

*Research Article*

**SOCIO-ECONOMIC FACTORS AFFECTING WOMEN  
EMPOWERMENT: AN EMPIRICAL ANALYSIS**

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**Abstract:**

The objective of this paper is to explore relationship between various socio-economic factors and women empowerment, using 20 years' time series data spanning from 2001 to 2021. The dependent variable is women empowerment while independent variables include fertility rate, mortality rate, population growth, literacy rate, health facilities and female labor force participation. Different statistical techniques such as Descriptive statistics, Correlation matrix and ARDL Model were employed to analyze data. The findings reveal that mortality rate, population growth rate, health facilities and literacy rate have positive and statistically significant association with women empowerment whereas unemployment, female labor force participation and fertility rates have negative link with it in the long run.

**Key words:** Socio-economic factors; women empowerment; high fertility rate;  
Education; women empowerment.

**Type of study:** Original research Article

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## **1. Introduction**

Despite growing global awareness and various policy initiatives to address the issue of gender inequality, the gender gap is continued to widen in recent years. This issue is specifically serious in developing countries such as Pakistan, India, Bangladesh and Pakistan where the expected positive impact of women's empowerment is not yet being realized (Gupta, 2023). The debate about the policies and measures to reduce gender inequality is still going on at international level, yet there is high uncertainty about the effective way of enhancing women empowerment. Sayeh, Badel, and Goyal (2023) disclosed that female labor participation is increasing by 5.9 percent in emerging and under-developed countries might potentially trigger GDP growth by roughly 8 percent over the next few years. However, women in the emerging economies continue to face significant barriers and disparity in employment, wages, and limited job opportunities for decent work and freedom of movement.

### ***1.1 Background of Study***

The link between women's empowerment and economic growth has been underscored by several key studies. Michelle Bachelet, former President of Chile, emphasized that significant economic benefits can be achieved by providing women with access to healthcare, education, and employment opportunities. He warned that society can suffer loss of half of its potential growth if gender equality is not ensured in the society. Gopinath (2021) also disclosed that in the global labor market 55% of women are actively participating in labor market as compared of 78% of men and in this way, there is 28% gap in labor market. Moreover, women have no access to financial services in 72 countries and they earn less than 50% of men for the same job assignment, resulting about 50% gap in wages. The participation of women in

the Parliament is restricted to 25%, reflecting very low representation in legislation.

Despite remarkable progress in breaking barriers in education, achieving economic freedom, and raising political voices in recent years, women still face significant socio-economic challenges. The United Nations (2022) declare women's economic empowerment as a multi-dimensional issue which are related to control over resources and opportunities in the labor market and freedom to make independent decisions about their lives. Abigail and Moizza (2017) noted that women often enjoy fewer privileges than men in education, jobs, and promotions, causing in lower income, high poverty level, and complicated health issues. Hassan and Cooray (2015) and Oztunc et al. (2015) highlighted the importance of giving women economic rights and opportunities to enable them to demonstrate their skills and expertise without constraints (UN,2013)

### ***1.2 Objectives of study***

The main objectives of the study are listed below: -

- To examine the socio-economic factors such as such as literacy rate, fertility rate, mortality rate, unemployment, and female participation in the labor force and their impact on women empowerment in Pakistan, using time series data from 2002 to 2021 and regression analysis.
- To analyze the access of healthcare facilities and their impact on the ability of women to participate in labor market and make independent decisions about their lives and future.
- To examine the role of literacy in the education, skill and access to job opportunities of women and their household income.

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- To propose the policy recommendations to address issue of women unemployment, increasing their participation in labor force, higher education and elevation to higher positions in the workforce by removing barriers to their career development particularly for high educated and skilled women.

### ***1.3 Main Research Question***

In this context, the main research question of the study is:

*What are the socio-economic factors which affect women's empowerment in Pakistan, and how do literacy rates, fertility rates, mortality rates, unemployment, and healthcare facilities influence women empowerment in Pakistan?*

The aim of this research question is to identify key determinants of women's empowerment in Pakistan and provide an effective approach about how various socio-economic factors hinder the empowerment of women in Pakistan. The findings of the study will offer valuable insights for all stakeholders to develop targeted policies that gear up women's empowerment and promote gender equality in Pakistan.

The study will make significant contributions to develop understanding about women's empowerment and will also highlight the factors that influence it. We briefly discuss the likely contribution of the study in the following. This study will highlight the importance of literacy rate for women's empowerment. It will emphasize that literacy is a core pillar for women's empowerment as it enables the women to take independent decisions by improving their education and skill and get access to available job opportunities. This study will address the unemployment issue of women in Pakistan because their participation in higher educational institutions is rising rapidly and at some departments of universities their strength has exceeded than male students but their participation in labor force or serving at higher

position is still very low. This study will propose how to improve their participation in labor force in Pakistan. The study will also identify different types of barriers in the way of the career development of educated and skilled women. The focal point of this study is that reducing unemployment among women is crucial for enhancing their empowerment. As more than half of Pakistan's population is consisted of women and their participation in labor force can enhance national income as well as economic development of the country. The findings of this study will provide valuable insights for policy makers to devise policies to improve women empowerment in Pakistan as is proposed in UN's Sustainable Development fifth goal to "achieve gender equality and empower for all women and girls."

