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Funds and Fears: How Crime Against Women Undermines Gender Equality in India

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Abstract

Gender inequality is a universal phenomenon that requires immediate attention if a country intends to develop in its true sense. Gender equality encompasses multiple dimensions, with various causes determining the existing discrepancies. This study analyzes the factors affecting the gender inequality index (GII) in India. We aim to investigate how the gender budget and crime against women (CAW) affect the GII. This paper utilized time-series data for India to examine the available variables, which included the GII, gender budget, number of CAW, and health variable. The results obtained by applying the ARDL model indicated a long-run relationship between the variables. An increase in gender budget allocation and efforts to reduce CAW would contribute to gender equality and better socioeconomic status for women in India. We addressed the research gap by examining the combined influence of gender budget and CAW on GII and employed analytical approaches to assess their impact. This study offers novel insights into the determinants of gender equality. Our study suggests that the gender budget is an invaluable tool for enhancing the overall status of women by directing resources toward women-focused policies. The policy framework in India needs to be modified to reduce CAW and ensure proper implementation of safety measures.

Key words

Gender inequality, ARDL, gender budgeting, gender gap, crime rate

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Introduction

Today, no society is untouched by gender inequality or existing gender gaps. As per UNICEF, equality does not imply women and men will become equal, but their rights, duties, and opportunities do not depend on their gender (2017). Inequality manifests in various ways, including gender norms at home, disparities in educational attainment, employment preferences, workplace harassment, and discrimination. The Veda and Upanishads in ancient India revered women as goddesses, and early Vedic society valued and cared for girls. However, the practice of polygamy, followed by the purdah, dowry, and sati systems later, gradually decreased women's status over the centuries (Jha & Nagar, 2015). Despite several acts, laws, and policies, inequality continues to exist in this high-tech era. The reasons are patriarchy, rigid gender norms, unequal access to opportunities, and limited decision-making power for women (Zhu, 2021; Sharma, 2015b). Additional issues influencing gender parity in India include political underrepresentation, limited access to healthcare, work discrimination, harassment, and unpaid caregiving responsibilities. The tolerance of gender-based violence and the rising fear of crime further intensify gender inequality. Gender-based violence directed at women and girls violates their essential human rights, creates an atmosphere of fear, and inhibits their possibilities to reach their true potential (Sharma, 2015a). Current circumstances and gender conventions often place women subordinate to men, increasing their vulnerability to violence.

According to the National Crime Records Bureau (NCRB), Even though overall crime rates are down, crimes against women (CAW) are growing annually, except during the COVID-19 lockdown. Reduced mobility and decreased use of public space are the reasons for this, leading to a mismatch between victims and criminals (Hoehn-Velasco et al., 2021). The evidence indicates that crime changes women's perception of safety while going out. According to UN Women (2021), females experience fear when navigating public spaces, therefore preventing them from using services and educational resources. They run the risk of permanent exclusion if they don't voice their opinions and participate. Culture and gender stereotypes certainly play an essential part in the societal position of women, but economic independence and empowerment enable women to make their own decisions (Pandey, 2024). It also aids in reducing barriers for women and broadening prospects in several different domains. However, to attain economic independence, the current administration must implement safety measures.

To date, the Government of India has implemented several measures, including

the introduction of gender budgeting in 2005-2006. It is defined as "*a gender-based assessment of budgets, incorporating a gender perspective at all levels of the budgetary process and restructuring revenues and expenditures to promote equality*" (Council of Europe, 2009). It facilitates macro-level budget analysis through a gender-sensitive lens. The gender budget in India includes programs in education, health, safety, science, and agriculture, etc. If executed and implemented appropriately, the gender budget can uplift the status of women. Globally, countries recognize gender budgeting as a vital instrument for ensuring true gender parity and enhancing women's economic and social empowerment (Koehler, 2016; Addabbo et al., 2011). Currently, not all countries have incorporated gender budgeting, and those that have often fail to allocate a sufficient portion of their total budget. By holding governments responsible for their equality programs, gender budgeting seeks to advance gender equality in government finances (Sharp & Broomhill, 2002). When women have access to resources, they can participate on an equal footing with men, thereby reducing the existing gap and disparity. While equality begins at home, to ameliorate women's socioeconomic status, safety, security laws, and effective fiscal support are vital. The gender budget can be an effective instrument for mainstreaming gender and promoting government accountability.

Indian states vary in gender disparities, including CAW and gender budgeting. Only 20 Indian states integrate gender budgeting in their annual budgets, and CAW varies across states. This profoundly impacts gender inequalities in the country. Rajasthan and Haryana have strict gender norms, such as early marriage, which lowers women's status. Even Kerala, with a higher literacy rate, has a high rate of CAW. Delhi has a high CAW rate despite its well-developed infrastructure. So, gender disparity in India hinges on various factors and not on a few.

