Critique Paper on Study of Correlates of Maternal Mortality

Li Ying Nong, RN

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NYCCT, Professor Rita DeBonis

**Introduction**

Maternal mortality is the incidence of death of a woman during childbirth or the period of time related to complications of labor and delivery, leading to her death. High mortality rates have led global humanitarian organizations to recognize its importance as a worldwide epidemic and statistics from statistical databases have spurred efforts to improve through international programs and action. Programs such as World Health Organization take part in relief efforts and their statistics are published and get utilized by researchers around the world, gaining momentum to achieve a global acknowledgment about issues impacting vulnerable populations everywhere. Although the maternal mortality rate has been decreasing, the rate of decline has not made much progress to address the problem and a disparity is noticed between the degrees to which efforts have made an impact on developing countries as compared to developed countries. In fact, some of the latest updates on trends related to maternal mortality are found on UNICEF’s website and is presented on an epidemiologic spot map. According to the map, high frequency incidences of maternal mortality are clustered around countries in Africa, extending out to South East Asia regions (UNICEF, 2019). The staggering difference in rates of maternal mortality between developed and developing countries bring up intriguing research topics among healthcare fields, such as Girum and Wasie’s study.

Of particular importance is how the role of a woman in her household influences the structure of the family, and in a larger scale, the developing nation as a whole. Girum and Wasie make a point about the impact of a woman’s risks during pregnancy not only for her own health but also the subsequent dilemmas to follow in the occurrence of her injury or death. These dilemmas may directly or indirectly lead to negative social and economic consequences that “represent a drain on all development efforts” (Girum and Wasie, 2017).

**Problem and Purpose**

The main purpose of the study, as described in the abstract and background section of the paper, is to determine contributing factors to the high maternal mortality ratios shown on statistics from international databases. Studies also include the prevalences of MMR in relation to its socio-economic impact on the family and nation as a whole. The problem developing into the purpose and aim of the study is the existence of disparity between the rates of maternal mortality in countries of varying economic status but previous studies fail to compile and make connections between vital information related to “the impact of broader health and social indicators” (Girum and Wasie, 2017, pg 2). The authors of the study deduces several reasons why developing countries are significantly behind on the relief rates compared to developed countries; these include factors encompassing socio-economic development, healthcare, and disease among women at risk for deaths during her childbearing periods. Using the selected factors to be studied, a quantitative study was conducted using statistics from databases created by international organizations.

            A quantitative study involves studying the correlations of observable phenomena in order to determine possible solutions for problems, whether it is medically related or otherwise, and variables are used to explain the narrative. A variable is a term used to explain the relationship between two (or more) observable factors or behaviors. Variables are essentially built on the presumption that one variable, the dependent one, is changed under the influence of another variable, the independent one. The dependent variable is referred to as an outcome (Polit, 2014). In Girum and Wasie’s study, the dependent variable is maternal mortality ratio. This ratio is set at a standard being the number of deaths of women during childbirth periods per 100,000 live births, collectively termed MMR (maternal mortality ratio) (Girum and Wasie, 2017). The independent variable is synonymous with the different causes of the specific effect. Because maternal mortality ratio is a variable with a wide range of possible causes, it might be too extensive to be covered in one single study and may even overwhelm or distract readers from important highlights of the presented data. In fact, the authors select the following three broad topics as the “determinants”: socioeconomic, healthcare related, and disease related causes.

Rather than delving into all specific causes of the high number of maternal mortality rates in developing countries and discussing methods focused on decreasing the rates, it seemed like the authors were simply stating and explaining the relationship between the general statistics of international research. However, they also did point out the statistics may have a degree of inaccuracy due to the lack of access to a better demography analytic system in developing countries, a fallible component to the study. Thus it is understandable the authors can only depend on data from reputable humanitarian organizations due to a lack of a better source of data. It is also not to be assumed even though only three diseases were listed (TB, HIV, and anemia), that the woman is completely immune to other diseases although one can assume the average reader does not make these hypotheses.

The study did not prioritize researching actual methods to improve the ratio which brings up a fundamental question about its significance in Nursing. For example, do we really need another study about relationships between A and B, rather than coming up with realistic C solutions? And the answer is yes. Despite being informative about the reality of improving mortality rates, studies like this can also be incentivizing for other research teams to develop better methods when they are planning real field work. For example, one could study the connection between the gross national income per capita and the rates of not only maternal deaths but also how it affects the growth and development of the people in the society as a whole. In addition, research is always ongoing; statistical data may change as newer technology enhance people's lives around the world and the new changes should be addressed by researchers in order to be able to present the most accurate and current statistics possible.