## **2- Literature review**

The literature review presents a comprehensive analysis of female empowerment from various dimensions, primarily focusing on economic, social, and educational aspects. A bring sketch of review of relevant studies is given below: -

Malhotra et al (2002) examined various approaches to women's empowerment among the poor nations. They emphasized the importance of women having decision-making power regarding choices, wealth, and domestic issues and being knowledgeable about all aspects of their lives. Malik and Courtney (2010) studied the role of higher- education in women's empowerment in Pakistan and noted that female participation in higher education motivate them to engage in income-generating activities, leading to economic prosperity and overall development. Desai (2010) sheds light on the conceptual and empirical aspects of female empowerment, emphasizing

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education, health, and economic are core determinants. He discussed challenges of quantifying female empowerment and disclosed that the persistence of issues like education disparities, gender wage gaps, fertility rates, and violence against women are the main constraints in the way of women empowerment. Sadaquat and Sheikh (2011) discussed the limited involvement of women in the workforce in Pakistan due to traditional values and religion-based constraints. They identified the main issues being faced by women who often worked in unproductive, low-wage, and unsafe sectors, with higher unemployment rates than men. Nazneen et al (2011) examined female empowerment in Bangladesh. Despite being a poverty-stricken country with a significant Muslim population, Bangladesh has made substantial progress in women's education, healthcare, and workforce participation over the past two decades. Chaudhary (2012) explored the significance of recognition and awareness of women's choices in achieving community development and enhancing female economic empowerment. This study found that women who were knowledgeable about their choices played a crucial role in economic decision-making process. Duflo (2012) analyzed the close relationship between female empowerment and economic stability and emphasized that while economic growth plays a significant role in reducing gender inequality, female empowerment also contributes to economic growth. The study highlighted the two-way relationship between these factors, showing that when poverty decreases, female empowerment increases, and vice versa. Kandpal (2012) sheds light on the crucial role of female participation at both the community and national levels for economic development of a country. The study emphasized the need for women to be informed, empowered, and economically stable to address challenges like early marriages, high population growth, and high unemployment rates. Mariya (2013) analyzed the

negative impact of high population growth rates on women's empowerment, identifying a link between high fertility rates and women's intended decision-making capability and self-respect. The study emphasized the need to educate women to make informed choices and reduce high population growth, unemployment, and its adverse effects on GDP. Bandiera et al (2014) conducted research on women's empowerment, education, and health in developed countries such as Sweden, Canada, and Australia. They stressed the importance of healthcare and women's education, advocating for women's autonomy in decision-making to foster societal development. Alyna (2014) investigated the correlation between female education and economic empowerment in Egypt. The study highlighted the role of education in improving the social and economic status of educated young women and its significant impact on their participation in the labor force. According to the study of UNDP (2021) only 20% of women are participating in labor force in Pakistan. About 7.0 million are working in agriculture sector which is non-remunerative sector for women because under this category they support their male family members without receiving any wages. This is unrecognized and unpaid activity. The gap between the earnings of men and women has also widen in Pakistan. Women earned just 18% of what men earned in 2018-2019 because their most of time are consumed in domestic activities. Their main responsibility is to look after their children and to manage their domestic affairs. They spend about 10 times the hours as men in unpaid care work receiving no economic benefits. Similarly, the women, who are earning from their jobs, will have to spend their most of income on their family members and they have no financial independence in decision-making or about spending money according their own choices. This indicates the existence of a vicious cycle of silent abuse and exploitation.

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The review of literature provides a comprehensive analysis of female empowerment across various dimensions and countries, yet there appears to be a significant gap in the examination of cultural and religious factors that influence women's empowerment. Some studies analyzed the role of education, healthcare and economic stability individually but they did not investigate the impact of traditional values and religious constraints on women empowerment specifically in Pakistan. Investigating the relationship between cultural norms, religious constraints and female empowerment will be an important area for future research. It is very important to understand whether these factors either support or restrict women empowerment and their economic well-being and it will provide valuable insights for policy formulation and its effective execution in Pakistan.

### ***2.1 Hypotheses Development***

In the light of reviewed literature and objectives of study the following hypotheses have been developed for testing through a data to be collected from real life.

