

# Examining Gender Inequality and Female Health Outcomes: A Cross-National Analysis of Structural Determinants, Capabilities, and Policy Implications

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## Abstract

Persistent gender inequality remains a key structural determinant of global health disparities. This paper investigates the relationship between gender inequality across education, economic, political, and personal safety domain with health and women's health outcomes—specifically female mortality, life expectancy, and incidence of HIV—using a panel dataset of 116 countries from 2007-2019 derived from the World Bank. The analysis employs general linear models controlling for year and country effects to estimate the strength and direction of associations between dimensions of gender inequality and female health outcomes. Results indicate that gender inequality in education, employment, and political representation significantly affects female mortality and longevity, while the relationship with HIV incidence is weaker. Paradoxically, greater gender parity in education and employment correlates with shorter female life expectancy, suggesting contextual vulnerabilities in occupational health and structural inequities in work environments. The study integrates Sen's Capability Approach, Institutional Theory, and the Social Determinants of Health framework to interpret results. Findings emphasize the necessity for integrative policies that transcend access equality to address institutional, economic, and cultural factors that limit the translation of gender equity into improved health outcomes. Implications extend to the design of gender-sensitive health policies, enforcement of labor protections, and investment in women's political empowerment.

## Keywords

Gender Inequality, Female Health Outcomes, Capability Approach, Institutional Theory, Social Determinants of Health, Life Expectancy,

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## 1. Introduction

Gender inequality remains a defining feature of global social structure and an enduring barrier to equitable health outcomes. According to the World Health Organization [1], gender has implications for healthcare across all aspects of a person's life, from access to preventive services to the quality of treatment received for chronic conditions. Although progress in women's education, political participation, and economic opportunities has been documented across most world regions, persistent inequalities continue to shape differential health experiences and outcomes between men and women [2]-[4]. Research demonstrates that gender inequalities in healthcare stem from the primary inequality between men and women that is prevalent in many cultures [5] [6]. The Platform for Action rightfully emphasizes that the existence of economic servitude and poverty and economic subjugation of women, violence against women, historically hostile viewpoints toward the female gender, discrimination by race, employment and income levels, the limited control women may have over their sexual and reproductive rights, and the powerlessness and vulnerability in all walks of life are the truths that negatively impact women's health [7] [8]. Women ought to have the right to the best quality of overall health, which is requisite not only to their individual lives and general contentment but also to being actively involved in all aspects of society [9] [10].

However, healthiness and contentment have been deprived for most women globally. Good health represents an equilibrium across all aspects of contentment and is not merely the absence of adverse health conditions [10]. A major obstacle is the inequality between genders and within genders across various ethnicities, countries, and locations. Major policy forums have affirmed that to achieve greater health throughout one's lifespan, equality in sharing family obligations, progress, and tranquility is required [7] [8].

Despite this normative recognition, both healthcare providers and consumers have hardly been alerted to the consequences of "gender" in deliberating how the delivery and caliber of healthcare are identified and evaluated. Gender describes not only the biological differences but also the sharply varying roles in culture and society between traditionally defined men and women, including the assumptions and limitations imposed on their respective functional responsibilities. Researchers from diverse entities and fields have recently highlighted significant gender disparities in accessing healthcare services and in the provision and quality of care received [11]-[13]. Gender encompasses both biological differences and the distinct roles in culture and society between traditionally defined men and women, including the assumptions and limitations imposed on their respective functional responsibilities [14]. It is generally accepted in epidemiology and the sociology of

health that in developed countries, men have a shorter lifespan than women, but women experience greater malaise than men [15]-[17]. Numerous arguments have been proposed and tested regarding differences in risks associated with biases and discrimination in healthcare. Several studies have revealed that the directions of gender inequities in health-related conditions are more complex than traditionally understood [18]-[20]. The trends and immensity of gender-related disparities in health vary depending on the prevailing indications or observations, as well as the stage of the life cycle [17] [21]. Gender inequality has been found to be persistent during the entire life cycle for affliction in psychological issues, but less pronounced or contradictory for many physical indications.

Despite this normative recognition, the empirical relationship between gender inequality and women's health outcomes remains complex and context dependent. While macro-level indices such as the Gender Inequality Index (GII) and Global Gender Gap Report highlight patterns of inequality, few studies systematically examine how specific domains of gender inequity—education, employment, political participation, and personal safety—translate into measurable health outcomes across countries and over time [22] [23]. Moreover, even where gender parity has advanced in access, the quality and safety of participation (e.g., work environments, exposure to pollutants, political violence) often remain unaddressed [24] [25].

