The Myanmar JOURNAL

Letter from the Editor-in-Chief

Myanmar and Korea have many similarities and are complementary relationship. Therefore, we believe that research exchange will expand mutual understanding between Myanmar and Korea, and will be the cornerstone for mutual development.

KOMYRA and YUE have co-published The Myanmar Journal since August 2014. So far, many scholars have published numerous papers through the journal, and We are sure that this journal has helped many people understand Myanmar and Korea more clearly and closely.

The Myanmar Journal covers various issues in Myanmar and Korea. It covers various topics that can promote bilateral development and mutual understanding, not limited to specific topics such as economy, industry, society, education, welfare, culture, energy, engineering, healthcare, and agriculture.

We hope that this journal will continue to promote understanding of the current status and potential capabilities of Myanmar and South Korea and promote in-depth international exchange and cooperation.

We would like to express our deepest gratitude to the editorial board and YUE and KOMYRA for their valuable support in The Myanmar Journal publication.

August 30, 2022

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INFORMATION ABOUT
The Myanmar Journal

The Myanmar Journal (ISSN 2383-6563) is the official international journal co-published by Yangon University of Economics (YUE) and Korea Myanmar Research Institute (KOMYRA).

This journal aims to promote the mutual cooperation and development of Myanmar and Korea through intensive researches in the entire filed of society, economy, culture, and industry.

It will cover all general academic and industrial issues, and share ideas, problems and solution for development of Myanmar.

Articles for publication will be on-line released twice a year at the end of February and August every year on the Myanmar Journal webpage (http://www.komyra.com/bbs/board.php?bo_table=articles).

Factor Associated with Maternal Mortality Ratio

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ABSTRACT : Maternal mortality ratio (MMR) is a fundamental issue, especially in low- and middle-income countries. It was identified as the health indicator with the greatest disparity between the developed and developing countries. To eliminate the issues of maternal mortality, identification of the causes is more important to save the lives of women. This study tries to find out the factors which are much impact on the MMR. The data are obtained from the Human Development Report (2020) published by the United Nations Development Program (UNDP). The socio-economic factors and the health care system factors are used to find out the influencing factor with the aid of the multiple linear regression analysis. The result has been shown that female life expectancy contributes most significantly to the reduction of maternal mortality ratio, followed by the HDI, physician, adolescent birth rate, and violence against women ever experienced is a significant impact on the MMR. The female labor force participation and the national poverty line do not significantly impact the MMR.

Key words : *Maternal Mortality Ratio, female life expectancy, adolescent birth rate, violent against women, HDI*

I. Introduction

Maternal mortality as well as deaths during pregnancy, childbirth or within 42 days after delivery remain major challenges for world health systems. Maternal mortality ratio (MMR) is the number of deaths due to pregnancy-related causes per

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100,000 live births. It is a sensitive indicator of health conditions and socio-economic development of a society, and forms Goal 5 of the Millennium Development Goals (MDG 5) to reduce MMR by three quarters from 1990 to 2015 (Hogan et al, 2010). The global ratio of maternal mortality declined to an estimated 216 deaths per 100,000 live births during 1990–2015, less than MDG 5, and far from the target Sustainable Development Goal (SDG) of a reduction to 70 maternal deaths per 100,000 live births by 2030 (UN, 2016).

Maternal mortality is unacceptably high in some developing countries in the last century. The estimated number of maternal deaths was recorded as 529,000 global. Of the total maternal deaths, 95% has been reported in Africa and Asia. According to WHO, in 2010 a total of 827,000 has been reported dead due to the absence of proper maternal health care facilities and poverty in the developing countries. In 2013, the maternal mortality figures have been found high as 289,000 maternal deaths took place at the global level. Estimates for 2017 show that some 810 women die every day from pregnancy- or childbirth-related complications around the world. In 2017, 295,000 women died during and following pregnancy and childbirth. The vast majority occurred in low-resource settings, and most could have been prevented (WHO, 2013). The maternal mortality rate for 2020 was 23.8 deaths per 100,000 live births compared with a rate of 20.1 in 2019.

