

УДК 339.727.22:330.341.1
JEL Classification: F23, K2, M48

AN ASSESSMENT OF CHILD MORTALITY IN THE LOW AND MIDDLE INCOME NATIONS: A CROSS COUNTRY ANALYSIS

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The study examines the probable factors such as female literacy, and per capita GNP who affects the child mortality in different extend. It reveals in the study that female literacy and per capita GNP adversely influence the child mortality of the low and middle income countries around the world, meaning that an increase in the both variables can trim down the child mortality significantly. It is found that the impact of female literacy is nearly double than that of per capita GNP which suggests to give more importance on female education and public awareness to reduce child mortality.

Keywords: *child mortality, female literacy, per capita GNP, cross country analysis.*

Introduction

Nevertheless, child mortality is considered as a crucial issue for the world. Each country wants to keep it at a minimum tolerance level. Child mortality bears special significance because it indicates overall health care system and public awareness and health education system of a state. In addition, child mortality works as an imperative development indicator of any state. Besides, it's a burning question for the civil society too. There can be so many factors affecting the child mortality and it may varies country to country, but if we generalize the determinants or the influencing factors of child mortality, female literacy rate, access to health care, malnutrition, per capita GNP and total fertility are the chief underlying issue. In this study endeavor is given to scrutinize the influencing factors of child mortality of the world and here female literacy rate (FR), and per capita GNP (PGNP) is considered for the analysis.

Objective of the Study

The broad objective of this study is to examine the influencing factors of child mortality of the world. The specific objectives are to:

- Examine the relationship between child mortality, female literacy rate, and per capita GNP.

- Investigate the impact of female literacy rate, and per capita GNP on child mortality.

Methodology and Data

Multiple regression model has been used to examine the influence of female literacy rate, per capita GNP and total female literacy rate on child mortality. Some post estimation specification test has been carried out to inspect the goodness of model. Here, White’s method has been used to check the heteroscedasticity and Skewness and Kurtosis test has been adopted to verify whether the residuals are normally distributed.

Data of child mortality, female literacy rate, and per capita GNP is generated from the purposively selected 62 low and middle income countries around the world. The source of all the secondary data is the World Bank.

Multiple Regression Model

A log linear model is exercised to find out the influence of female literacy rate, and per capita GNP on child mortality.

$$CM = \beta_0 + \beta_1 FLR_i + \beta_2 PGNP_i + U_i$$

Where, CM is the dependent variable which represents child mortality, β_0 denotes intercept, β_1 and β_2 indicates the regression co-efficient of chosen variable. Beside, FLR_i and $PGNP_i$ represent female literacy rate, and per capita gross national product correspondingly and U_i considered as the stochastic term.

Post Estimation Specification testing

In post estimation testing I have test the heteroscedasticity and normality test of residual to check the goodness and reliability of the model.

Result and Discussion

It is expected that both female literacy rate and per capita income will have negative sign. If so they will trim down the child mortality rate significantly.

Table 1. Estimates of Multiple Regression Model

Child Mortality	Coefficient	t-Statistic	Robust Standard Error
Female literacy rate	-1.93	-7.86***	0.229
Per Capita GNP	-0.019	-3.16***	0.005
<i>Adjusted R² : 0.72, Constant: 260.19, No. of Observation: 62</i>			

*Note: *p<0.1, ** p<0.05, *** p<0.01*

Source: Authors Estimation Based on the Data of World Bank

It is appeared in the regression estimates that both per capita GNP and female literacy rate are negatively related with child mortality and statistically significant ant 1% level. Which indicates increase in explanatory variables will cause to reduce child mortality of the selected 62 countries. It can be stated from results that if female literacy rate increase 1 unit child mortality will decrease by 1.93 unit. Similarly, if per capita GNP increase by 1 unit child mortality will be reduced by nearly 0.02 unit.

$$\widehat{CM} = 260.20 - 1.93FLR - 0.02PGNP$$

(Round figure is used in the equation from the table)

Furthermore, if the influence of female literacy rate and per capita GNP is zero, child mortality will remain nearly 260 per thousand. This indicates there are some other key factors those who can significantly influence the child mortality.

Detection of Heteroscedasticity

To examine whether the data has heteroscedasticity problem I generate the scatter plot of the residual. To detect heteroscedasticity problem following scatter plot of squared residual has been used against the predicted value.