This study examines how gender inequality across multiple societal dimensions affects women's health outcomes globally. Drawing upon 13 years of panel data from 116 countries, the analysis investigates whether improvements in gender parity correlate with reductions in female mortality, increases in life expectancy, and lower HIV incidence among women. Using general linear modeling (GLM) with fixed effects for year and country, this study assesses the magnitude and direction of these associations while accounting for key confounders such as national wealth (GDP per capita), fertility rate, immunization coverage, and population size. The study's significance lies in integrating quantitative data analysis with theoretical frameworks that capture the institutional and structural underpinnings of gender inequality. While most existing cross-national studies rely on composite indices, this paper disaggregates gender inequality into education, economic opportunity, political representation, and personal safety, offering a more granular understanding of how distinct inequities shape health outcomes. The study is guided by the following overarching research question:

*Is there an association between gender inequality across education, economic, political, and personal safety domains and adverse health outcomes for women across countries?*

The contribution of this study is threefold. First, it empirically extends the Capability Approach [24] [26] by quantifying how institutional inequalities limit women's realized capabilities in terms of health and longevity. Second, it integrates Institutional Theory to explain how national structures and governance could mediate gender-health linkages [27]. Third, it introduces a public health policy perspective grounded in the Social Determinants of Health framework [28],

connecting socioeconomic and political determinants to measurable epidemiological outcomes.

The remainder of this paper proceeds as follows. Section 2 develops the theoretical basis, linking gender inequality to institutional and capability perspectives on health. Section 3 presents a literature review synthesizing prior empirical and conceptual work. Section 4 describes the variables and hypotheses with their rationales. Section 5 outlines the methodology, including data sources, model specifications, and analytic procedures. Section 6 presents results and analysis, incorporating statistical tables and providing an interpretation of the findings. Section 7 discusses implications, scope and limitations, and future research directions, followed by conclusions and references.

## 2. Theoretical Basis

Understanding the complex linkages between gender inequality and female health outcomes requires a grounding in multiple, complementary theoretical perspectives. This study draws primarily on Sen's Capability Approach, Institutional Theory, and the Social Determinants of Health (SDH) framework. Together, these perspectives articulate how individual agencies, institutional structure, and systemic social determinants intersect to shape women's health globally [29].

Amartya Sen's Capability Approach (1999) provides a normative and analytical framework for understanding well-being not merely in terms of resources or utilities but as the substantive freedoms—capabilities—that individuals possess to live the lives they value [24]. Health is both an intrinsic capability and an instrumental one, enabling participation in economic, educational, and political life [26]. Gender inequality constrains these freedoms through unequal access to education, employment, safety, and political voice. In contexts where women face institutional or cultural barriers, even improvements in income or education do not necessarily translate into enhanced health outcomes. Sen emphasizes that conversion factors—such as social norms, discrimination, and bodily integrity—mediate the transformation of resources into capabilities. Hence, gender inequality represents both a deprivation and a mechanism perpetuating multidimensional disadvantages.

In this study, gender inequality in education, economic participation, political representation, and personal safety is conceptualized as a restriction on women's capabilities. Their cumulative effects manifest in health outcomes, particularly mortality, life expectancy, and HIV incidence, which are themselves reflections of realized well-being. In this capability framework, gender inequality manifests as systematic restrictions on freedoms that prevent women from achieving optimal health. As Sen and Ostlin (2007) articulated, enhancing gender equity in healthcare and articulating women's rights to healthcare are two key strategies to mitigate overall disparities and ensure fair and equitable healthcare delivery [30]. The capability approach helps explain why even in contexts where women have gained access to education or employment, health outcomes may not improve propor-

tionally—the conversion of these resources into health capabilities depends on the absence of gender-based restrictions and the presence of supportive institutional environments.

Women have historically faced a stereotypical perception of being the primary care provider, as well as an excessive user of healthcare services in the family. The aspirations and realities of women's economic and social conditions differ considerably from those of men, and therefore, their overall demands and rights regarding healthcare delivery are also vastly different. In clinical practice, women are generally perceived to fall ill more frequently under the assumption that they face additional reproductive health problems and inexplicable emotional or physical health issues [21] [31] [32]. Even with these presumed ubiquitous traits, major dissimilarities persist among women, differentiated by age, culture, job status, ethnicity, motherhood, race, sexual preference, and socio-economic strata, among others [33] [34]. Historically, healthcare providers and key players have overlooked the fact that women are an eclectic group with clearly delineated aspirations and demands [17] [35] [36]. Research has highlighted systemic inequalities and underscored the need for targeted interventions to address health inequities [37] [38].

