The report emphasizes the broader implications of these inequalities, which hinder social progress and economic growth. It advocates for a multi-faceted approach to address these challenges, involving governments, civil society, the private sector, and individuals. Recommended solutions include political reforms, legislative changes, educational initiatives, and awareness campaigns to combat gender biases and empower women. The report also proposes the use of an NLP-based model to detect gender representation in media, ensuring equal visibility for female contributions. By implementing these strategies, societies can reduce gender gaps, unlock women's potential, and foster a more inclusive and sustainable future.

Index Terms—NLP, Machine Learning, Gender Bias, Wage-Gap

I. INTRODUCTION

Gender bias, involving unequal treatment based on gender, creates persistent disparities across education, employment, income, and political representation. Despite progress, significant gaps remain, and this paper explores gender gap analysis across sectors and regions, highlighting both challenges and opportunities to enhance gender parity. It begins by examining the historical and theoretical foundations of gender gap analysis, such as feminist theory and the social construction of gender. The paper outlines the methodologies used to assess gender disparities, including statistical analysis, surveys, and qualitative research. It also emphasizes the role of intersectionality in understanding how gender intersects with race, class, and sexuality. The paper discusses the impact of gender gap analysis on policy and advocates for evidence-based interventions, continuous monitoring, and a collaborative approach involving governments, NGOs, and the private sector. Recommendations include legislative reforms, institutional changes, educational campaigns, and innovative approaches like NLP models to ensure balanced gender representation in media. The paper stresses the urgency of collective action to achieve gender equality.

II. LITERATURE REVIEW

Rotman and Mandel (2022) This study analyzes gender-specific wage structures and the gender wage gap in the U.S. labor market, offering a comprehensive examination of the factors contributing to wage inequality and its implications on social and economic outcomes [1]. Handl, Seck, and Simons (2022) The authors explore the intersection of gender and human rights, discussing how intersectionality shapes business and human rights scholarship, focusing on the challenges of integrating diverse gender perspectives in policy and business practices [2]. Górska (2016) This paper investigates gender differences in leadership styles, arguing that women and men exhibit distinct leadership behaviors, with implications for organizational effectiveness, gender equality in leadership roles, and broader societal norms [3]. Shah (2020) A multidisciplinary review addressing gender disparity in research, highlighting how gender influences academic careers across various fields. The study underscores the need for a more

inclusive research environment to bridge the gender gap [4]. Huang et al. (2020) This research compares gender inequality in scientific careers across countries and disciplines, revealing persistent gender disparities and offering historical insights into the progression of women's participation in science and academia globally [5]. Buckingham (2016) Buckingham examines the relationship between gender and climate change, arguing that women are disproportionately impacted by environmental challenges. The paper discusses gender-sensitive policy interventions to address these disparities in climate action [6].

Burns et al. (2018) This book explores the evolving gender gap in political participation, highlighting how gender dynamics shape political engagement and the barriers that still exist for women in participating fully in political processes [7]. Delaney and Devereux (2019) The study investigates gender differences in STEM fields, using data from college applications to analyze how gender influences academic choices and career paths, offering insights into the broader issues of gender disparity in science and technology [8]. Bosomworth and Khan (2023) This umbrella review focuses on gender-based inequalities in cardiovascular health, highlighting how gender disparities manifest in health outcomes and calling for gender-sensitive approaches in healthcare systems and policies [9]. Li (2023) Li's study investigates women's work in India, focusing on changes in time use between 1998 and 2019. The research highlights shifts in labor patterns and the persistent gender gaps in economic participation and household responsibilities [10]. Masud, Mutalib, and Ismail (2018) This comparative study addresses gender inequality in technical courses, emphasizing the low participation of women in STEM education and offering recommendations for policies to encourage greater female enrollment in technical disciplines [11].

Molina et al. (2013) This experimental study investigates gender differences in cooperation among high school students, showing that gender plays a significant role in collaborative behaviors and contributing to our understanding of gendered social dynamics [12]. Bharadwaj et al. (2012) The study analyzes the gender gap in mathematics education across low- and middle-income countries, providing empirical evidence of the persistent gender disparities in academic achievement in STEM fields [13]. Son Hing et al. (2023) This holistic review examines gender inequities in the workplace, focusing on organizational practices and processes that contribute to systemic gender inequality and proposing ways to foster more inclusive and equitable work environments [14]. Jose and Sivaraman (2023) This paper provides an overview of gender inequality and the gender gap in India, exploring societal, cultural, and economic factors that contribute to the persistent challenges women face in various sectors [15].