MMRs have been found high in developing countries (240 per 100,000 births) as compared to the developed countries (16 per 100,000 births). These disparities can be found very high among the countries where few countries have very high maternal mortality ratios of 1,000 or more per 100,000 live births. These kinds of disparities can be further found within the countries and among the people of high and low-income status groups. Moreover, these ratios have also been found high in rural areas as compared to urban areas of most of the developing countries where poverty, social, religious, and cultural factors contribute towards the issue significantly (WHO, 2014).

To eliminate the issues of maternal mortality or reduce it requires a better understanding of its underlying causes. The Human Development Index, adolescent birth rate, violence against women ever experienced (intimate partner violence), female labour force participation rate, female life expectancy at birth, physicians, and poverty are causes related to the MMR. The understanding and identification of these causes are more important to reduce the MMR and can save the lives of women.

Human Development Index (HDI) is one of the causes of the decline in MMR. It is a composition index based on three indicators, namely: health, educational attainment, and standard of living. High HDI will improve the quality of economic development. Generally, the high HDI countries can have more health care utilization than these mediums and low HDI countries. In this study, a random sample of

seventy-four countries with different statuses of HDI (high, medium, and low HDI) was selected to find out the causes that impact the MMR.

Another cause that can impact the MMR is the adolescent birth rate. Adolescent birth rate is the number of births per 1,000 women ages 15–19. Among adolescent girls aged (15-19) years, pregnancy and childbirth complications are the leading cause of death globally. Several countries, particularly those in Latin America and the Caribbean, and in South-East Asia, have already begun reporting data for women and girls outside the standard (15–49) year age interval, documenting the disturbing fact that maternal deaths are occurring among girls even younger than 15 (WHO, 2016). Similarly, among the adolescent girls under 15 years of age, the maternal mortality ratio has been found high in the developing countries (1 in 150) as compared to the developed countries as 1 in 3,800. (Conde-Agudelo et al., 2004; Patton et al., 2009; WHO, 2014).

Violence against women ever experienced (intimate partner violence) is an issue directly related to the MMR. Violence against women is a global public health problem and many women of reproductive age endure violence usually exerted by their intimate partners (intimate partner violence (IPV)). IPV can be measured the percentage of the female population ages 15 and older that has ever experienced physical and/or sexual violence from an intimate partner. Globally, 30% of women have experienced partner abuse. However, the IPV rate varies across studies ranging from 15% to 71% and from 1% to 28% during pregnancy. Diverse studies have also reported a wide range of IPV rate during pregnancy from 0.9% to 20.1% in high-income countries, 3% to 44% in Latin America and Caribbean countries and 2% to 57% in African countries (WHO, 2014).

Another issue related to the MMR is female life expectancy at birth. It is an accurate proxy measure of the overall health of the female population and therefore could also be a precise predictor of maternal mortality. It can be measured the number of years a newborn female infant could expect to live if prevailing patterns of age-specific mortality rates at the time of birth stay the same throughout the infant's life. Over the past 30 years, women have been living longer. In 1984, a woman's life expectancy was 78. Today, women on average live at 81 and that number continues to rise. However, the life expectancy of American women ranks far below Asian and European women, whose life expectancies range from 87 to 90 years. During the 1980s and 1990s, female life expectancy slightly falls and it matched with the rise in MMR in the same period and the female life expectancy rose in the early 2000s and it matched with the fall in MMR during this time. The female expectancy at birth is inversely related to the MMR (Hakkert, 2001).

Poverty is one of the causes that can impact the MMR. Poverty is often identified as a significant barrier to human development. Today, about 600 million people live

on less than $1.90 a day. There has been considerable progress in the fight against poverty in recent decades. The extreme income poverty rate fell from 36 percent in 1990 to 8.6 percent in 2018. Despite this progress, the number of people living in extreme poverty globally is unacceptably high, and poverty reduction may not be fast enough to end extreme poverty by 2030, as the SDGs demand. High levels of poverty limit access to quality health care and consequently affect the level of the human development index. Poverty is also a major cause of maternal mortality, as it prevents many women from getting proper and adequate medical attention due to their inability to afford good antenatal care (Lanre-Abass, 2008). Population living below national poverty line can be measured the percentage of the population living below the national poverty line, which is the poverty line deemed appropriate for a country by its authorities. National estimates are based on population-weighted subgroup estimates from household surveys.