**Research design**

            The design of the study is tailored to its purpose, to inform and make correlations between maternal mortality ratio and the selected causative variables. Through observational studies, the authors become narrators for teaching the public about the epidemic of maternal mortality and current effectiveness of global management in regards to the issue. Because multiple components are part of efforts to improve the quality of life in poorer countries, few studies have presented significant data enough to make ground-breaking changes. Using the method of a correlation study, the authors make an effective point about linking certain detrimental factors to the rates of maternal mortality and ideas on improvement for future perspectives. However, the topics may be too broad to effectively capture the real stem of the problem. For example, one would look at the design of the study and be able to make correlations between socio-economic indicators and maternal mortality ratio but may find it hard to understand the importance of improving the former or latter patterns in order to make improvements.

 Girum and Wasie do not mention the exact methods of data collection but methods resemble a cross-sectional design where they perform data entry of specific independent variables and derive meaningful statistics from computation. Their method can change the persuasiveness of the study because maternal mortality is not a variable that occurs at a single given point in time in a specific location.

**Population and sample**

Based on the nature and focus of the study, the population of subjects is limited to women of childbearing age in a total of 82 developing countries. These countries were categorized by the gross national income per capita, and the lower values further divided into low and lower middle income groups. Of the 62 countries having sufficient data compiled from formal registration presumably either by the government or similar agencies which would be statistically more accurate, the numbers were incorporated directly into the data pool without needing adjustments to minimize inaccuracies. The remaining countries had data gathered and represented using a regression model to account for incomplete data. As previously mentioned, the authors addressed the issue of inaccuracy to a certain degree due to the negative correlation between maternal mortality ratio and the reliability of vital statistics.  The data in the study originates from the work of other organizations; therefore, the authors were not involved in direct sampling and data retrieval. This could mean the authors had no confirmation that the population size was a randomized group; an error or inconsistency of this aspect could be detrimental to the study, since the sample population is an essential part of a study (Haegele, 2015). In addition, there were no set age limits or health conditions to the women of the study, suggesting that these parameters, in addition to other possibilities, are outside of the authors’ control and therefore are completely dependent on the data they get from other organizations.

The study also do not mention the list of all the countries they selected to study, which makes the sample and population choices questionable based on two reasons: first, which countries were studied, and second, to what extent are the data gathered reliable from those countries mentioned but were more difficult to obtain information from. Of the 82 total countries, the reader must assume all 46 countries in Sub-Saharan Africa were selected since the authors mentioned the particular region (UNDP, 2013). The locations of the remaining 16 countries remain a mystery as well, again forcing the reader to assume those are developing South East Asian countries. However, this list of countries was already preselected by data-collecting agencies and this type of choice refinement could be part of what makes the study biased.

In regards to the diseases mentioned as part of the independent variables (HIV, tuberculosis, and anemia), a possible explanation to why the authors chose this specific set of diseases could be because of the high prevalence rates. Globally, HIV ranks #10 as leading causes of deaths across all ages; in African regions, HIV/AIDs and tuberculosis ranks #2 and #6 respectively, as leading causes of death (WHO, 2019). The etiology of these diseases plays a role in determining a woman’s risk factors throughout her perinatal stages, especially for those living in places where access to immediate healthcare could be delayed. Being a worldwide epidemic, not only in regions of Africa have HIV and tuberculosis become a topic of interest in regards to maternal mortality; according to a study done in rural parts of China about the effects of “maternal death on household economy”, the authors believe the occurrence of more common diseases such as HIV, malaria, and tuberculosis may be a reason why research and focus on maternal mortality may not be as sufficient compared to the previously mentioned diseases (Ye et al., 2015). Having demonstrated the correlations between those common diseases and compared to rates of maternal mortality, it would make a good argument about how instead of studying and comparing those two variables side by side to make a point, a wiser decision would be to examine the effects of common diseases on the rates of maternal mortality and how the degree of significance change for the woman already with mortality risks in addition to the presence of common life threatening diseases.

In this study, a power analysis was not explicitly explained. The purpose of a power analysis is to help researchers determine an adequate number of sample sizes that is suitable for the study (Polit, 2014). Sometimes, the population size may not be enough to deduct a convincing result; for example, studying the effects on ice cream on the number of cavities diagnosed in school-aged children would have compelling results if the sample size were 10,000 children across the country, instead of one class size of 20 children in one town. For this study, very large sample sizes were assumed because some variables were written as *x* per 1,000or 100,000 population.

**Data Collection and Measurement**

Statistics were obtained from compilations of international data-collecting agencies based on most recent data; these agencies are considered accurate sources for the topics of interest but the authors do not state whether being directly involved in the data collection processes. This method, although useful for large-scale population samplings which involve employing specialized teams to complete the job, may not be as precise when compared to direct interviews. Essentially, observations were done on the numbers gathered by other organizations instead of on the actual women and their family. Some values were actually estimated due to restrictions on obtaining completed reports; this is mentioned by the authors as likely because of a lack of formal registry system in poorer countries. Girum and Wasie also mentioned Member States, which is assumed to be states that are members of international organizations. For countries where data collection is not as reliable, regression models were made to fill in gaps in results; this may negatively impact the reliability of the results to a degree. Reliability of these data was not explicitly described by the authors. In addition, regression analysis methods only point out significant values and bring those factors into focus while outliers may not be considered.