Considering India's overall rank on the Gender Inequality Index (GII) 108/198 in 2022, this research examines India's gender inequality determinants. India, a rising economy with unique socio-economic dynamics, must close the gender gap to fully realize its potential as a developed nation. Various factors, including family structure, stereotypes, and gender roles, contribute to inequality in India; however, gender budgeting, government policies, and crime prevention have the potential to alter this situation. Building on existing literature, this study links gender budgeting and CAW to gender inequality to fill the empirical void. This investigation is the first examination of recent time series data on gender inequality in India and its causes. Most studies on gender budgeting have been qualitative or offered a quick summary; they have not explored its link with gender equality. We fill the gap in empirical studies linking gender budgeting, CAW, health indicator and GII. We

evaluated the fiscal policy variable of gender budget, the number of CAWs registered to the NCRB in the previous 18 years, and their influence on India's GII score. The study aims to examine the role of gender budgeting, women's health, and recent crime trends in worsening gender inequality. Furthermore, it explores how changes to safety measures and fiscal policies, such as budget allocation, can contribute to achieving gender equality.

We structure this paper as follows: The next section comprises a review of the available research pertaining to the issue, followed by the approach employed to analyze the data and characterize the variables. Section 4 describes the findings, whereas the last section provides the conclusion of the study.

Literature

India is currently among the fastest-growing economies globally; yet, it remains inferior to several other countries in gender parity. The World Economic Forum (WEF) published the Gender Gap Report, which shows that every country in the region, except for Afghanistan, ranks higher than India. This is a concern for India, as gender equality drives economic growth, particularly in the job and educational sectors. A country cannot fully progress without empowering its female population (Kabeer & Natali, 2013). India can leverage 48.46% of its female population as a valuable human resource by providing them with economic opportunities and choices. Gender inequality has several aspects and definitions. It can be defined as discrimination against women based on sex (Sharma, 2015b). The causes of gender inequality include sexism, culture, patriarchal society, education level, violence against women, and existing legal remedies, policies, and laws. Zhu (2021) focused on workplace harassment and cultural issues, covering only one dimension. This inequality affects a woman's home, work, access to resources, right to a dignified existence, and public space use. This confines women to unpaid domestic work and gradually deteriorates their societal status.

Families often combine their honor with women's sense of dignity and behavior, restricting them from making their own decisions. CAW worsen this situation. Crimes in public transport and street assaults restrict women's mobility, reduce their independence, and limit their capacity to engage in socioeconomic activities outside the home (Ranaweera, 2024). Sexual harassment and assault significantly affect the mental and emotional well-being of survivors (UN Women, 2021). Borker (2021) conducted a study in Delhi with 4000 students and found that women often settle for less prestigious colleges if the route to the better ones is unsafe. Such behavior hampers their

education and further diminishes human capital and the potential to grow. Crime and fear of violence do impact women's daily lives, educational choices, and work preferences; other regional factors also contribute to these issues.

Women often refrain from entering areas where they perceive a higher threat of sexual harassment against girls (Chakraborty et al., 2016). Past incidents and city planning also influence women's choices regarding how they use public spaces. They would rather not work away from home or in an unsafe place. Mishra et al. (2021) found in their study of 517 Indian districts that the crime rate impacts women's labor force participation more than men's, affecting their economic status. Women's economic standing strongly influences their ability to make decisions, making them subordinate to the wage earners. Factors such as family behavior, choice availability, and decision-making all contribute substantially to determining women's economic choices. The health of women is also an indicator of parity. Heymann et al. (2019) examined the impacts of national legislation and policy reforms and all the social determinants of existing health inequalities. They found that increasing equality status positively impacts health outcomes, and conversely, lower equality status negatively affects them. However, the lack of longitudinal data in this study limits its robustness. We can conclude that gender norms, decision-making, and policy all affect the health of women. Socio-behavioral factors and cultural attitudes, including myths and misconceptions regarding reproductive and maternal health, contribute to the deteriorating health status of females (Asha & Moly, 2023). Moreover, every facet of life, including economic, social, and political engagement, is interlinked with health. Further, the absence of female political engagement constrains legislative advocacy for gender equality and leads to underrepresentation in areas of leadership.

In this growing world, Women's participation in the labor market is vital for ensuring gender parity, and this depends on giving them the autonomy and mobility to participate in the labor market (Costagliola, 2021). Nevertheless, gender conventions and the dual load of work frequently restrict women to domestic roles, hence restricting labor force participation (Hwang, 2024). Socially, Women's economic independence is an essential first step toward gender equality, enabling them to make decisions that affect their own well-being and that of their communities (Pandey, 2024). Decision making can lead to positive change and progress for society as a whole. Yodanis (2004) established a relationship between the violence and status of women in the North America and European region and found significant relations between them, especially physical and sexual violence. Any act of violence against a woman impacts the lives of other women, as experiencing vic-

timization is not a precondition of its dread. Countries with higher status for women generally have lower crime rates compared to those with lower status for women. Reducing the number of crimes can enhance their status and improve gender equality in a region. In addition, initiatives are required in the majority of fields to empower women and offer them opportunities. We should take remedial measures to reduce inequalities, including raising educational and employment thresholds and fostering collaboration between local government, NGOs, NPOs, and SHGs (Sharma, 2015b).