There have been several factors that contributed to the severity of the issue related to MMR in some researches but this study focuses on different perspectives. This means that different factors and methods were chosen to analyze it. This study has used socio-economic factors and health care system factors. The aim of the study is to explore the factors associated with MMR. The conceptual framework of the study was shown in Figure 1. It explains the relationships between the MMR and socio-economic factors and health care system-related factors.

Figure 1: Conceptual Framework of the Study
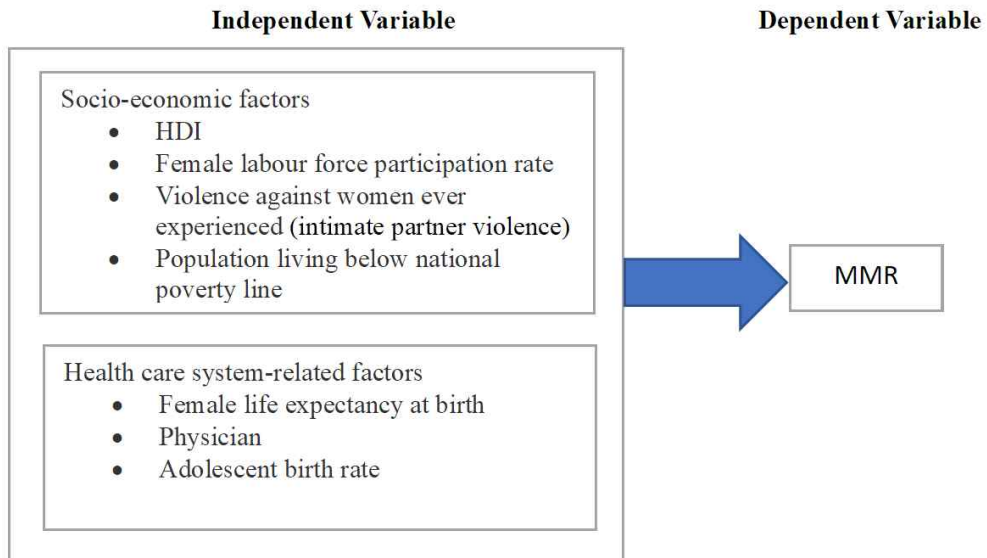
In this study, it can be expected that the MMR might be inversely related to HDI, female life expectancy at birth, and physicians. It can directly be related to the female labour force participation rate, violence against women ever experienced (intimate partner violence), adolescent birth rate (aged 15-19), and the population living below national poverty line.

II. Data & Methods

A random sample of 74 countries was selected from 188 countries and the required data were obtained from the Human Development Report (2020) published by the United Nations Development Program (UNDP). First, the Pearson correlation coefficient was used to analyze the relationship between variables, and then the multiple linear regression analysis was applied to explore the factors influencing the MMR.

III. Results & Discussion

The socio-economic factors were human development index, female labor force participation rate (%), violence against women ever experienced (intimate partner) (%), and the population living below income poverty line (National Poverty Line). The health care system-related factors were female life expectancy at birth (years), physicians (per 100,000 people), and adolescent birth rate (%15-19). These variables were independent variables. In this study, labour force participation rate can be measured the proportion of the working-age population (ages 15 and older) that engages in the labour market, either by working or actively looking for work, expressed as a percentage of the female working-age population, and Physicians is the number of medical doctors (physicians), both generalists and specialists, expressed per 10,000 people.

Before analysis, whether or not these independent variables shown above were individually related to the dependent variable (MMR) was checked first. Thus, the Pearson correlation analysis was performed to ascertain the degree of the relationship between MMR and the independent variables, and the results were displayed in Table 1. Results show that all independent variables were significantly correlated with the MMR and thus these variables were included in the model building process.