**H<sub>0</sub>:** There is no significant increase in women's empowerment in Pakistan during last 20 years.

**H<sub>1</sub>:** There has been a significant increase in women's empowerment in Pakistan during last 20 years.

**H<sub>0</sub>:** Education has no significant impact on the economic empowerment of women in Pakistan.

**H<sub>1</sub>:** Education has significant impact on economic empowerment of women in Pakistan.

**H<sub>0</sub>:** There is no significant relationship between literacy rate, unemployment, fertility rate, mortality rate, healthcare facilities, population growth and labor force participation with women empowerment in Pakistan.



**H<sub>1</sub>:** There is significant relationship between literacy rate, unemployment, fertility rate, healthcare facilities, population growth and labor force participation with women empowerment in Pakistan.

## ***2.2. Novelty of study***

The novelty of this study lies in its holistic approach, spanning across different nations, socioeconomic conditions, and cultural contexts. It underscores the universality of certain factors while also recognizing the unique challenges and opportunities faced by women in diverse settings. This diversity and comprehensive analysis contribute to a deeper understanding of women's empowerment and its role in economic development and societal progress.

## **3. Data and Methodology**

The objective of this study is to analyze the socio-economic factors affecting women empowerment in Pakistan. We used 20 years data spanning from 2002 to 2021 which was collected from World Development Indicators, Asian Development Bank, Pakistan Economic Survey and the State Bank of Pakistan. The dependent variable of this study is women empowerment while independent variables are fertility rate, mortality rate, unemployment rate, population growth rate, women education, female participation in labour force and health facilities. Different statistical techniques such as descriptive statistics, Correlation matrix and ARDL model were employed to analyze data. The reason for using of these statistical techniques is that descriptive statistics help us understand normal distribution of data and behavior of variables while correlation matrix demonstrate the pattern of relationship between pair of variables whether they have positive or negative relationships. Similarly, Regression analysis predicts positive or negative impact of independent variables in the long run. This method also reveals the behavior

of variables in the long run which is very crucial because this study has used time series data. The general form of model based on these variables is engraved as follows:

$$WE_t = f(UR_t, FR_t, MR_t, LR_t, PG_t, HF_t, FLF_t + \epsilon)$$

Where:

WE= Women Empowerment

UR= Unemployment Rate

FR = Fertility Rate

LR+ Literacy rate among women.

MR= Mortality Rate

PG = Population Growth.

HF = Health Facilities.

U = Error term.

FLF= Female labour force Participation.

In order to determine relationship between dependent and independent variables the following econometric model has been developed.

$$WE_t = \alpha_0 UR_t + \alpha_1 FR_t + \alpha_2 MR_t + \alpha_3 WE_t + \alpha_4 PG_t + \alpha_5 HF_t + \alpha_6 FLF_t + \alpha_7 \epsilon_t$$

The log form of the mode is described as under:

$$WE_t = a_0 + \alpha_1 LUR_t + \alpha_2 LFR_t + \alpha_3 LMR_t + \alpha_4 LPG_t + \alpha_5 LHF_t + \alpha_6 LFLF_t + \epsilon$$

## **4- Results**

The estimate results of various statistical techniques used to analyze data and draw the results are presented in the following: -

### **4.1 Descriptive Statistics**



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In the table 1. we have calculated mean that shows the average value of the series. and median shows the middle values of the series. minimum values are the smallest values of the series .and maximum values are the higher values of the series in the dataset values. The maximum value of health facilities is 2.860000 and fertility rate is 4.640000 and female labour force is 22.59000 and for female literacy rate is 46.49000 for mortality rate is 76.80000 for population growth rate is 2.250000, for unemployment rate is 6.260000 and for the dependent variable women empowerment is 79.11000. whereas the minimum values are 2.140000 for HF, 3.620000 for FR, 2.160000 for FLF, 35.37000 for FLR, for MR it is showing 55.90000 for population growth it is 1.330000 and for women empowerment and rate of female unemployment is 68.57000 and 0.250000. Standard deviation shows the deviations of all the observation of average value. Skewness measures the degree of asymmetry of the series. So, the result shows that all variables except unemployment rate are negatively skewed whereas unemployment rate is positively skewed. The next is Jarque Bera statistics that states that invalid theorem utters dispersal is standard and substitute theorem utters dispersal is not standard. By applying the rule of thumb, i-e, if the likelihood is below (0.05) so, we will reject invalid theorem of standard distribution. In our series, the likelihood is beyond (0.05) so we will not reject invalid theorem. It is concluded that distribution of data is normal.

#### **4.2 Correlation Matrix**

Correlation Matrix is used to check degree of association between two variables. It lies between -1 and +1. Negative sign shows there is no correlation between variables while positive sign shows there is perfect correlation between variables. If two variables have positive association it means if one

variable increases the other variable also increases in the same direction. The results of correlation matrix are presented in [Table 2](#).