Institutional Theory complements the capability framework by emphasizing the rules, norms, and structures that shape social behavior and constrain agency [27]. Institutions—both formal (laws, policies) and informal (norms, traditions) mediate gendered access to opportunities and resources. For example, labor laws governing maternity protection, equal pay, and workplace safety are institutional levers that influence women's occupational health and economic security [39]. In the context of this study, national institutions are treated as contextual moderators: even with similar levels of gender parity in education or employment, institutional quality determines whether these gains translate into improved health outcomes. Weak regulatory environments can expose women to occupational hazards or limit access to health care, undermining the benefits of equality in participation [40]. The findings that gender equality in education and employment correlate paradoxically with lower life expectancy (see Section 6) reflect precisely these institutional failures—where participation without protection exacerbates exposure to risks.

The Social Determinants of Health (SDH) framework [28] [29] situates health outcomes within the broader context of social hierarchies and economic structures. Gender operates as a structural determinant, intersecting with class, ethnicity, and geography to shape exposure and vulnerability to disease. The framework distinguishes between structural determinants (e.g., governance, policy, socioeconomic position) and intermediary determinants (e.g., living conditions, behaviors, psychosocial factors). Gender inequality in education, employment, and politics constitutes a structural determinant that cascades through intermediary pathways such as access to care, income security, and social participation. The SDH perspective thus reinforces the idea that health disparities are socially pro-

duced and require policy interventions beyond the biomedical domain.

Synthesizing these frameworks, this study conceptualizes gender inequality as a multidimensional structural constraint on women's capabilities and expressed through measurable health outcomes. This framework underpins the hypotheses and operationalization of variables detailed in Sections 4 and 5.

### 3. Literature Review

A gender-sensitive healthcare system ought to consider the culturally and socially implemented gender differences in overall health, including curative, preventive, and reproductive healthcare, education, research, infrastructure issues, financing, and policymaking. The physiological traits and biorhythms of women and processes vary substantially from those of men, particularly in the domains of reproductive and sexual health. Likewise, the aspirations and reality in the economic and social conditions of women differ considerably from those of men [41]-[43]. A healthcare delivery system that is perceptive to women is essential, as women generally cope with health issues that are vastly different from those of men. Further, even if they face the same issues as men, they are likely to be affected in different ways [44]-[46]. The physiological traits, processes, and biorhythms of women vary substantially from those of men, particularly in the domains of reproductive and sexual health.

Research has increasingly demonstrated that gender inequalities in healthcare are vested in social aspects, while also acknowledging that males have their biological limitations [19] [38]. Gender perceptions have mostly transformed, and several of these changes likely impact gender-related challenges in health and sickness. An affirming possibility is that gender inequalities in healthcare have changed over time [4] [30] [41]. Gender inequalities refer to the different treatment of men and women, resulting in the methodical empowerment of men, often with adverse effects on women's health. It is universally recognized that while the lifespan of women is longer than that of men in advanced countries, women often live it in unacceptable health [21] [47] [48].

Gender inequalities in healthcare are caused by the inequity in the relative financial situation and leverage of power [49] as well as the delineation of work based on sex [50]. Therefore, understanding the impact of gender inequality can help inform decision-making and shaping policies aimed at alleviating discrimination in healthcare and ameliorate the delivery and caliber of the health system, leading to better health outcomes for all individuals [51]-[54].

The empirical and theoretical literature on gender inequality and health outcomes spans public health, economics, sociology, and political science. This section synthesizes findings across these fields, emphasizing 1) global trends in gender and health; 2) sectoral dimensions of inequality; and 3) methodological advances in cross-national analysis.

Empirical studies have consistently shown that gender inequality undermines population health [23] [55]. Countries with lower GII scores tend to have higher

female life expectancy and lower maternal mortality [56]. However, aggregate indices often mask domain-specific disparities. For instance, Sub-Saharan Africa exhibits improving education parity but continues to report the world's highest female HIV incidence [57]. Similarly, South Asia has narrowed gender gaps in schooling but lags in women's labor force participation and safety [22]. Cross-national studies by Pörtner *et al.* (2018) and Shannon *et al.* (2019) confirm that gender equality is positively correlated with female health outcomes, yet the magnitude and direction of relationships vary by context [58] [59]. In many developing countries, improvements in education do not immediately translate into better health due to systemic poverty, cultural constraints, and weak public health infrastructure.