The Government of India took several steps to bridge the gender gap, like the formulation of the National Commission for Women (1992), Beti Bachao Beti Padhao, Matra Vandan Yojana, Mission Shakti, and the incorporation of a gender budget in 2005–2006. Gender budgeting here refers to the systematic use of budget cycle instruments, strategies, and processes to promote equality (Downes et al., 2017). Research has proven that it is an effective strategy to financially support women's initiatives and empower them alongside everyone. Hooda (2022) established a strong association between gender budgeting and improvements in the female Human Development Index (HDI) and Gender Development Index (GDI). The study also found a connection between gender budgeting and key indicators such as the female dropout rate, gender parity index, and maternal mortality rate. He analyzed the importance of gender-responsive budgeting in improving multiple gender development indicators. Allocating budgets and implementing policies for women promotes individual advancement and enhances the comprehensive growth of a nation.

GII is one reliable indicator of gender equality; changes in the percentage of gender budgets and the prevalence of crimes over time and the health status of women will undoubtedly have an impact. Access to health care depends on women's decision-making power, income, independence, and family norms. However, in patriarchal societies, the male authority also bears the primary responsibility for women's reproductive health (Tesha et al., 2023). Additionally, India is not immune to this phenomenon; unsafe abortions continue to be prevalent. The United Nations Population Fund (2022) ranks unsafe abortions as India's third leading cause of maternal death. Therefore, we must immediately address health issues affecting women. We can address this issue by allocating sufficient funds for women's health, providing adequate services, and ensuring safe abortion and contraceptive access.

Gender budgets can also help local governments integrate sustainable development goals at the municipal level and improve women's quality of life. Gunluk- Senesen (2021) studied three cities in Turkey, developing an analytical framework to determine whether or not national policies are changing the safety and status of women. This study

integrated UN SDGs with gender budgeting but omitted other aspects and areas. We cannot generalize the findings to other countries or regions due to cultural and gender role differences. There is a need to incorporate gender budgeting tools to empower women in any country (Agrawal, 2017). Countries with effective gender budgeting practices show improvements in women's status and gender equality (Maruzani et al., 2012). They stressed how important gender budgeting tools are for making it easier to move from making idealistic promises to actually addressing gender inequality in the budgeting process. Countries such as Mozambique, Zimbabwe, and Tanzania are succeeding in their gender budget projects by incorporating ministries and reforms. Ghana, as another example, has successfully tackled numerous national issues by implementing gender-specific budgeting, establishing itself as a government committed to empowering women and enhancing equality (Asiedu, 2023). They addressed issues that specifically impacted women and girls, leading to an improvement in gender equality within the country. Consequently, the gender budgeting process is crucial for advancing gender equality and incorporating gender priorities into regional policies (Del Gesso, 2019).

Not just gender budgeting, but gender-inclusive planning and a comprehensive understanding of gender issues are imperative to ensuring safety and other concerns in urban planning (Swain & Mohanty, 2015). Nations that invest in the economic future of women and girls are better positioned to narrow gender gaps and attain elevated levels of economic expansion and productivity. These investments foster human capital development and optimize the use of resources, leading to poverty reduction (Fernández et al., 2021). Gender equality and its determinants have been the subject of numerous studies, most of which are qualitative in nature and do not incorporate these variables. No single study has integrated the time series variables of crime, gender budget, and GII within the context of India. The lack of evidence in the literature was notable. By analyzing the importance of gender budgeting, reduction in CAW, and health indicators for improving gender equality in India, we aimed to address this gap. We also proposed several policy strategies for the government to tackle the pressing issues of crime and gender inequality.

Methods

Factors Affecting Gender Equality

This study intends to examine India's current state that indicates and influences gender equality. This study employs time series data from 2005 to 2022, obtained