Haslanger (2000) Haslanger's philosophical inquiry into gender and race challenges traditional conceptions of these categories, offering an analysis of their social construction and the implications for justice, equality, and policy [16]. Buchmann et al. (2008) The authors discuss gender inequalities

in education, highlighting how educational systems reproduce gendered social structures and the need for reforms to create more equitable learning environments for both genders [17]. Bertrand et al. (2018) This study examines the effect of board quotas on female labor market outcomes in Norway, showing how policy interventions can reduce gender inequality in corporate settings and encourage more female participation in leadership roles [18].

Blau and Kahn (2016) The authors provide an extensive review of the gender wage gap, discussing its extent, trends, and the various factors that contribute to wage inequality, offering insights into the economic, social, and institutional determinants of the gap [19]. J. Ma et al. (2022) examine the interplay between gender inequality and the prevalence of parental physical abuse in low- and middle-income countries, specifically considering the moderation effect of child gender on abuse patterns. Their findings suggest significant disparities based on child gender, which are influenced by broader societal gender inequalities. This study highlights critical implications for developing targeted interventions that address these complex gender dynamics to effectively reduce instances of child abuse [20]. Anand et al. (2024) present an innovative smart AI-based volume control system that utilizes gesture recognition technology combining OpenCV and Mediapipe. Their research demonstrates the system's efficacy in providing a user-friendly interface for adjusting volume through simple gestures, enhancing accessibility and interaction in digital devices. This development could revolutionize user experience in multimedia environments, offering a practical application of AI in everyday technology [21].

Sikarwar et al. (2024) explore the use of IoT technology to enhance parking management systems in urban areas, advocating for its integration into smart city planning to improve efficiency and resource management [22]. Rathore et al. (2024) apply Recurrent Neural Networks (RNN) for customer segmentation in banking, enabling personalized marketing and improved customer retention by analyzing behavior and profitability [23]. Sharma et al. (2024) combine K-Means clustering with the RFM model to segment customers, optimizing marketing strategies for revenue growth. Their approach helps businesses identify valuable customer segments for more effective promotional efforts [24].

III. METHODOLOGY

Gender gap analysis is a systematic process used to identify and quantify gender disparities across various sectors like education, employment, and healthcare. The first step involves defining the scope and objectives of the analysis, selecting specific domains such as leadership roles or healthcare access. Clear goals are then set, framed by research questions to guide the investigation. It's crucial to consider design constraints, such as data availability and cultural norms, which may limit the scope. Data collection involves gathering relevant data from credible sources, ensuring representation of both genders. Pre-processing of the data follows, removing noise, handling missing values, and standardizing categories. Indicators such

as wage gaps and educational attainment are selected to measure disparities. Data analysis, using statistical and machine learning techniques, helps quantify disparities, while visualization tools like Matplotlib highlight key patterns. The next step involves exploring the causes behind the gaps, considering societal, economic, and institutional factors. Findings are interpreted to understand the implications of gender disparities. Based on these findings, actionable recommendations are developed to mitigate gaps. Finally, results are communicated to stakeholders through reports and presentations, and ongoing monitoring ensures the effectiveness of implemented strategies, allowing for adjustments based on new data and feedback.

Fig. 1. Steps for Gender Gap Analysis.

Additional steps used to make NLP model are:

1) Gender Identification and Bias Word List Creation: This process involves using a gender identification algorithm to determine the gender of individuals in text data, typically by analyzing names and pronouns. Additionally, a gender-bias word list is created, containing terms that exhibit masculine or feminine connotations, which could influence perceptions when used in contexts like job descriptions. For example, words like "dominant" and "aggressive" are often associated with masculine biases, while "nurturing" and "supportive" are linked with feminine biases. The use of an aliases file assists in recognizing different names used for the same individuals across various texts.

2) Entity Recognition: Entity recognition or Named Entity Recognition (NER) is a crucial task in Natural Language Processing (NLP). It involves identifying and categorizing textual entities into predefined groups such as names, organizations, and locations. This process is treated as a supervised learning task in machine learning, where models are trained on labeled data to recognize and predict entities in new, unseen text, helping in structuring unstructured data.

3) Topic Modeling: Topic modeling is a machine learning technique used to uncover hidden topics or themes

within a large collection of documents. It operates without prior knowledge of the content, identifying prevalent themes across texts. Techniques like Latent Dirichlet Allocation (LDA) and Non-negative Matrix Factorization (NMF) are commonly employed to perform this analysis, aiding in the understanding of large text corpora by distilling them into their most salient topics.

4) The Gender Gap Tracker: The Gender Gap Tracker (GGT) is an innovative tool designed to monitor the representation of men and women in major Canadian news outlets in real time. By applying Natural Language Processing (NLP), the GGT analyzes content from several French and English-language publications in Canada, quantifying the disparity in how frequently men and women are quoted, thereby providing insights into gender representation in media.