**Table 2**

*Results of Correlation Matrix*

LOGHF	LOGFR	LOG_FLF	LOGLR	LOGMR	LOGPOP	LOGEMPF	LOGSEMPF
1	-0.18973	0.076032	0.053392	-0.18287	-0.16205	-0.18351	-0.58571
-0.18973	1	-0.26679	-0.93814	0.999125	0.820606	-0.8718	0.273866
0.076032	-0.26679	1	0.244384	-0.27907	-0.37309	0.015862	-0.23073
0.053392	-0.93814	0.244384	1	-0.9292	-0.78486	0.857598	-0.00552
-0.18287	0.999125	-0.27907	-0.9292	1	0.828262	-0.86954	0.287726
-0.16205	0.820606	-0.37309	-0.78486	0.828262	1	-0.65849	0.380999
-0.18351	-0.8718	0.015862	0.857598	-0.86954	-0.65849	1	0.044242
-0.58571	0.273866	-0.23073	-0.00552	0.287726	0.380999	0.044242	1

The correlation coefficient value of dependent variable, women empowerment is -0.58571 with independent variable health facilities, indicating positive correlation between these two variables. The coefficient value of independent variable, fertility rate, is 0.273866, exhibiting its positive correlation with women empowerment. The correlation coefficient value of female labor force is -0.23073, showing negative relationship with women empowerment. It means that female labor force participation and women empowerment have negative association with each other. Similarly, the correlation coefficient value of mortality rate is -0.0052, indicating negative correlation between these two variables. The correlation between population growth and women empowerment is positive because their coefficient value is 0.380999. The correlation between unemployment and women

empowerment is also positive because their coefficient value is 0.044242. The correlation analysis discloses negative association between health care facilities, mortality rate, labor force participation and positive correlation between mortality rate, unemployment rate, fertility rate, literacy rate and population growth rate.

### 4.3 ADF Unit Root Test

ADF test is used to check stationarity among variables for the purpose of using correct statistical model to determine long run and short run relations between variables. If the variables are stationers at the same level the we will have to use traditional Ordinary Least Square (OLS) model. In contrast, if the variables are stationarity at level, first and second difference then we can apply ARDL approach to estimate relationship between variables. The results of ADF test are presented in the [Table 3](#)

**Table 3**

*Estimated results of ADF Test*

Variables	LEVEL		1 <sup>st</sup> difference		2 <sup>nd</sup> difference		Decision
	Intercept/Trends & intercept		Intercept/Trends & intercept		Intercept/Trends & intercept		
FR	-0.290523	1.878458	-3.227323	0.0350	-5.689160	0.0003-	1(1)
	0.09095	0.06259	-0.034825	0.0504	0.0782760	0.0013	
MR	2.555152	0.9999	0.342516	0.9738	-3.204788	0.0376	1(0)
	0.043344	0.9985	-0.954349	0.1771	0.0355145	0.0911	
FLF	0.012643	0.0056	-0.0950559	0.0000	-0.699100	0.0004	1(0)
	-0.139523	0.0120	-0.0733853	0.0002	-0.075808	0.0025	
UNEMP	-0.721845	0.0180	-4.674006	0.0019	-6.944682	0.0000	1(1)
	-0.016787	0.0412	-0.177946	0.1234	-6.723383	0.0003	
WE	-3.141766	0.0413	-3.444861	0.0229	-4.560069	0.0033	1(1)
	-1.056469	0.0557	-0.091404	0.0007	-0.064156	0.0068	

POPG	-5.060984	0.0008	-7.407222	0.0000	-2.868149	0.02024	1(1)
	-0.388819	0.0019	-0.173900	0.0001	0.107214	0.0511	
HF	-2.231772	0.2031	-3.328163	0.0297	-3.893546	0.0105	1(1)
	-0.214250	0.4529	-0.117559	0.1335	-3.707983	0.0522	
LR	-1.091207	0.6521	-37.14995	0.0001	-29.44387	0.000	1(1)
	-0.56610	0.00001	-0.41557	0.0001			

The results in [Table 3](#) show that the variables, Fertility rate, Unemployment, Women empowerment, Population growth, Health facilities and literacy rate are stationers at 1(1) while Mortality rate and Female labor participation are stationer at 1(0) level and we can conclude that the variable in the model are stationers at different levels and as such we can use ARDL approach for further analysis.