**Procedures**

The aim of the study is to study the rates of and highlight the effects of different variables on rate of maternal mortality in developing countries. The study was purely observational; there were no interventions to study different outcomes. Unbiased data collection remains the best methods because there would be least amount of tampering with the data and sources and reliability of the results would be unaffected. However, the authors do not mention how the data were collected. If there was an opportunity to learn about how international organizations conducted census studies, we should expect procedures to not involve some type of rewards programs. For example, if the sample population was promised rewards in exchange of information, there would be a bias in the number of collected data. It is only assumed that the teams who conducted the studies were well trained and experienced with handling and obtaining statistical census data from different populations in developing countries and data was not falsified to mask the tragic nature of maternal deaths.

**Data Analysis**

 All the gathered data were reviewed using SPSS version 21 and additional data from more recent studies were used to replace older information. This method can help authors get a larger overview of the variables in order to make a conclusion. Girum and Wasie acknowledged possible factors which may alter accuracy, such as incompleted data and possible outliers. The normality of results is important in statistical studies because the validity of the data depends on the normality (Ghasemi and Zahediasl, 2012). The Kolmogorov-Smirnov test (KS test) was the tool used in this study to determine normality in a pool of data; however, the efficacy of this test has been cited to be often inaccurate because its effectiveness decreases when used on data obtained through estimations rather than direct measurement. In a mock study using the KS test and other models to compare accuracies, the authors concluded the KS test was not a good choice for determining normality in data (Steinskog, [Tjøstheim](https://journals.ametsoc.org/author/Tj%C3%B8stheim%2C%2BDag%2BB), [Kvamstø](https://journals.ametsoc.org/author/Kvamst%C3%B8%2C%2BNils%2BG), 2007). This is likely due to the *p* value being too large because the parameters had to be estimated. Error with checking normality could impact the accuracy of the results because “if the KS test does not reject normality for a given dataset, this result carries almost no informative value. (Steinskog, [Tjøstheim](https://journals.ametsoc.org/author/Tj%C3%B8stheim%2C%2BDag%2BB), [Kvamstø](https://journals.ametsoc.org/author/Kvamst%C3%B8%2C%2BNils%2BG), 2007).

 Girum and Wasie’s study is a descriptive study on the existence of significant correlations between specific indicators and reported high rates of maternal mortality in developing countries. Therefore, no formal hypothesis was stated; however if there were to be a hypothesis, it is assumed to be the following: there are statistical significance between the selected determinant variables (socio-economic, health care related, and morbidity variables) and the outcome variable (maternal mortality ratio). The authors discussed the significance of results based on correlations to maternal mortality ratios.

**Findings**

 The data gathered were presented in two data tables; table 1 shows a summary of the prevalence of specific variables found to be significant to data interpretation. In table 2, correlations were charted with *r* and *p* values. The *r* values, also called Pearson’s *r*, are “descriptive statistic” which helps determine the relationship between two variables in terms of correlation (Polit, 2010, pg 434). From table 2, positive *r* values are evident of having a significant positive correlation to maternal mortality ratio; for example, early marriage as a determinant variable has a 0.64 *r* value which is interpreted as the earlier the marriage, the higher the likelihood of maternal death.

 The *p* value of data essentially show the accuracy of the data based on its likeliness to be reliable. Based on table 2, three variables had *p* values greater than 0.05, meaning the variables were not considered significant for consideration in its roles of high maternal mortality ratios in the population samples. However, just by explicating the p value is not enough to determine statistical significance. The study did not mention effect size, which is not influenced by sample size, whereas the *p* value is likely to be affected by the number of samples (Sullivan and Feinn, 2012). If given effect size, the presented data would have more statistical value beyond the possibity of the *p* value being influenced by the large population size.

**Summary Assessment**

 Due to the nature of the study, it can be hard to conduct a large-scale international study with the authors personally performing the field work likely because of lack of either funding or manpower. The best we can do is trust the validity of the data obtained from governmental organizations; in this case, the truth value of the results can be concluded as essentially *true*. In addition, many determinant variables noted in the study are valid and reasonable causes of maternal deaths even in developed countries. For example, it is reasonable to make correlations between the ratio of nurse and midwife to number of pregnant women and rates of maternal deaths. The real question would instead be: how to make improvements to healthcare practices when presented with these “true statements”, which would make good future implications for nurses in midwifery or obstetrics.

 Girum and Wasie’s study summarizes the correlations between specific indicators and its effects on maternal mortality. Based on this study, nurses working in the community can pay more attention to the specific determinants that are particular to the populations they work with. For examples, nurses working with patients living in poorer neighborhoods would likely to benefit more from meeting basic needs such as access to healthier food choices or even clean water to reduce mortality rates. On the other hand, nurses in richer neighborhoods, where the basic needs are essentially not a problem, can direct their interventions towards fulfulling higher steps along Maslow’s hierarchy, such as social needs and implementing creative activities to help achieve self-actualization.

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