Education enhances women's health literacy, decision-making, and access to health services [60]. However, the returns to education depend heavily on institutional quality and economic structure. In industrialized nations, higher female education correlates with longer life expectancy [61], while in lower-income settings, early entry into unsafe labor markets or poor healthcare access can offset these gains [62]. Moreover, education fosters intergenerational benefits—educated women tend to have fewer, healthier children [63]. Yet, in societies where gender norms restrict autonomy, education alone may not yield proportional health benefits [64]. These findings align with the current study's mixed results on education parity, suggesting that educational access without empowerment is insufficient for improving health outcomes.

Economic participation is a double-edged determinant. On the one hand, gainful employment enhances women's autonomy and control over resources; on the other, exposure to occupational hazards, informal labor, and economic stress can deteriorate their health [65] [66]. Studies in manufacturing sectors of developing economies reveal that women often face unsafe working conditions, limited healthcare, and gender-based pay gaps [67]. Cross-national evidence shows that women's employment correlates with improved family nutrition and child health but may increase psychosocial stress and chronic disease risk if unaccompanied by labor protections [68]. These dynamics explain why economic opportunity parity, while desirable, may paradoxically be associated with lower female life expectancy when structural inequities persist.

Women's political empowerment is increasingly recognized as a determinant of health policy priorities [69]. Countries with higher proportions of women in parliament exhibit greater investment in health and social welfare [69]. Political representation not only enhances women's voice but also shapes legislation around maternal care, HIV prevention, and gender-based violence. Empirical analyses by [70] [71] show that political gender parity is associated with lower female mortality and higher immunization rates. In this study, political representation emerged as a significant predictor of reduced female HIV incidence, underscoring the policy-mediating role of women's agency in governance.

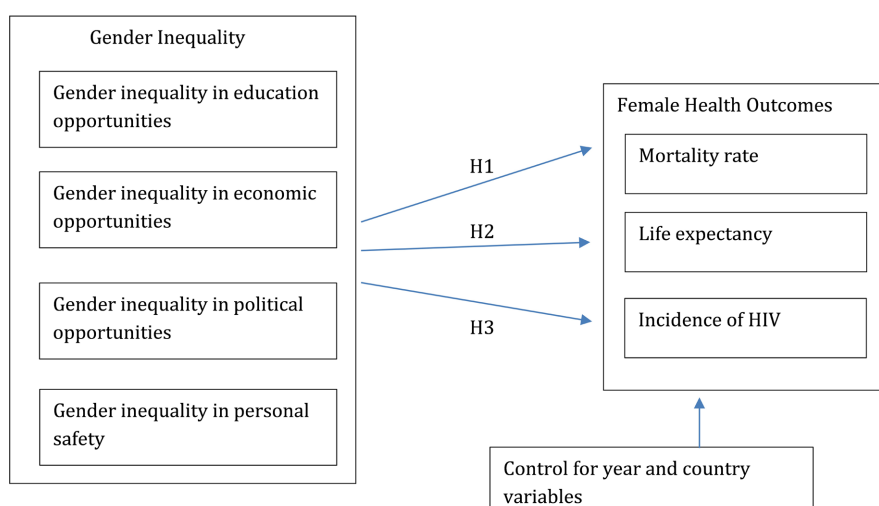
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equity is foundational to health equity. For example, access to HIV treatment represents a critical indicator of gendered safety and healthcare reach [57]. Countries where women have equitable access to antiretroviral therapy report lower HIV incidence and better life expectancy. However, barriers such as stigma, geographic isolation, and weaknesses in the health system persist [29].

Prior cross-national studies have typically employed composite indices such as the Gender Development Index or GII to test correlations with macro-level health outcomes [72]. While useful for global comparisons, these indices often obscure causal mechanisms and domain-specific dynamics. Few studies disaggregate gender inequality into specific dimensions—education, employment, politics, and safety—and examine their unique associations with health outcomes over time. This study advances the field by employing a 13-year panel dataset across 116 countries, disaggregating inequality dimensions, using General Linear Models controlling for both country and temporal effects, and testing multiple dependent variables (mortality, life expectancy, HIV incidence). The following section operationalizes these constructs, presenting variables, measurement rationale, and hypothesis development.

## 4. Hypotheses Development and Variable Measurement

Drawing on the theoretical framework, the following research model (Figure 1) and hypotheses are proposed to examine how gender inequality in each domain relates to women's health outcomes. Each main hypothesis comprises four sub-hypotheses corresponding to the four dimensions of gender inequality.