Table 1.　Correlation Coefficients

	MMR	HDI	ABR	VAW	FLPR	FLE	PHY	NPL
MMR	1	-0.832[**]	0.692[**]	0.354[**]	0.400[**]	-0.882[**]	-0.444[**]	0.569[**]
HDI		1	-0.697[**]	-0.273[*]	-0.372[**]	0.840[**]	0.529[**]	-0.599[**]
ABR			1	0.361[**]	0.443[**]	-0.682[**]	-0.313[**]	0.580[**]
VAW				1	0.171	-0.290[*]	-0.077	0.262[*]
FLPR					1	-0.374[**]	-0.345[**]	0.245[*]
FLE						1	0.345[**]	-0.561[**]
PHY							1	-0.245[*]
NPL								1

Source: Based on calculation
*　　Correlation is significant at the 0.05 level 5%
** Correlation is significant at the 0.01 level 1%

Next, each independent variable was examined to check the linearly related to the dependent variable. It was found that the MMR (dependent variable) and all independent variables except the Human Development Index, the female life expectancy at birth, and the population living below income poverty line were not linearly related to the MMR. Thus, these variables were transformed by taking the natural logarithm to make linearity.

The multiple regression model with these two factors (independent variables) was developed for finding the significant factor for the MMR. The multiple linear regression model was shown in Equation (1).

$$LnMMR_i= \beta_0 + \beta_1 HDI_i + \beta_2 LnABR_i + \beta_3 LnVAW_i + \beta_4 LnFLPR_i + \beta_5 FLE_i + \beta_6 LnPHY_i + \beta_7 NPL_i + \varepsilon_i \qquad (1)$$

where,

LnMMR　　　　= Logarithm of maternal mortality ratio
HDI　　　　　= Human Development Index
LnABR　　　　= Logarithm of adolescent birth rate
LnVAW　　　　= Logarithm of violence against women ever experienced (Intimate partner)
LnFLPR　　　　= Logarithm of female labor force participation rate
FLE　　　　　= Female life expectancy at birth
LnPHY　　　　= Logarithm of physicians
NPL　　　　　= Population living below income poverty line (National Poverty Line)

Table 2 displays the results of the multiple linear regression. Among the socio-economic factors, HDI was negatively related to MMR, while violence against women was positively related to MMR. All health care system-related factors were significantly related to MMR. The remaining variables such as the female labor force participation rate, and the national poverty line were not significantly associated with the MMR.

Table 2. Summary Results of Multiple Linear Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.t	VIF
	B	Std. Error	Beta			
(Constant)	8.670	1.269		6.833	0.000	
HDI	-3.056***	1.054	-0.303	-2.901	0.005	5.195
LNABR	0.291**	0.125	0.168	2.320	0.023	2.490
LNVAW	0.364***	0.125	0.148	2.911	0.005	1.222
LNFLPR	0.053	0.187	0.015	0.280	0.780	1.407
FLE	-0.057***	0.015	-0.327	-3.729	0.000	3.649
LNPHY	-0.156***	0.058	-0.209	-2.674	0.009	2.910
NPL	-0.004	0.005	-0.050	-0.794	0.430	1.887
F = 58.472 (p-value = 0.000), Adjusted R^2 = 0.846, Standard error of the estimate = 0.4672						

Source: Based on calculation
Dependent variable: LnMMR
Independent variables: (Constant), HDI, LNABR, LNVAW, LNFLPR, FLE, LNPHY, NPL
* significant at the 0.10 level 10%,
** significant at the 0.05 level 5%,
*** significant at the 0.01 level 1%,

It was found that the female life expectancy had the largest standardized coefficient of β5= -0.327 with a p-value of 0.000. Thus, it was statistically significant and negatively related to the MMR. This means that the maternal mortality rate may be lower in women living in countries with a higher life expectancy. If female life expectancy at birth is higher the MMR will be decreased, holding all the other independent variables constant.

The same result was found in HDI, and it was statistically significant and negatively related to the MMR. It had the second largest standardized coefficient of β1= -0.303 with a p-value of 0.005. Thus, it can be said that if the level of HDI changed from low to medium and high, the MMR will be declined, holding all the other independent variables constant.

The third significant factor was the physician and it had the standardized coefficient of $\beta_6 = -0.209$ with a p-value of 0.009. The factor of physician was inversely related to the MMR, which means that the country has insufficient physicians cannot give better health services, owing to lack of adequate medical care; high prevalence of infectious diseases, and due to health care system difference.