#### **4.4 ARDL Model**

We have estimated relationship between dependent and independent variables in the long run through ARDL model. The dependent variable is women empowerment while independent variables are fertility rate, mortality rate, population growth, literacy rate, unemployment rate, health facilities and women participation in labour force. The estimated results are exhibited in [Table 4](#)

**Table 4***Estimated results of ARDL Model*

Variables	Coefficients	Std.Errors	T-statistics	Prob
Fertility Rate	-14.65039	14.10171	-1.038909	0.3334
Mortality Rate	0.285137	0.073967	3.854935	0.0032
Population Growth	4.780416	5.610403	0.852063	0.4269
Literacy Rate	1.770739	0.044742	39.57692	0.0000
Unemployment among females	-0.193514	0.285805	0.677084	0.5174
Health facilities	-7.705965	4.709004	-1.636432	0.1362
Female labor force participation.	-0.014159	0.099178	-0.142758	0.8891
C	7.067835	12.06679	0.585726	0.04947

R-squared	0.939123	Mean dependent var	74.48813
Adjusted R-squared	0.885855	S.D. dependent var	2.992957
S.E. of regression	1.011181	Akaike info criterion	3.166967
Sum squared resid	8.179888	Schwarz criterion	3.553261
Log likelihood	-17.33573	Hannan-Quinn criter.	3.186748
F-statistic	17.63027	Durbin-Watson stat	1.717686
Prob(F-statistic)	0.000284		

Table 4 shows estimated results of ARDL model in which the coefficients, standard errors, T-statistics and probability values are given. Now we discuss the result of each independent variable one by one to understand their



individual effect on dependent variable. First, we take Fertility Rate, its coefficient value is negative -14.65039, which means if one unit increases in fertility rate there will likely to be decreased in women empowerment by 15.65 percent. It is logical if a woman has more children, she has more family responsibilities and less time for earning, leading to lower empowerment. However, there is positive association between population growth rate and women empowerment. The coefficient value of population growth rate is 4.780416, which indicates that if one unit increases in population growth there will likely to be increased women empowerment by 4.78 percent. It is natural if number of females is increased in any society the women empowerment will increase in that society. The literacy rate and women empowerment also have positive relationship and the coefficient value of literacy rate is 1.770739, suggesting that one unit increases in literacy is associated with women empowerment by 1.77 percent. In this study, literacy rate has been used as proxy variable of women education. If women education is increased their empowerment will also increase. However, there is negative association between unemployment among female and women empowerment as the coefficient value of unemployment is -0.193514, which suggests that one unit is increased among female unemployment is associated with a decrease in women empowerment by 19.30 percent. In other words, unemployed women cannot enjoy any kind of power because they will be dependent upon their families and they have less participation in family's economic decision-making. Thus, women's employment is very necessary for their empowerment. Healthcare facilities also have negative association with women empowerment because its coefficient value is -7.705965, which indicates one unit increases in health facilities is associated with a decrease of women empowerment by 7.71. In the same way, labor force participation and

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women empowerment also has negative relationship with each other and their coefficient value is -0.014159, indicating that one unit increases in female labor force participation is associated with a decrease of women empowerment by 0.14 percent. The empirical results of healthcare facilities and female participation in labor force, which demonstrate negative association with women empowerment need further research as they contradict economic theory which state expanding healthcare services for women and increase women participation in labor force will increase their empowerment.

The  $R^2$  value reveals overall goodness of fit of data in the model. The value of  $R^2$  (0.939123), representing proportional variation in the dependent variable (women empowerment) due to combined variation in all independent variables. It means that about 93.91% variation in the dependent variable is illustrated by the model. Similarly, the adjusted  $R^2$  is a version of R-squared value which adjusts as per number of independent variables in the model. In this case, it's 0.885855 in this case. It shows that the model is goodness of fit. The F-statistics tests are used to test significance of the model from its associated low p-value. In this case, the value of F-statistics is 0.000284, which suggests that the model as a whole is statistically significant. Durbin Watson statistics is used to check problem of autocorrelation in the residuals of model. If the value of this statistics is closed to 2 it suggests there is no autocorrelation and if its value is below or above 2 significantly it indicates there is autocorrelation. In this case, the value of Durbin Watson is 1.717686 which is close to 2 and as such there is no autocorrelation in the model. In short, the empirical results reveal that some independent variables such as Mortality Rate and Literacy Rate are statistically significant predictors of women empowerment, while other variables like Fertility Rate, Population Growth are not statistically significant in the long run. The high value of  $R^2$

indicates the model is goodness of fit to the data and low value of F-Statistics suggests that overall model is statistically significant and there is no autocorrelation problem in the model.

#### 4.5 Bound Test

Bound test is applied to check statistical long run relationship between variables through F-statistics. If the calculated value of F-statistics is larger than critical value the null hypothesis is rejected and alternate hypothesis is accepted. If F-statistics calculated value is below than critical value then alternate hypothesis is accepted. The null hypotheses of this study are the following: -

Null Hypothesis (H<sub>0</sub>): There is no long run relationship between variables.

Alternative hypothesis (H<sub>1</sub>): There is long run relationship between variables.

Table 5 contains the estimated results of Bound test.