**Figure 1.** Conceptual framework linking gender inequality to female health outcomes.

### 4.1. Hypotheses Development

#### 4.1.1. Hypotheses Related to Female Mortality

While educational and economic empowerment enhance health literacy and access to care, political and safety-related equality support systemic reforms and protection against disease [29] [60], we propose H1: A country with lower gender

inequality is associated with a lower female mortality rate. There are four sub-hypotheses under H1, they are:

H1a: Lower inequality in education is associated with lower female mortality.

H1b: Lower inequality in economic opportunities is associated with lower female mortality.

H1c: Lower inequality in political representation is associated with lower female mortality.

H1d: Lower inequality in personal safety is associated with lower female mortality.

#### **4.1.2. Hypotheses Related to Female Life Expectancy**

Higher education and political participation enhance women's ability to make informed health decisions and shape public health policy. Economic opportunity may also extend longevity through income effects, though occupational health risks may mediate outcomes [62]. As such, we propose H2: A country with lower gender inequality is associated with longer female life expectancy. Specifically, we have:

H2a: Lower inequality in education is associated with longer female life expectancy.

H2b: Lower inequality in economic opportunities is associated with longer female life expectancy.

H2c: Lower inequality in political representation is associated with longer female life expectancy.

H2d: Lower inequality in personal safety is associated with longer female life expectancy.

#### **4.1.3. Hypotheses Related to HIV Incidence**

Gender parity in education, political agency, and access to antiretroviral therapy reduces HIV vulnerability by improving awareness, empowerment, and care access [57]. Therefore, H3: A country with lower gender inequality is associated with a lower female incidence of HIV.

H3a: Lower inequality in education is associated with lower female HIV incidence.

H3b: Lower inequality in economic opportunities is associated with lower female HIV incidence.

H3c: Lower inequality in political representation is associated with lower female HIV incidence.

H3d: Lower inequality in personal safety is associated with lower female HIV incidence.

## **4.2. Variable Measurement**

The empirical analysis in this study operationalizes gender inequality as a multi-dimensional construct across four domains—education, economic opportunity, political representation, and personal safety—and examines their association with key female health outcomes: mortality, life expectancy, and incidence of HIV.

Control variables capture macro-level contextual factors that may confound or mediate these relationships.

#### 4.2.1. Independent Variables: Dimensions of Gender Inequality

Four measures of gender inequality are derived from World Bank indicators to represent institutionalized gender inequalities shaping access to education, work, political representation, and bodily integrity (Table 1).

**Table 1.** Independent variables (Gender Inequality Indicators).

Independent Variable	Measurement	Conceptual Rationale
<b>School Enrollment, Gender Parity Index (SchoolGPI)</b>	Ratio of girls to boys enrolled in primary and secondary education	Educational access enhances cognitive capability and health literacy, influencing life expectancy and mortality (Gakidou <i>et al.</i> , 2010).
<b>Unemployment, Gender Parity Index (UnempGPI)</b>	Ratio of female-to-male unemployment rates	Measures gendered exclusion from labor markets; lower parity suggests limited economic participation.
<b>Proportion of Seats Held by Women in Parliament (PoliticalST)</b>	% of parliamentary seats occupied by women	Proxy for political empowerment and capacity to influence health and gender policy [2018].
<b>Access to HIV Antiretroviral Therapy (HealthcareGPI)</b>	Ratio of female-to-male adults receiving HIV treatment	Represents gendered access to health services and personal safety infrastructure.

#### 4.2.2. Dependent Variables: Female Health Outcomes

Three female health outcome variables—mortality, life expectancy, and incidence of HIV—were selected to capture different dimensions of population health and disease vulnerability (Table 2).

**Table 2.** Dependent variables (Female Health Outcomes).

Dependent Variable	Measurement	Rationale
<b>Mortality from NCDs (Mortality)</b>	% of 30-year-old females dying before age 70 from cardiovascular disease, cancer, diabetes, or chronic respiratory disease	Reflects preventable premature mortality, influenced by socioeconomic and structural determinants.
<b>Life Expectancy at Birth (LifeExp)</b>	Average years a newborn female is expected to live	Summative indicator of health system performance and social well-being.
<b>Incidence of HIV (HIV)</b>	New female HIV infections per 1000 uninfected women (ages 15 - 49)	Proxy for reproductive and sexual health vulnerability, safety, and access to preventive care.

### 4.3. Control Variables

To isolate the effects of gender inequality, the analysis controls for macroeconomic, demographic, and public health factors identified in prior research [29] [62], as summarized in **Table 3**.