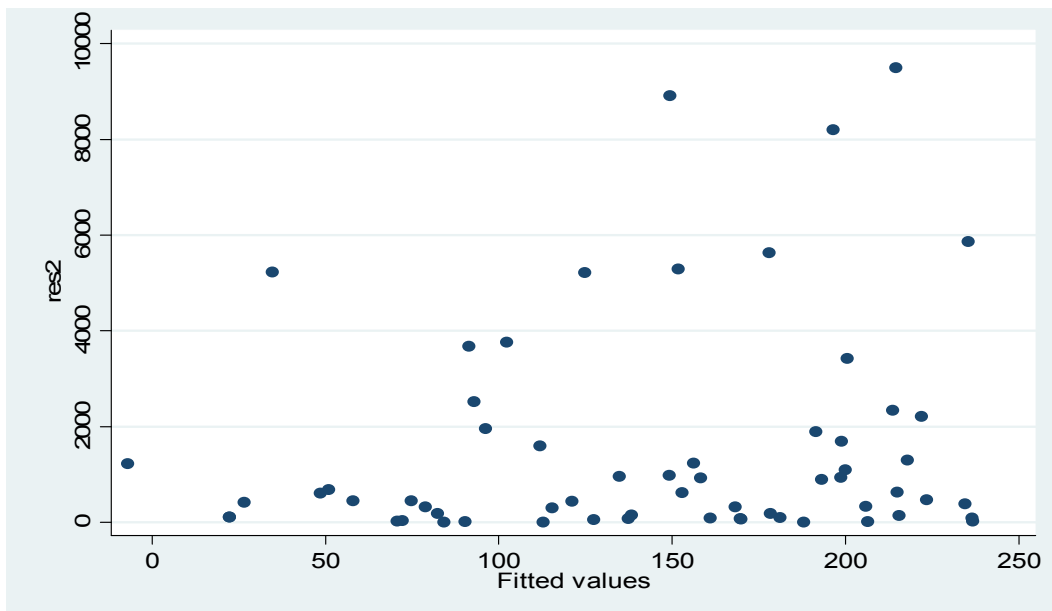


Figure 1. Scatter Plot of the Residuals

It is appeared in the above diagram that there is no systematic pattern of squared residuals aligned with estimated values. Since no systematic pattern is found we can conclude that there is no heteroscedasticity problem in the model.

Now, in order to detect heteroscedasticity we run a formal test. Here White's test is selected for the analysis. According to White's test one should form the following auxiliary regression model:

$$\hat{\varepsilon}_i^2 = \alpha_1 + \alpha_2 FLR_i + \alpha_3 PGNP_i + \alpha_4 FLR_i^2 + \alpha_5 PGNP_i^2 + \alpha_6 FLR_i PGNP_i + u_i$$

Table 2. Results of White Test

	Coefficient	t-Statistic	Standard Error
Female literacy rate	22.567	0.33	68.27
Per Capita GNP	-0.90	-0.52	1.74
Sqared FLR	-0.38	-0.51	0.76
Sqared PGNP	0.000	-0.12	0.000
FLR_PGNP	0.012	0.41	0.03
<i>Adjusted R²: 0.058, Constant: 1816 No. of Observation: 62</i>			

Under the assumption of homoscedasticity, the product of the sample size (n) and the R^2 obtained from the auxiliary regression asymptotically follow a chi-squared distribution with df , equal to the number of regressors (excluding the intercept). As the number of observation is 62 and R^2 , derived from auxiliary regression = 0.028, the calculated $\chi^2 = 62 * 0.028 = 1.73$. On the other hand critical χ^2 value, collected from χ^2 table in 95% confidence level with degrees of freedom equal to 5 is 10.0705. Since the calculated chi-squared value is greater than the critical value we cannot reject the null hypothesis of having homoscedasticity. Therefore according to White's test it can be concluded that there is no heteroscedasticity in the model.

Normality Test

In this part we generate histogram of residuals to test normality. Besides, skewness and kurtosis have been run as a formal test. Following is the histogram of residual where a normal curve overlays on histogram:

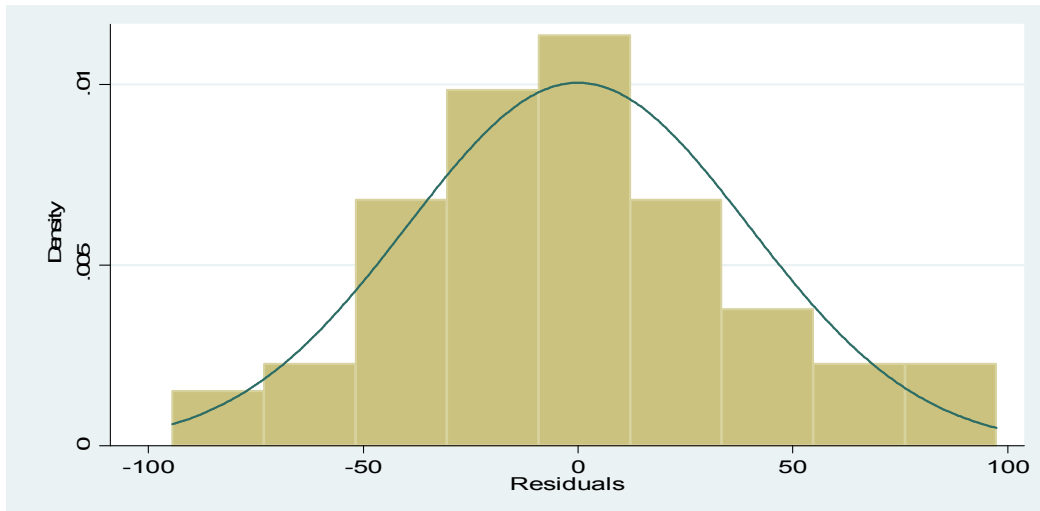


Figure 2. Histogram of the Residuals

It is appeared from the above figure that residuals are normally distributed.

Table 3. Estimates of Skewness/Kurtosis Test

Skewness/Kurtosis tests for Normality					
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi ² (2)	Prob>chi ²
res	62	0.3487	0.5419	1.3	0.5232

Null hypothesis; H₀: the residuals are normally distributed

Alt. hypothesis; H₁: the residuals are not normally distributed

Here our null hypothesis is “the residuals are normally distributed” which refers that the distribution of residuals is not skewed. The skewness and kurtosis test gives us high the probability values for both skewness and kurtosis. As the probability value is not small we can reject the alternate hypothesis of normality. Here the null hypothesis remains valid and we can end that the residuals are normally distributed.

Summary of Findings

It is evident from the analysis that child mortality is highly influenced my female literacy rate at the same time per capita GNP has a few impact on child mortality. As expected both female literacy rate and per capita GNP has negative relationship with child mortality. In the post estimation specification test it is found that there is no heteroscedasticity problem in the model and residuals are normally distributed. Which

signifies the model is correctly specified and has a goodness of fit. Consequently, the prediction concluded from the model has reliability.

Conclusion

It is very significant to analyze the influencing factor of child mortality. Here the two determining variable is chosen in this study for the analysis which may not capture the entire picture of the reason of child mortality. Some relevant variable like public awareness, access to the health care, nutrition etc can play a significant role to lessen child mortality. Whatever, the studied variable also has a significant impact on child mortality which deserve further study for the individual country. The outcome of the study recommends to bestow more emphasizes on female literacy in the low and middle income countries to considerably trim down the child mortality from the world.

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**ОЦІНКА ДИТЯЧОЇ СМЕРТНОСТІ В КРАЇНАХ З НИЗЬКИМ І СЕРЕДНІМ ДОХОДОМ:
МІЖКРАЇННИЙ АНАЛІЗ**

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У дослідженні розглядаються такі фактори, як грамотність серед жінок і ВВП на душу населення, що в різному ступені впливають на показник дитячої смертності. У дослідженні показано, що освіченість жінок і ВВП на душу населення знижують дитячу смертність у країнах з низьким і середнім рівнем доходів, а це означає, що збільшення обох змінних може значно знизити дитячу смертність. Встановлено, що вплив грамотності серед жінок майже у два рази вище, ніж вплив ВВП на душу населення, що приводить до висновку, що необхідно звернути більшу увагу освіти жінок та підвищенню інформованості громадськості для зниження дитячої смертності.

Ключові слова: *дитяча смертність, поширення грамотності серед жінок, ВВП на душу населення, міжкраїнний аналіз.*

**ОЦЕНКА ДЕТСКОЙ СМЕРТНОСТИ В СТРАНАХ С НИЗКИМ И СРЕДНИМ
ДОХОДОМ: МЕЖСТРАНОВОЙ АНАЛИЗ**

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В исследовании рассматриваются такие факторы, как грамотность среди женщин и ВВП на душу населения, которые в разной степени влияют на показатель детской смертности. В исследовании показано, что образованность женщин и ВВП на душу населения снижают детскую смертность в странах с низким и средним уровнем доходов, а это означает, что увеличение обеих переменных может значительно снизить детскую смертность. Установлено, что воздействие грамотности среди женщин почти в два раза выше, чем влияние ВВП на душу населения, что приводит к выводу, что необходимо придать большее значение женскому образованию и повышению осведомленности общественности для снижения детской смертности.

Ключевые слова: *детская смертность, распространение грамотности среди женщин, ВВП на душу населения, межстрановые сравнения.*