Table 1. Description of variables and their sources

S no.	Variable	Year	Source	Agency/organization	Website link
1	Number of crimes against women (NCAW)	2005-2022	National crime records bureau yearly report	National Crime Records Bureau (NCRB), Ministry of home affairs, Government of India	https://www.ncrb.gov.in/
2	Gender Inequality Index (GII)	2005-2022	Gender inequality index, Human development reports	United Nations Development Program (UNDP)	https://hdr.undp.org/data-center/thematic-composite-indices/gender-inequality-index#/indicies/GII
3	Gender Budget (GB)	2005-2022	Gender budget expenditure profile from annual budget statement	Ministry of finance, Government of India	https://www.indiabudget.gov.in/
4	Health Variable	2005-2022	Gender Gap Report	World Economic Forum (WEF)	https://www.weforum.org/publications/series/global-gender-gap-report/

from various secondary sources (Table 1). This encompasses government websites and reports from international organizations, including the Ministry of Finance (Government of India), WEF, and United Nations. We chose India because of its diverse demographics and its emergence as a developing country. We want to understand the unique cultural, social, and economic determinants that perpetuate gender disparity in the nation. The availability of information on CAW and gender budgeting is another factor in the decision to focus on India. The study investigates four variables, with the gender inequality index (GII) acting as the dependent variable. India's Ministry of Finance released the gender budget (GB), the National Crime Records Bureau (NCRB) of India kept track of all the crimes against women (NCAW), and the WEF reported the health variable, which is a part of the gender gap report. These are three independent variables. The health subindex elucidates gender differences in health using two indicators: the sex ratio at birth, which examines the issue of son preference in countries, and the gap in healthy life expectancy between women and men. Our study aims to measure the influence of independent variables on GII.

The United Nations Development Program has published the GII since 1990. In the index, 0 represents equality and 1 represents total inequality. It includes 3 sub-indices: reproductive health, empowerment, and labor market. Maternal mortality ratio and adolescent birth rates measure reproductive health, while the proportion of female parliamentary seats occupied and the percentage of females in secondary education measure empowerment. The labor market takes into account the rate of participation in the labor force for both female and male populations aged 15 years and older. We selected GII for this study because it comprehensively measures multiple dimensions of gender inequality using multiple correspondence analysis (MCA), and it best represents the status of women in a country (UNDP, 2010).

Previous studies haven't given much attention to gender budgeting, despite its considerable potential to improve women's empowerment and gender equality through fiscal policies. Policy formulation must consider women's requirements to enhance their socioeconomic status. Another variable, the NCAW, serves as an indicator of safety. Research indicates that reducing gender inequality can also prevent violence against women, because it challenges harmful gender norms and empowers women to advocate for their rights. Due to the direct influence of health on women's lives across all spheres, the gender gap index often uses the health indicator to measure women's empowerment and status (Richardson, 2018). Specific indicators that reflect women's health outcomes and their access to health services operationalize the health index. The key components of the health index include the sex ratio at birth and healthy life expectancy, among others. The health index is considered the most suitable variable to depict the current gaps and disparities in health and survival. By analyzing these variables, this study aims to assess their long-term impact on dependent variable and establish a meaningful relationship.

Models and Techniques

Several models can be applied to check relationships between dependent and independent variables. As our variables are time series and stationary at first difference and on level, i.e., a combination of both I (1) and I (0). Compared to typical cointegration methods, ARDL is the most appropriate model in this case, as the variables meet the basic requirements of ARDL. It's possible to use ARDL models on time series variables without taking the integration order into account (Pesaran & Shin, 1995), so stationarity won't change the results in this case. Furthermore,

the F-statistic tests the joint significance of the lagged level coefficients in the ARDL-ECM. The error correction model (ECM) model lets you see both short-term changes and long-term equilibrium relationships. This helps you understand how deviations from the long-term trend are fixed over time.

The ARDL approach can capture the dynamics of the data better by including lag values for both the dependent and independent variables. In the ARDL model, the risks of multicollinearity and small sample size can be cut down by choosing the right lag duration (Shin et al., 2014). This model keeps its power and gives fair estimates of a long-term relationship even when some of the regressors are endogenous (Harris & Sollis, 2003). It also assists in reducing the problem of omitted variables as well as heteroscedasticity. Overfitting can result in short time series data; we solved it by selecting lags based on AIC criteria. AIC lag selection also resolved the problem with a small sample. This model can provide reliable results even for small sample sizes, unlike some other econometric models that require large datasets for reliable results.

We initially conduct the bound test and determine whether there is a long-run association between the variables based on F-statistics, then proceed towards the ARDL model. We reject the null hypothesis if the value of F-statistics is greater than the lower bound I (0) and the upper bound I (1). This means that the variables used in the model have a long-term relationship.

The study's empirical framework is described, and its implicit form is as follows:

$$GII_t = f\,(LGB_t, HEALTH_t, LNCAW_t) \tag{1}$$

Equation (1) can be described in the form:

$$GII_t = \alpha 0 + LGBt + HEALTH_t + LNCAW_t + \varepsilon_t \tag{2}$$

where GIIt is the gender inequality index, LGB_t is logarithmic form of gender budget, $HEALTH_t$ is the health subindex from gender gap index, and $LNCAW_t$ represents the logarithmic form of number of CAW.