**Table 3.** Control variables.

Control Variable	Definition	Justification
<b>GDP per Capita (PPP)</b>	Gross domestic product per capita, adjusted for purchasing power parity	Economic development influences access to healthcare and education.
<b>Total Population (TP)</b>	Total national population	Captures scale effects and demographic pressure on health systems.
<b>Fertility Rate (FR)</b>	Average number of children per woman	Higher fertility is associated with greater maternal and child health risks.
<b>Immunization (IM)</b>	% of children receiving measles vaccination	Represents general health system capacity and coverage.

## 5. Methods

This study employs a quantitative, cross-national panel design to analyze the relationship between gender inequality and female health outcomes over time. The empirical model integrates cross-sectional and longitudinal variation, allowing for robust estimation of structural effects while controlling for unobserved country- and year-specific heterogeneity. Data were drawn from the World Bank's World Development Indicators (WDI) for the period 2007-2019, encompassing 116 countries with balanced data coverage. This 13-year window captures post-Millennium Development Goal (MDG) and early Sustainable Development Goal (SDG) implementation phases, providing a relevant temporal context for assessing progress toward gender and health equity.

All variables (**Tables 1-3** above) were compiled and normalized to comparable scales to minimize multicollinearity and heteroskedasticity. Gender inequality indicators were expressed as ratios (female-to-male), ensuring comparability across countries. Dependent and control variables were standardized (z-scores) to allow direct interpretation of regression coefficients.

Bivariate correlation analysis was conducted to assess the strength and direction of relationships among variables. The results, presented in **Table 4**, indicate strong relationships between gender inequality variables and female health indicators, providing preliminary support for the hypothesized associations. Education parity (SchoolGPI) correlates positively with life expectancy ( $r = 0.53^{**}$ ) and negatively with mortality ( $r = -0.40^{**}$ ), consistent with theoretical expectations.

## 6. Analysis and Results

Three General Linear Models (GLM) were estimated in SPSS to test H1-H3, cor-

responding to each dependent variable: female mortality, life expectancy, and HIV incidence. Country and year were modeled as fixed effects to account for unobserved heterogeneity such as cultural norms, geographic factors, and global shocks. Control variables (GDP, fertility rate, immunization, total population) were included in all models.

**Table 4.** Correlation matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) SchoolGPI	1										
(2) UnempGPI	0.15**	1									
(3) PoliticalST	0.19**	-0.19**	1								
(4) HealthcareGPI	0.01	0.09**	-0.08*	1							
(5) GDP	0.27**	0.11**	0.20**	-0.18**	1						
(6) IM	0.61**	0.15**	0.09**	-0.10**	0.34**	1					
(7) TP	-0.02	-0.08*	-0.04	0.004	-0.12**	-0.19**	1				
(8) FR	-0.63**	-0.05	-0.12**	0.22**	-0.56**	-0.62**	0.07*	1			
(9) Mortality	-0.40**	0.03	-0.21**	0.14**	-0.60**	-0.36**	0.02	0.61**	1		
(10) LifeExp	0.53**	0.09**	0.19**	-0.18**	0.66**	0.59**	-0.10**	-0.85**	-0.82**	1	
(11) HIV	-0.02	-0.03	0.003	-0.04	-0.15**	-0.05	-0.05	0.12**	0.47**	-0.46**	1

Notes: \*\*:  $p < 0.01$  (two-tailed); \*:  $p < 0.05$  (two-tailed) thereafter.

### 6.1. Model 1: Female Mortality

To test hypothesis 1, the female mortality rate was set as the dependent variable, where the four gender inequality variables were the independent variables. The model produced an adjusted  $R^2$  of 48.4%; the year effect was insignificant. These indicate that gender inequality is a key factor associated with female mortality rate.

Educational equality (SchoolGPI) and political representation (PoliticalST) are associated with reduced mortality. Overall, H1a-c are supported, H1d is not, as the coefficient of gender inequality in personal safety is insignificant ( $\beta = -0.009$ ,  $p = 0.319$ ) from zero (Table 5).

**Table 5.** General linear model results on female mortality.

Predictor	Coefficient	p-value	Hypothesis	Conclusion
Intercept	0.330	<0.001	—	—
SchoolGPI	-0.104	0.021	H1a	Supported
UnempGPI	0.016	<0.001	H1b	Supported
PoliticalST	-0.053	0.015	H1c	Supported
HealthcareGPI	-0.009	0.319	H1d	Not supported
GDP per capita	-0.577	<0.001	—	Control significant

**Continued**

Fertility rate	0.267	<0.001	—	Control significant
Total population	-0.130	0.062	—	Not significant
Immunization	0.039	0.235	—	Not significant
Adjusted R <sup>2</sup>	48.4%			

**6.2. Model 2: Female Life Expectancy**

The same procedures were followed to test H2 with life expectancy as the dependent variable, and the results are summarized in **Table 6**. The model explains 78.5% of the variance in female life expectancy, confirming the strong influence of gender equality and macroeconomic context.