IV. RESULT

Gender-wage gap: The gender wage gap refers to the difference in average earnings between men and women in the workforce. It is usually expressed as a percentage, with women's earnings compared to men's earnings for the same job or work of equal value. It is defined as the difference between median earnings of men and women relative to median earnings of men. Data refer to full-time employees for the year 2021. Given below is the graph of gender-wage gap prevalent in different countries for the year 2021.
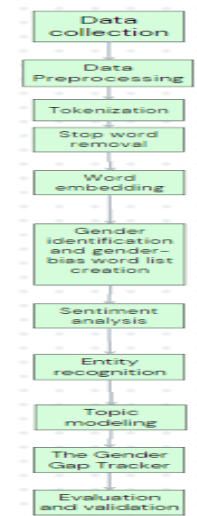

Fig. 2. Flowchart For Model Based On NLP

From the above graph and table we can interpret that almost in every country women are paid less than men for the same job. The percentage of gender wage gap vary in every region with it being as high as 31% in Korea to a minimum of 8.72 in Italy. Studies have consistently shown that women earn less than men on average across most professions and industries and our report has once again proven the same.
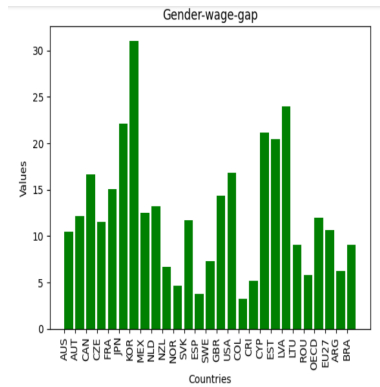
Fig. 3.   Gender-Wage-Gap

Comparison with India: India according to the "Global Wage Report 2020–21" has a gender- wage gap percentage of 35% which is much more than world average. In 1993–1994 Indian women made 48% less money on average than their male counterparts. Since then, according to statistics from the National Sample Survey Office's (NSSO) labour force survey, the disparity has decreased, reaching 28% in 2018–19.

Share of female managers: It is the percentage share of managers that are female as compared with total number of managers. The data is for the year 2021. The graph represents how many higher or manager level positions are held by women out of 100 managers.
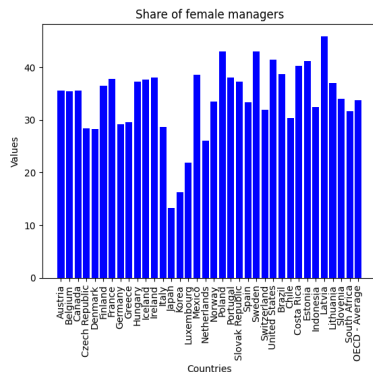

Fig. 4.   Share of female Managers

From the above graph we can interpret that all throughout the world the percentage of female managers is less than their male counterparts. Countries like Korea and Japan has the lowest number of female mangers per 100 managers that is 15% and 11% respectively. European countries percentage lies between 28% to 38% while the average percentage share of female managers is 32% globally.

Comparison with India: According to Grant Thornton's International Business Report, India has 36% women in senior management roles across mid-market companies, which is 4% more than the global average of 32. According to the report, India has a higher percentage of women in leadership positions than the current worldwide (32%), BRIC (34%), and G7 (30%) norms.

Unpaid labour: Unpaid labour refers to any work or effort that a person performs without receiving any financial compensation or benefits. This type of work may include activities such as volunteering, internships, or work experience programs, among others. It can also mean household work like cooking, buying groceries, cleaning, raising kids, looking after house etc.
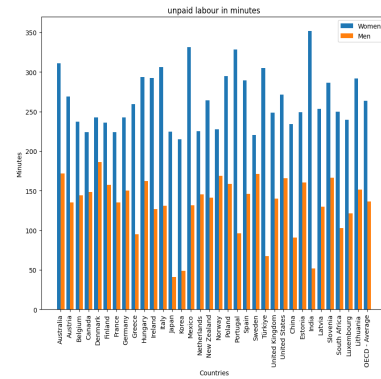

Fig. 5.   Global Comparison of Unpaid Labor by Gender

As we can see from the graph women do unpaid work almost twice as much as men on average. This is because even now it is assumed a women's job to do household chores. Even if the women is financially employed she is still supposed to be the one looking after children, washing dishes, cooking etc. Men's support is very limited in household work. Asian countries like Japan, Korea and India has one of the highest difference in the working hours of men and women in unpaid labour. The global average is 170 minutes for men and 225 minutes for women.

Paid labour: Paid labor refers to any work or employment that a person engages in and receives compensation in the form of wages, salary, or other forms of payment. This can include full-time or part-time work, temporary or contract work, and self-employment. The compensation received for paid labor is intended to provide the worker with a source of income that they can use to meet their financial needs and achieve their goals. The data is based on the year 2021.