To determine the long-term relationship among the variables, we employ the ARDL bound testing methodology, which may be stated as:

$$\Delta GII_t = \alpha_{0i} + \sum_{i=1}^{p} \alpha_{1i} \Delta GII_{t-i} + \sum_{i=1}^{q_1} \alpha_2 \Delta LGB_{t-i} + \sum_{i=1}^{q_2} \alpha_3 \Delta HEALTH_{t-i} + \sum_{i=1}^{q_3} \alpha_4 LNCAW_{t-i} + \beta_1 GII_{t-i} + \beta_2 LGB_{t-i} + \beta_3 HEALTH_{t-i} + \beta_4 LNCAW_{t-i} + \varepsilon_t \quad (3)$$

After establishing the long-run association, the subsequent process is to carry out an ECM. It represents that for a dependent variable, how much time will it take to return to equilibrium following a reversion in the other independent variable.

Estimated ECM equation for the paper is as follows:

$$\Delta GII_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta GII_{t-1} + \sum_{i=1}^{q_1} \alpha_{2i} \Delta LGB_{t-1} + \sum_{i=1}^{q_2} \alpha_{3i} \Delta HEALTH_{t-i} + \sum_{i=1}^{q_3} \alpha_{4i} \Delta LNCAW_{t-i} + \gamma ECT_{t-1} + \varepsilon_t \quad (4)$$

Further, to verify the stability and robustness of the model, we calculated the F-statistics of the other independent variable, replacing each with the dependent variable one at a time. Other post-diagnostic tests include the Breusch-Pagan, the white test for homoscedasticity, and the Ramsey RESET test using the powers of the fitted values of the endogenous variable. A CUSUM plot serves as a tool for assessing the stability of the model.

Results and Discussions

Gender Inequality Index (GII) and Other Independent Variables Trend

The GII score demonstrates a slight improvement in gender equality in India, although not substantially so. The score decreased from 0.619 in 2005 to 0.437 in 2022 at a gradual rate (Figure 1). While the GII has improved, other factors are responsible for the persistent inequality in India. For instance, violence against women directly affects the labor force participation rate, as increasing crime engenders fear of violence outside the vicinity (Chakraborty et al., 2016). The GII includes the LFPR as an indicator of the labor market, which directly correlates with the socioeconomic status of women. A major element contributing to inequality is the number of CAW, which exhibit an increasing trend between 2005 and 2014. The number of CAW marginally decreased in 2015, but it continued to rise until 2019.

Figure 1. Gender Inequality Index (GII) score of India.

Note. The horizontal axis represents the time intervals whereas the vertical axis represents the GII score of India from 2005 to 2022

Source. Estimates by authors derived from data from the United Nations Development Program.

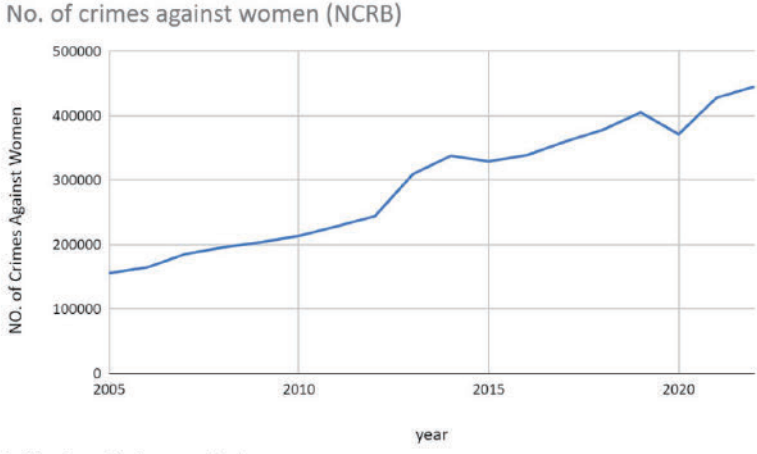

Figure 2. Number of crimes against women.

Note. The horizontal axis represents the time intervals whereas the vertical axis indicates the number of crimes against women happened between 2005 and 2022

Source. Estimates by authors derived from data from NCRB.

The decline in the total number of CAW in 2020 can be attributed to the COVID-19 lockdown. This is consistent with the observation that the mobility of women decreased in public areas and workplaces (Ravindran & Shah, 2023), which