Access to anti-retroviral therapy (HealthcareGPI) is strongly associated with female longevity ( $\beta = 0.073, p < 0.001$ ), followed by political equality (PoliticalST) ( $\beta = 0.013, p = 0.085$ ). However, the results also show that educational and economic equality unexpectedly correlate negatively with life expectancy. This counterintuitive finding suggests that in some contexts, formal equality may coincide with exposure to harmful work environments, stress, or inequitable labor conditions—highlighting the importance of institutional safeguards. The strength of fertility and GDP effects confirms established demographic-economic health linkages.

**Table 6.** General linear model results on female life expectancy.

Predictor	Coefficient	p-value	Hypothesis	Conclusion
Intercept	0.688	<0.001	—	—
SchoolGPI	-0.084	0.026	H2a	Not supported
UnempGPI	0.009	0.018	H2b	Not supported
PoliticalST	0.013	0.085	H2c	Marginally supported
HealthcareGPI	0.073	<0.001	H2d	Supported
GDP per capita	0.470	<0.001	—	Control significant
Fertility rate	-0.628	<0.001	—	Control significant
Total population	0.000	0.996	—	Not significant
Immunization	0.149	<0.001	—	Control significant
Adjusted R <sup>2</sup>	78.5%			

**6.3. Model 3: Female HIV Incidence**

We perform the same procedure to test H3, and the results are kept in **Table 7**. Model 3's explanatory power is weak (Adj. R<sup>2</sup> = 2.4%), suggesting that structural gender inequality alone does not associate much with female HIV incidence. Only political representation (PoliticalST) remains significant, implying that women's participation in governance correlates with HIV prevention and treatment policies. Other factors—such as behavioral, cultural, and epidemiological variables—

likely play dominant roles.

**Table 7.** General linear model results on female HIV incidence.

Predictor	Coefficient	p-value	Hypothesis	Conclusion
Intercept	-0.024	0.584	—	—
SchoolGPI	0.102	0.027	H3a	Not supported
UnempGPI	-0.002	0.677	H3b	Not supported
PoliticalST	-0.026	0.007	H3c	Supported
HealthcareGPI	0.014	0.540	H3d	Not supported
GDP per capita	-0.124	0.003	—	Control significant
Fertility rate	0.070	0.010	—	Control significant
Total population	-0.154	0.031	—	Control significant
Immunization	-0.006	0.869	—	Not significant
Adjusted R <sup>2</sup>	2.4%			

## 7. Discussions and Conclusions

### 7.1. Discussions

The cross-national analysis provides compelling evidence that gender inequality remains a key structural determinant of female health outcomes, but its effects are heterogeneous across domains and outcomes. The findings confirm that while improvements in gender parity often align with better health, equality in access does not automatically yield equality in outcomes. The results demand a nuanced interpretation grounded in the theoretical frameworks presented earlier. Within the Capability Approach, the observed negative relationships between education or economic parity and life expectancy underscore Sen's (1999) argument that access to formal resources does not guarantee realized freedoms. In several developing contexts, women's entry into labor markets may occur in low-wage, hazardous sectors such as textile manufacturing or agriculture [24]. Without labor protections, gender equality in employment may translate into higher exposure to occupational risks and environmental toxins—thereby eroding health gains. Similarly, the Institutional Theory perspective explains cross-country variations as a function of regulatory and normative strength. Nations with robust institutions—where gender equality is supported by enforceable rights, health insurance coverage, and anti-discrimination policies—are more likely to convert equality in opportunity into health improvements. Where institutions are weak, equality remains largely symbolic, generating the “equality paradox” observed in the data.

One of the most consistent findings is the strong, positive influence of women's political representation on health outcomes, reducing both mortality and HIV incidence and marginally improving life expectancy. This aligns with prior evidence that female legislators prioritize social welfare, maternal health, and anti-violence policies [31] [70]. Political empowerment amplifies the translation of gender eq-

uity into systemic change by influencing budget allocations, regulatory oversight, and public accountability. In the language of institutional theory, political representation functions as a meta-institution, reshaping rules and norms across sectors.