**Table 5**

*Results of Bound test*

The statistical test of k value is 5.7114561		
F –test statistics		
Critical value of Bound Test:		
Significant level	1(0) Bounds	1(1) Bounds
10%	3.02	3.51
5%	3.62	4.16
2.5%	4.18	4.79
1%	4.94	5.58

The F-statistics calculated value in Table 5 is 5.711456, and it is labeled "k." The table also show critical values of Bound test at different significance level (10%, 5%, 2.5%, and 1%) that suggests that for a 10% significance level, the critical value for the Bound Test is 3.02 for 0 Bounds and 3.51 for 1 Bounds. This value is less than statistical test of k value of 5.711456. Similarly, for a 5% significance level, the critical value is 3.62 for 0 Bounds and 4.16 for 1 Bounds. This value is also less than statistical test k-value of 5.711456. At a 2.5% significance level, the critical value is 4.18 for 0 Bounds and 4.79 for 1 Bounds. This value is also below the statistical value. At a significance level 1%, the critical value is 4.94 for 0 Bounds and 5.58 for 1 Bounds. This value is also less than statistical test of k-value. When we compare the statistical value of test-k and critical value of bounds test we conclude that the calculated F-statistics (k-value) is above than the critical value for the selected significance level of 5% or 1%, the null hypothesis ( $H_0$ ) is rejected and alternate hypothesis ( $H_1$ ) is accepted. Thus, it has been proved from these empirical results that there is long run relationship between independent and dependent variables and these results validate the results of ARDL Model.

#### **4.6 Error Correction Model**

Error Correction Model (ECM) is commonly used in time series analysis to check cointegration between variables where the variables move together in the long run despite their short-run divergent variations. It is an effective econometric technique to determine the speed of adjustment of variables from one period (short run) to another (long run). This model highlights how the variables reveal short term dynamics before returning to their long run equilibrium. This model explains the difference between actual and predicted values of dependent variable in the previous period. This model also used to

test Granger causality which determines whether one independent variable predicts variation in another variable. The underlying objective of using this model is ascertain the direction of causality between variables in time series. This model also helps us identify which variables have a strong or weak cointegration in the short run or in the long run. As economic theories and models are developed on the basis of long run equilibrium and how economies or markets adjust to it, this mode provides us valuable insight to test these theories and model by using data from real life. This model also facilitates the policy makers to frame effective policies keeping in vies the short run and long run behavior of certain variables. In the same way, this model also predicts how policy changes affect the economy in the short run and long run and how external shocks cause fluctuations in the economies. In short, it is useful econometric technique to draw results in empirical research. The estimated results of ECM are exhibited in [Table 6](#).

**Table 6***Estimated results of Error Correction Model*

Dependent Variable: D(WE)

Method: Least Squares

Date: 08/29/23 Time: 10:12

Sample (adjusted): 2007 2020

Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(WE(-1))	1.099150	0.312016	3.522741	0.0720
D(FR)Fe	-78.62280	39.96408	-1.967337	0.1880
D(MR)	3.217739	1.348006	2.387037	0.1397
D (POP (-1))	0.024686	3.626649	0.006807	0.9952
D(UNEMP)	-0.144079	0.825049	-0.174631	0.8774
D (FLF (-1))	-0.070283	0.042010	-1.673033	0.2363
D(HF)	0.663829	5.159276	0.128667	0.9094
D (LR (-1))	-0.514568	0.464032	-1.108906	0.3830
ECT (-1)	-1.328011	1.081148	-1.228334	0.3443
R-squared	0.947140	Mean dependent var		0.060000
Adjusted R-squared	0.735702	S.D. dependent var		1.559615
S.E. of regression	0.801797	Akaike info criterion		2.327692
Sum squared resid	1.285756	Schwarz criterion		2.653243
Log likelihood	-3.802306	Hannan-Quinn criteria.		2.122478
Durbin-Watson stat	2.963359			

In the results shown in Table 6, the coefficient value of  $D(WE)$  is 1.099150, and it has a t-statistic of 3.522741. It suggests that the lagged value of  $D(WE)$  in the previous period is statistically significant at the 10% level ( $p = 0.0720$ ). The positive value of coefficient indicates that past period's change in women empowerment will also influence the current period's change. In other words, if women empowerment improves in past it will continue to improve in the current period. Similarly, the coefficient value of fertility rate  $DF(FR)$  is -78.62280, and it has a t-statistic of -1.967337. However, this coefficient is not statistically significant ( $p = 0.1880$ ), suggesting that increases in the Fertility Rate do not have a significant impact on women empowerment in the short run because the relationship between two variables is not significant statistically. The coefficient value of Mortality Rate  $D(MR)$  is 3.217739, and it has a t-statistic of 2.387037. This variable is statistically significant at the 10% level ( $p = 0.1397$ ). The result suggests that increases in mortality rate positively affects women empowerment in the short run. It means if mortality rate is increased in the short run, it will likely to enhance women empowerment. However, the coefficient value of  $D(POP(-1))$  lagged by one period is 0.024686 is not statistically significant because its p-value is 0.9952. So, any change in population growth rate does not affect women empowerment in the short run. The same results are of unemployment as the coefficient value of  $D(UNEMP)$  is -0.144079, and it has a t-statistic of -0.174631. This variable is not statistically significant ( $p = 0.8774$ ), suggesting that increase in unemployment among women will not affect their empowerment in the short run. The short run relationship between female labor force participation and women empowerment is not statistically significant as is shown by their coefficient value ( $D(FLF(-1))$ ) with one period lag is -0.070283 and its value of t-statistics -1.673033 which is not significant