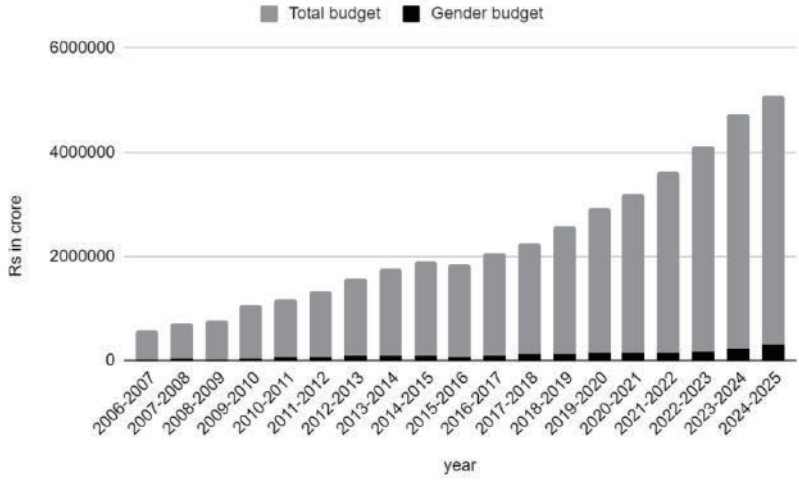

Figure 3. Share of gender Budget to the total Budget estimation.

Note. The horizontal axis shows the time intervals whereas the vertical axis shows the Rs. in crores estimated in the gender budget in proportion to total budget.

Source. Estimates by authors derived from data from the Ministry of Finance (Government of India)

retained its trend after 2020. However, stringent laws, education, proper planning, fiscal policies, and government initiatives have the potential to mitigate this crime situation. These measures can significantly impact the improvement of gender equality and the overall status of women (Kolovich, 2018).

India is certainly making efforts to enhance gender equality, one of which is gender budgeting. However, GB data indicates that the percentage share of it in India's annual budget estimation consistently ranges between 4 and 6 percent of the total budget allocation (Figure 3). The GB's share has not increased substantially over the years, despite a rise in total budget expenditure in the past 19 years. Gender budget data not only explains the trend in GB in the past 19 years but also highlights the areas where the government is deficient. This limited growth in GB has likely influenced the overall status of women in the nation. Gender budgeting is necessary in this age of women's empowerment and gender fairness, as national budgets affect different segments of society differently in terms of resource allocation and priority given to competing sectors (Agrawal, 2017).

Descriptive Statistics

The statistical results presented in Table 2 demonstrate that the mean of all variables is positive while the skewness is less than 1, suggesting that the data is normally distributed. Also, the correlation matrix shows that variables like GII, LGB, and LNCAW are significantly linked (Part B, Table 2). Low correlations among the variables indicate a minimal probability of multicollinearity. Additionally, we evaluate the stationarity of the series using the Augmented Dickey-Fuller and Phillips-Perron unit root tests. HEALTH is stationary at I (0), whereas GII, LGB, and LNCAW are stationary at I (1), confirmed by test statistics (Table 3). We checked the variables at I (1) after confirming that they are not stationary at I (0).

Table 2. Correlation Matrix and descriptive Statistics

Variables	GII	LGB	LNCAW	HEALTH
Part: A Descriptive Statistics				
Mean	.532	11.24	12.53	.936
Standard Deviation	.055	.629	.345	.008
Kurtosis	.664	.161	.546	.003
Skewness	.242	.552	.039	.012
Part: B Correlation Matrix				
GII	1			
LGB	-0.906**	1		
LNCAW	-0.938**	0.924**	1	
HEALTH	-0.157	-0.035	0.063	1

Note. GII, LGB, LNCAW, and HEALTH denote gender inequality index, natural log of gender budget, natural log of number of crimes against women and Health sub index from Gender Gap Index respectively. ** indicates significance at 5% level.

Table 3. Unit Root Test statistics

Variables	ADF		PP	
	I (0)	I (1)	I (0)	I (1)
GII	0.965	0.004**	0.978	0.003**
LGB	0.553	0.000**	0.515	0.000**
LNCAW	0.708	0.000**	0.671	0.000**
HEALTH	0.000**	0.000**	0.000**	0.000**

Note. Results of ADP, PP unit root tests presented in this table. I (0) and I (1) denote level and level one stationarity. Stationary variables are denoted by ** at 5% significance level.

Relationship Between the Variables

Interpretation of long-run relationship

To analyze the long-term relationship between the variables, we compute the equation (3). We included variables with the optimum lag length, selected based on AIC criteria, and followed a bound testing approach to compute F-statistics. The F-statistics play a crucial role in determining the long-run relationship among the variables. We considered each variable as a dependent variable to compute the F-statistics. In the matrix with LGB, LNCAW, and HEALTH as the independent variables and GII as the dependent variable, the F-statistics surpass the upper bound critical value and demonstrate significance (5%). This value indicates a long-run cointegrating association between the variables (Table 4). We assess the ARDL model (2,1,2,2) after evaluating that the selected variables have a cointegration relation. Variables LGB and LNCAW show statistically significant results, and the signs of the coefficients match our initial presumption (Table 5). However, the health variable doesn't yield a significant result.