Access to HIV therapy (HealthcareGPI) emerges as the most robust predictor of female life expectancy, confirming the Social Determinants of Health framework: structural accessibility to treatment and safety underpins long-term health. Yet its non-significance for mortality and HIV incidence indicates that treatment access alone cannot offset prevention failures or social stigma. Comprehensive health equity requires integrating prevention, care, and empowerment. The low adjusted  $R^2$  (2.4%) in the HIV model highlights that infection dynamics are shaped by behavioral, epidemiological, and cultural variables beyond the structural scope of gender inequality. These include partner concurrency, biomedical prevention, and local epidemic typologies [57]. Nonetheless, the significant effect of political representation implies that policy voice remains essential even in epidemiological domains dominated by biomedical factors. Overall, three cross-cutting themes emerge: Institutional mediation matters. Equality in numbers must be backed by equality in power and protection. Contextual sensitivity is essential. Economic or educational equality may harm women's health when systemic protections lag. Political empowerment is transformative. It enables multisectoral coordination and sustained investments in gender-responsive health.

## 7.2. Scope and Limitations

The study relies on secondary data from the World Bank, limited by indicator availability and consistency across 116 countries. Several dimensions of gender inequality—such as unpaid care work, gender-based violence prevalence, or quality of employment—are not captured. Moreover, ratios (female:male) can mask mutual deprivations in low-resource contexts. While fixed-effects GLMs mitigate omitted-variable bias, causality cannot be inferred. Health outcomes and gender equality may be reciprocally reinforcing. Advanced methods such as instrumental variables or dynamic panel estimation (e.g., Arellano-Bond) could strengthen causal inference in future research. The data period (2007-2019) predates the COVID-19 pandemic, which dramatically altered gendered health and labor dynamics. Post-2020 shocks likely intensified inequalities; thus, current extrapolation must be cautious. Despite broad geographic coverage, country-specific cultural and policy contexts limit generalization. Sub-regional analyses (e.g. Latin America vs. Sub-Saharan Africa) may reveal divergent mechanisms.

## 7.3. Policy and Practical Implications

The findings of this study carry important implications for policymakers and international agencies. First, governments should move beyond access-based equality to structural and qualitative equality. The paradoxical finding that greater gender parity in education and employment correlates with reduced life expectancy

underscores that access alone is insufficient policies must simultaneously address occupational safety, labor protections, and the quality of work environments. Linking SDG 5 (Gender Equality) and SDG 3 (Health) within national development plans could yield synergistic outcomes by ensuring that gains in women's participation are matched by protective frameworks.

Second, the consistent positive effect of women's political representation on health outcomes—reducing mortality and HIV incidence while marginally improving life expectancy—highlights the transformative potential of political empowerment. Institutional reforms such as gender quotas, women's leadership pipelines, and independent health-equity commissions are essential to translate parity into protection. Cross-ministerial gender budgeting could further ensure resource alignment across health, education, and labor sectors.

Third, the strong association between access to HIV antiretroviral therapy (HealthcareGPI) and female life expectancy confirms that healthcare access remains a critical structural determinant. However, its non-significance for HIV incidence suggests that treatment access must be complemented by prevention, education, and stigma reduction efforts. Comprehensive health equity requires integrating prevention, care, and empowerment within a unified policy framework.

Finally, the findings highlight the need for granular, gender-disaggregated data across health and economic sectors. The weak explanatory power of the HIV model (Adj.  $R^2 = 2.4\%$ ) indicates that structural gender inequality alone does not capture the full complexity of infection dynamics, pointing to the need for integrated datasets that incorporate behavioral, cultural, and epidemiological variables. For development partners (UNDP, WHO, World Bank), this study underscores the value of multi-sectoral approaches that couple education and employment programs with health system investments and governance reforms.

#### **7.4. Conclusions and Future Research**

This study demonstrates that gender inequality—conceptualized across education, economic, political, and safety dimensions—is significantly associated with female health outcomes at the global level. The results validate the core premise that equality enhances health, but only under supportive institutional and regulatory conditions. Future research should extend the temporal frame to include post-pandemic data and new indicators (e.g., gender wage gap, maternal mortality). One may also employ causal modeling (panel VARs, multilevel SEM) to disentangle bidirectional effects. Future researchers may also explore intersectionality, incorporating factors such as ethnicity, age, and rural–urban divides. Linking micro- and macro-data and integrating household surveys with national indicators is another avenue for research. Ultimately, gender equality must be conceived not merely as a moral imperative but as a structural investment in population health and sustainable development. Achieving genuine parity requires coordinated action across education, labor, governance, and health sectors—translating formal equality into lived well-being.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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