As we can interpret from above men spend more time in paid work than women. This is due to the fact that women spend much more time doing unpaid domestic work which makes it very difficult to work full time. Also, in many cases women are discouraged by family or in laws from working full time as it will lead to neglection of housework. This force men to work full time to earn money to support their family. On average men spend 320 minutes doing paid labour and women spend 220 minutes doing the same. Countries like Japan, Korea and Türkiye have the highest difference in men's and women's paid working hours.

Total labour minutes: It is the time spent in doing any kind of labour whether its unpaid or paid. It is the total time
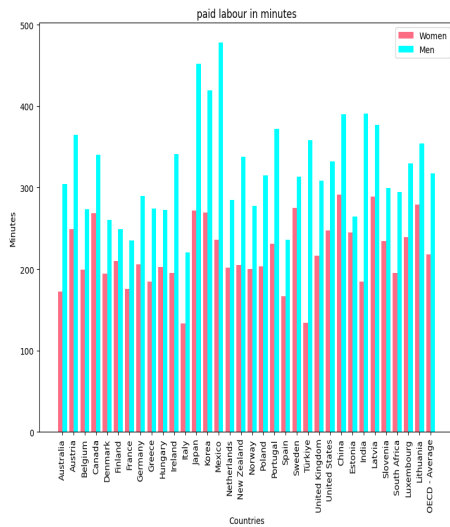
Fig. 6. Total Labor Minutes by Gender Across Different Countries

them economically dependent and vulnerable. On the other hand, it puts huge pressure on men to provide for their family by working extra hard as they are the only one earning money.

Causes for gender-bias in employment and economic sector

Gender bias in employment and the economic sector persists due to several factors, including historical biases where economic practices have been male-dominated, and discrimination in hiring, promotions, and pay. Unequal access to education and professional opportunities, hostile workplace cultures, and societal expectations regarding family and caregiving responsibilities also contribute to the disparity. Additionally, healthcare challenges, such as malnutrition and maternity care, disproportionately affect women, limiting their participation and advancement in the workforce.

Ways to decrease gender gap

The gender gap remains a significant global challenge, particularly in the economic sector. To mitigate this, enhancing education is crucial; girls and women should be empowered to study and excel in fields like economics, business, and finance. Promoting female entrepreneurship is also essential; providing women access to financial resources, mentoring, and networking can help level the playing field. Furthermore, eradicating workplace discrimination is vital for fostering an inclusive environment where women have equal opportunities for advancement and compensation. Flexible work arrangements can also support women in balancing professional and personal responsibilities, enhancing workforce diversity. Finally, implementing supportive government policies, including paid parental leave, affordable childcare, and equal pay laws, is fundamental in closing the economic gender gap.

spent in doing work throughout the day. It includes work like household work, financial work during office etc. By comparing the total work done by both genders we can find insights like why a certain gender works more or do they earn according to the work they do.

Fig. 7. Gender Disparity in Total Labor Minutes: A Closer Look

Fig. 8. Gender Distribution in Paid Labor

Fig. 9. Comparative Analysis of Paid and Unpaid Labor by Gender in Selected Countries

We can see from the graph that except from some countries like New Zealand, Norway and Netherlands where men work longer than women, in most countries women work far longer than men. On average women work for 470 minutes and men work for 450 minutes daily. Comparing it with the other two graphs presented before we see that although women spend more time working, they are still the ones who are economically vulnerable and dependent due to most of their work being unpaid.

Comparing with India: From the above graph, we see that on average in India women work for 520 minutes while men work for 430 minutes. This is a huge difference while comparing with world average. Also, it is unfair as most of the time spend in work by women is for unpaid labour which leaves them little to no time for earning money and thus, making

V. FUTURE SCOPE

Gender gap analysis is an ongoing process that requires continuous monitoring and evaluation. As such, there are

several future directions that could be explored in order to build upon the findings of this analysis. Some potential areas for further research include

1) Intersectionality: Examining the ways in which gender intersects with other factors such as race, class, and sexuality in order to better understand the ways in which multiple identities intersect to shape experiences of inequality

2) Longitudinal studies: Conducting studies over a longer period of time in order to identify changes and trends in gender disparities over time.

3) Policy evaluations: Evaluating the effectiveness of existing policies and programs aimed at addressing gender disparities overtime.

4) Expansion to other countries: The system has the potential to be expanded to other countries where women's safety is a major concern. Collaboration with local authorities and a thorough understanding of local laws and regulations will be required.

VI. CONCLUSION

Gender gap analysis is an important tool for identifying and addressing disparities between men and women in various aspects of life. By systematically collecting and analyzing data on gender disparities, we can better understand the root causes of inequality and develop targeted interventions to address them. This analysis has revealed significant gender disparities in several areas, including education, employment, and politics. These disparities are deeply rooted in societal attitudes and beliefs about gender roles, and will require sustained efforts at multiple levels in order to address them. Moving forward, it is critical that we continue to prioritize gender gap analysis as a tool for promoting gender equality.

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