The variable LGB growth rates have a negative long-run coefficient that is statistically significant, suggesting that a lower gender budget is associated with higher inequality. Gender equality is significantly influenced by the budget allotted to various sectors that contribute to enhancing the status of women. This finding aligns with the results of Chakraborty et al. (2017) and Stotsky and Zaman (2016), who investigated how gender planning budgeting aids in increasing gender parity in the Asia-Pacific region. The observed link exists due to the effect of gender budgeting and related fiscal policies on indicators of gender empowerment, such as education and economic participation. Our findings corroborate those of Stotsky and Zaman (2016), supporting the established relationship between gender budgeting and a country's socioeconomic growth. A gender budget has the potential to significantly alter the socio-economic landscape of a region and improve gender equality. In this regard, Ghana is actively involved in gender-responsive budgeting on an international scale as a result of the advocacy of local civil society organizations (Asiedu, 2023). India can implement the same approach and observe the desired results.

The LNCAW coefficient is positive and significant as predicted. The positive relationship implies that a higher number of CAW is associated with greater gender inequality. In regions where women have a higher socioeconomic status, the crime rate tends to decrease. Yodanis (2004) established a correlation between the prevalence of sexual assault against women and their educational and economic

status in a nation, a finding that our results confirm. CAW significantly impacts women's perspectives and heightens their fear of crime. Sharma (2015a) reported a similar result in a cross-sectional study of Indian states, demonstrating that states with low GII scores have lower gender-based crime. We can generalize this study to decrease the number of CAW and implement policy changes to improve India's GII. Further, Tayal (2014) and Chakraborty et al. (2016) showed a negative relationship between labor force participation, which is an indicator of gender equality, and CAW. Our study adds a new dimension to it by taking the whole GII as the dependent variable and proving empirically its sensitivity to CAW. A higher rate of CAW restricts their mobility, which in turn affects their education and economic status, resulting in higher inequality.

The health variable's coefficient is not statistically significant in our study. This assertion contradicts a WHO report that stated enhancing women's health, especially maternity and reproductive health, boosts labor force participation and productivity, promoting economic equality (2021). The health variable chosen for this study may not adequately represent gender health inequities, explaining this insignificance. This variable does not cover accessibility, reproductive health, or societal norms. Nevertheless, there is evidence that gender inequality enablers harm women and girls' sexual and reproductive health and rights (Tesha et al., 2023). Women's health was further hampered by a lack of decision-making authority, social norms, and resource access.

This study provides a detailed view of gender inequality in India and potential challenges related to its causes. We find that implementing appropriate fiscal measures like gender budgeting and enacting proper laws can achieve gender equality and reduce the number of CAW. Well-designed laws, policies, and programs that are well thought out and executed have the power to transform norms and enhance health outcomes (Heymann et al., 2019). It operates in a cycle: lower measures lead to higher crime rates, which in turn exacerbate inequality. However, countries and regions that adopt anti-violence against women and girls (VAWG) laws are achieving superior performance. Mexico, most of Central America, Bolivia, Peru, and Venezuela have stronger anti-VAWG laws (Yount et al., 2020). Challenges exist in India regarding policy execution, delayed court procedures, institutional aid for survivors, and the revision of legislation. India must enact more stringent anti-CAW legislation and expedite court processes to safeguard its vulnerable population for national prosperity.

Our model demonstrates a strong fit, as indicated by a high adjusted R^2 value. The F-statistic (Table 5) supports the ability of the independent variables to define

optimal changes in the dependent variable. Moreover, our model estimations have no evidence of heteroskedasticity; residuals are normally distributed, and there are no omitted variables (Table 6). The Variation Inflation Factor (VIF) suggests that multicollinearity is not a significant issue. Our model is stable too, as confirmed by the CUSUM plot (Figure 4).

Table 4. Cointegration from ARDL Bound Test

Variables	F- Statistics
F (GII, LGB HEALTH, LNCAW)	8.654**
F (LGB, GII, LNCAW, HEALTH)	3.844
F (HEALTH, LGB, GII, LNCAW)	5.861
F (LNCAW, HEALTH, LGB, GII)	1.864

Note. This table presents the calculated F-statistics. Asterisk values denote that the computed statistic exceeds the upper bounds value at the 1% significance level.

Table 5. Coefficients of Long Run Relationship in ARDL Model

Variables	Coefficients	P-value
LGB	-0.081*	0.007
LNCAW	0.093**	0.025
HEALTH	1.628	0.128
C	-0.492	0.413
Adjusted R2	0.993	
S.E. of regression	.539	
F-Statistics	218.25*	
DW-Statistic	2.55	

Note. A statistical significance level of 1% and 5%, respectively, is indicated by the symbols * and **. The AIC establishes the ideal lag duration. P-value is indicated by parenthesis.

Table 6. Diagnostic Tests

Test	LM Statistics
Breusch-Pagen (heteroscedasticity) test	0.175
White's test for heteroscedasticity	0.378
Jarque-Bera normality test	0.791
VIF	1.13
Ramsey RESET test	0.073

Note: The P-values of diagnostic tests are presented in the table.