because its p-value is 0.2363. Its means that women empowerment will not increase due to change in lagged female labor force participation in the short run. Similarly, improvement in health services and literacy rate will not impact women empowerment in the short run as their coefficient values are not significant. In other words, improvement in health services and literacy rate in the short run will not likely to impact women empowerment. The negative value of the coefficient of Error Correction Term -1.328011, its t-statistic of -1.228334 and p-value 0.3443 indicates that a tendency to correct deviations from equilibrium in the long run. The value of  $R^2$  is 0.947140, which suggests that 94.71% variations in the dependent variable, women empowerment, is explained by all independent variables collectively. The rest of variation in the model is on account of other factors. The adjusted  $R^2$  is 0.735792. Both values of  $R^2$  shows that model is goodness of fit to the data.

The values of other statistics such as standard error of regression, Schwarz Criterion, Akaike information criterion (AIC), log likelihood and the Durbin Watson test suggest that there is no autocorrelation problem in the model. To sum up, it has been proved from the results of ECM that in the short run mortality rate (MR) has significant impact on women empowerment  $D(WE)$ . In contrast, other independent variables included the lagged Error Correction Term (ECT) have no significant impact on women empowerment. This adjustment of variable is not statistically significant at 5% level.

## **5. Discussion**

We have estimated the results of ARDL and ECM Models in the above tables and also interpret them in their context. The Auto Regressive Distributed Lag model and the Error Correction Model (ECM) are both frequently applied in econometrics to determine relationship between variables particularly in time



series analysis. In this analysis, we estimated the impact of independent variables such as female fertility rate, mortality rate, female participation in labor force, female literacy rate, unemployment on dependent variable, women empowerment. We used different statistical techniques such as descriptive statistics, correlation matrix, ADF unit root test, ARDL Model, Bound Test and Error Correction model to analyze the data for the period spanning from 2001 to 2021. This data was collected from World Development Indicators, Asian Development Bank, Pakistan Economic Survey, and the State Bank of Pakistan. Key findings of this analysis are briefly described as under.

The empirical results reveal that the fertility rate has negative association with women empowerment. However, the p-value of (0.3334) is not significant at the 5% level, which means we cannot confidently say that the fertility rate has a significant influence on women empowerment. Mortality rate has positive relationship with women empowerment. The positive coefficient suggests a direct relationship between mortality rate and women empowerment. Given its p-value of 0.0032, this relationship is statistically significant at the 5% level. Population growth has also positive association with empowerment but these relationships are not statistically significant. However, the literacy rate has a strong direct relationship with women empowerment. It's highly significant with a p-value close to 0. The unemployment among females has negative association with women empowerment. The negative coefficient suggests that higher unemployment among females may decrease women empowerment, but it's not statistically significant with a p-value of 0.5174. The health facilities have negative association with women empowerment and it suggests as the quality/availability of health facilities increase, women empowerment may

decrease. However, with a p-value of 0.1362, this relationship isn't statistically significant. The women participation in labor force also has negative association with women empowerment and it suggests that an increase in female labor force participation might decrease women empowerment. Yet, the p-value (0.8891) makes this result statistically insignificant. The value of constant ensures that the regression line passes through the data correctly and isn't biased too high or low. Its p-value is 0.04947, which is just below the 0.05 threshold, suggesting that the constant is significant at the 5% level. In short from the aforesaid results only the literacy rate and mortality rate have statistically significant relationships with women empowerment specifically literacy rate having a particularly strong positive relationship. It means that if education level of females is increased the level of women empowerment will increase. The null hypothesis which states that education has no significant relationship with women literacy rate has been rejected and alternate hypothesis that states that literacy rate has significant impact on women empowerment has been accepted. Thus, it has been proved empirically that literacy rate has significant role in increasing women's empowerment. The empirical results also reveal that the model is goodness of fit and there is no autocorrelation in it.