The fourth significant factor was the adolescent birth rate and it had the standardized coefficient of $\beta_2 = 0.168$ with a p-value of 0.023. It was directly related to the MMR. This means that if the adolescent birth rate is higher, the MMR will be high, holding all the other independent variables constant. The same result was seen in violence against women ever experienced. It was the fifth significant factor and the standardized coefficient of $\beta_3 = 0.148$ with a p-value of 0.005. The result can be pointed out that the positive influence of violence against women on maternal mortality.

According to the model fitting criteria, the adjusted coefficient of determination(R^2) is 0.846. This means that 84.6% of the variation in MMR can be explained by seven independent variables. The F-statistic is 58.472 with a p-value of 0.000, and it concludes that there's a significant relationship between the independent variables and the dependent variable. All the necessary assumptions of the multiple regression model were checked and the results were also shown in Figure 2. From the results shown in Table and Figure, it can be concluded that all assumptions were met. The decision made from the analysis is valid and reliable.

Figure 2. The Diagnostics Plots :(a) Histogram; (b)Normal P-P Plot; (c) Standardized residual Vs Predicted Values.

(a)

(b)

(c)
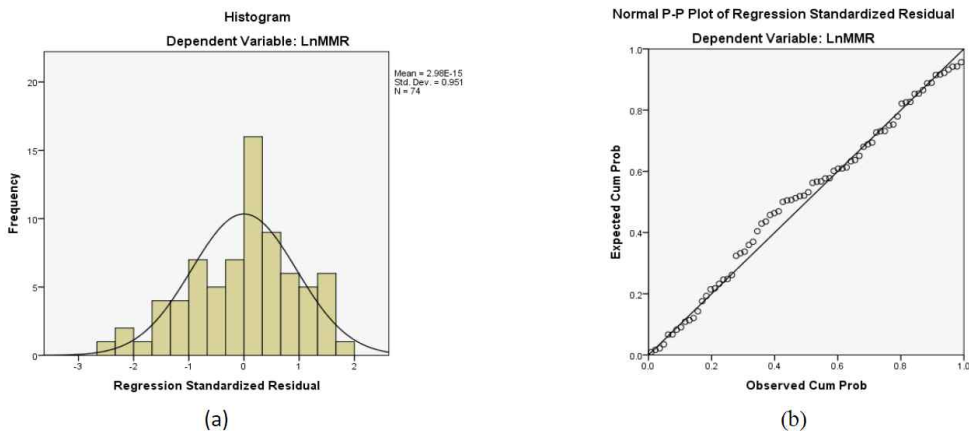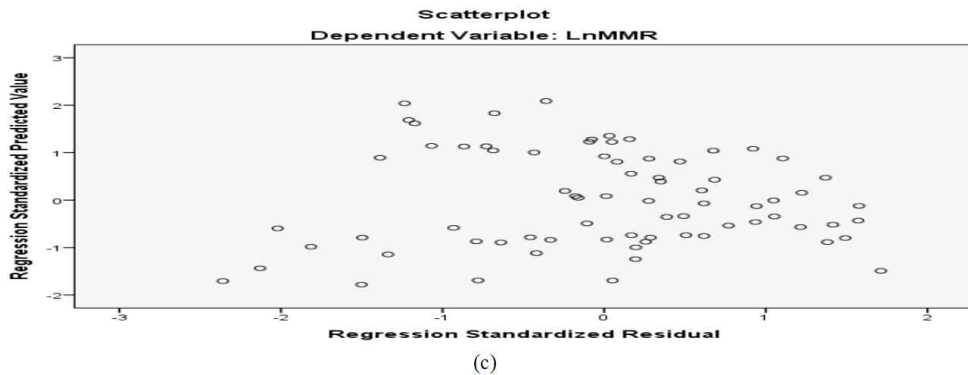
IV. Conclusion and Suggestions

Maternal mortality is one of the most sensitive indicators of the health disparities between poor and rich nations. It is also one of the most difficult health outcomes to measure reliably. The study aims to identify factors influencing on MMR based on the selected countries. This study can highlight the socio-economic factors: the Human Development Index and violence against women ever experienced, and health care system-related factors: female life expectancy at birth, physicians, and adolescent birth rate were influencing the MMR. Therefore, when policies and programs are targeted to improve maternal health and reduce maternal mortality, should consider these factors. These are major risks for mothers.

Acknowledgements

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