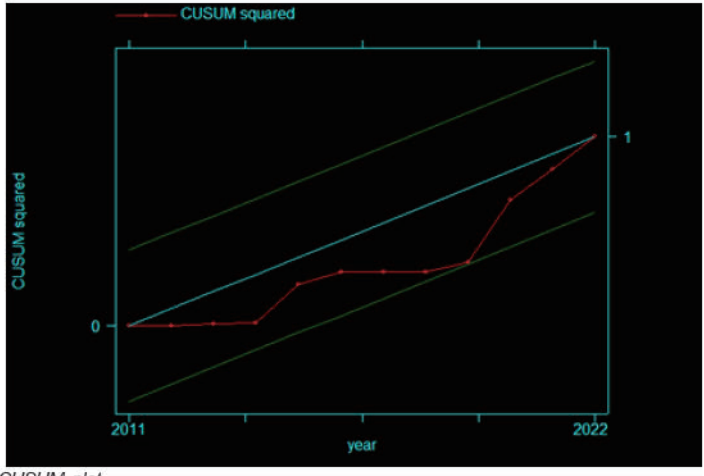

Figure 4. CUSUM plot.

Interpretation of short-run relationship and ECM

To estimate the short-run relationship among variables, we conducted an ECM test. The difference in GII served as the dependent variable, while the variables that were independent were clearly defined in the model. Our findings indicate that LGB and LNCAW are statistically significant factors in deciding gender inequality in India. The short-run relationship also finds the health variable to be significant, suggesting that a high score in the HEALTH indicator can aid in achieving gender equality in the short term (Table 7). Good health leads to better employment, education, and lifestyle, and vice versa. The equality status of men and women directly influences health outcomes, but a linear association is not always necessary (King et al., 2020). Furthermore, the error correction term provides stability to the model by quantifying the speed of adjustment. The negative value of ECT shows that short-term errors in the model are being fixed over time, which can be used to make policy suggestions. The adjustment process suggests an overcorrection, potentially leading to an overly aggressive response to variations in gender inequality. We can explain that taking corrective measures in the right direction could lead to a greater reduction in inequality than expected. The F-statistic, which is statistically significant (Table 7), confirms the validity of the model specification. Additionally, the adjusted R^2 value implies that the model is an adequate fit for the data.

Table 7. ECM illustration for the ARDL Model

Variable	Coefficient	P-value
ΔLGB	-0.033**	0.02
ΔLNCAW	0.267*	0.006
ΔHEALTH	-2.402**	0.010
C	-.492	0.413
T	-4.692	
F-Stat	8.654	
Adj. R2	0.851	
S.E. of regression		
ECT	-1.025	

Note: C represents the constant term, while T signifies the t-statistic. Significance is denoted by * for the 1% level and ** for the 5% level. The value enclosed in parentheses indicates the P-value.

Conclusions

This study concludes that gender equality determinants not only encompass the education and economic participation of women but also LNCAW and LGB, which are significant factors in deciding the scale of equality in India. The HEALTH variable only affects GII in the short run but remains capable of altering India's gender equality landscape. Our study filled the existing gap in explaining the evident relationship between gender budgets, CAWs and GII. Increasing the percentage share of gender in the total budget can potentially improve women's status in India. For instance, Nepal has also mandated that local bodies participating in a Target Group Development Program devote at least 10% of their budgets to women's activities (Chakraborty et al., 2017). Furthermore, strict laws and policies may enhance women's safety and reduce the incidences of crimes against women in India. A reduction in the fear of crime and the number of CAW could facilitate greater accessibility for women to public spaces, education, economic participation, and political empowerment. NGOs and local governments can regularly conduct safety audits by using UN handbook on women safety audit as a preventive measure to evaluate the safety of specific areas. The planners and policymakers can utilize these safety audits as a basis for action to enhance the overall safety of their citizens.

The introduction of sex education in schools may serve as a progressive approach to solving the problem from its root. The gender budget further contrib-

utes to greater equality and access to resources for women in the country. Therefore, the government should increase the percentage of women-specific programs in gender budgets and mandate the incorporation of gender budgets for all the states in their fiscal policies. It can be further implemented by enacting legislation that ensures the transparency and accountability of the budget implementation process. However, unless the government implements these measures efficiently and includes women in policy formulation and city planning, they may not be effective on their own. Gender-related stereotypes, patriarchy, and gender norms further contribute to gender inequality in the case of India. Future research might investigate additional factors that exert influence on the socio-economic status of women and conduct cross-country comparisons of gender inequality and women's position in society. They can also investigate the direct correlation between gender budget allocations across sectors on specific gender equality indicators across states. Further, crime data of Indian states from NCRB can be utilized to understand its causes and how it impacts women's positions.

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