When we compare the results of ARDL and ECM models we can conclude that ARDL focuses on long run relationship between independent and dependent variables. This model shows strong and significant positive relationship between Mortality Rate, Literacy Rate and women empowerment while other independent variables have insignificant impact in the long run. These long run results are also confirmed by the Bound Test. These findings are consistent with the results of Desai (2010) Malik and Courtney (2010)

Bandiera et al (2014) and Alyna (2014) who also identified positive and significant association between education (female literacy rate) and women's empowerment. On the other hand, the ECM, determine short run relationship between independent and dependent variables and its results show that only Mortality Rate has statistically significant relationship with women empowerment in the short run. Whereas other independent variables have insignificant impact on women empowerment. The comparison of these results of two models enables us to differentiate between short run and long run impact of independent variables on women empowerment.

## **6. CONCLUSIONS**

From the above discussion, we can conclude that literacy rate is a major predictor of women empowerment. Efforts to improve the literacy rate, particularly among women will enhance women empowerment. A literate woman is more likely to make informed decisions, access to opportunities, and contribute to the development of her community and the nation. Similarly, addressing unemployment, especially among women is essential for promoting women's empowerment. Even highly educated and skilled, women often face barriers to economic freedom when job opportunities are scarce. The findings reveal that women's participation in the labor force is closely tied to their empowerment. Encouraging more women to enter the workforce and have financial independence can significantly contribute to their empowerment and overall national development. The fertility rate and women's empowerment have an inverse relationship. Highly educated and employed women tend to have fewer children, as balancing child-rearing, workplace engagements and career development can be challenging. Consequently, an increase in fertility rates may lead to decreased women's

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empowerment. This highlights the importance of family planning and educating women about their reproductive choices. Education and health facilities play a vital role in women empowerment. Therefore, education and healthcare should be focused for enhancing women's empowerment. Women's good health and education empower them to make informed decisions about their lives. It leads to a decrease in fertility rates, unemployment, and an increase in female labor force participation. These positive changes collectively contribute to making a country a better place for all its citizens.

### ***6.1 Theoretical contributions***

The theoretical contributions of this study are that it has identified key determinants which affect women empowerment in the short run and long run. It identified the long run impact of Mortality Rate and Literacy Rate as an important predictor of women empowerment in the long run. These relationships highlight theoretical contribution of these two variables in the women's empowerment. Similarly, the ARDL model and Bound test have also established long run association between women empowerment and various independent variables. This theoretical underpinning highlights the impact of certain factors on women's empowerment in the short and long run. The results of Error Correction Model (ECM) highlight the immediate effect of Mortality Rate on women empowerment. This theoretical insight strengthens understanding of how certain variables significantly impact women empowerment in the short run. The empirical results of the study also validate conventional economic theories relating to female labor force participation and health facilities. The findings of the study suggest there is insignificant association between female labor force participation, health facilities and women empowerment, thus, contributing into empirical validation of

economic theories and emphasized upon the need of further research in these areas.

### ***6.2 Practical implications***

The practical implications of the study are that although the fertility rate shows a negative association with women's empowerment, it is not statistically significant. This suggests that policies or interventions aimed at controlling fertility rates may not have a direct impact on women's empowerment. However, the mortality rate has relationship with women empowerment along with its statistical significance, implies that improving healthcare and reducing mortality rate could be a practical way to enhance women's empowerment. The relationship between population growth and women's empowerment is not statistically significant. Therefore, population growth might not be a reliable indicator for policymakers concerned with women's empowerment. However, the strong positive relationship between literacy rate and women's empowerment indicates that promoting female education and literacy is likely to have a substantial positive impact on women's empowerment. Although there is a positive association between unemployment and women empowerment but it is not statistically significant. Policies aimed at reducing female unemployment may not necessarily lead to improvements in women's empowerment. Similarly, the negative association suggests that improving health facilities might have a negative impact on women's empowerment, but this relationship is not statistically significant. The negative association between female labor force participation and women's empowerment is not statistically significant. It means that encouraging women to participate in the labor force may not directly affect their empowerment.

### ***6.3 Limitations and suggestions for further research***

One of main limitations of study is that the study identifies associations but cannot establish causality. Other unobserved variables may be influencing both women's empowerment and the identified factors. The study does not specify the timeframe for the data. Women's empowerment and its determinants can change over time, so this should be considered in the analysis. The study uses a simple linear model, which may not capture the full complexity of the relationships involved. Other modeling techniques might provide a more accurate representation.

In the light of above limitations, it is suggested that the longitudinal studies can be conducted to observe how these relationships change over time, which could provide more insights into causality. The new researchers can examine how these relationships between variables vary across different regions, as socio-economic conditions can vary widely. Similarly, the impact of specific policies and interventions on women empowerment can be assessed to determine their effectiveness. There is also need to consider the intersectionality of factors, such as how women's empowerment may differ based on ethnicity, socioeconomic status, or other demographic variables.

#### **Data statement**

The data that supports the findings of this study will be made available by corresponding author on strong request.

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#### **Declaration of Competing Interests**

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