WORLDWIDE PATTERNS OF FACTORS AFFECTING CHILD MORTALITY

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ABSTRACT

Health is both a personal and social responsibility. But the common man fails to realize his duties regarding healthcare stragies.

Each year worldwide 10.6 million children die under the age of five (*Razum and Breckenkamp, 2007*). This study determined the factors that significantly influenced child mortality rates globally. Data mining was utilized and profiling of the countries was done based on country's characteristics namely: health workforce density, population density, geographical location, total health expenditure, national average income per capita and immunization status. In order to determine the significant factors affecting child mortality rate, multiple regression was used. Minitab was used to process the data. The results of the study revealed that among all the factors, health workforce density, geographical location and immunization status exert significant influence on child mortality rate. Child mortality rate can be determined by health service delivery (health workforce density and immunization status) and geographical factors of the countries worldwide. Government initiatives play a vital role in radically reducing child mortality rate.

Keywords: Child, mortality rate, Health workforce density, Geographical location, and Immunization status

INTRODUCTION

This study aims to investigate the factors that affect child mortality rate among countries around the world. The factors considered are health workforce density, country population, geographical location, total health expenditure, national average income per capita and immunization status. This study will support existing programs and initiatives in decreasing child mortality rate.

Recent report presented elucidated that about 21 children under the age of five die each minute, mainly from preventable causes (*UNICEF, 2008*) and each year, 10.6 million children under the age of five years die worldwide. The majority of child deaths take place in the resource-poor countries referred to as "developing countries" (*Razum and Breckenkamp, 2007*). One of the Millennium Development Goals (MDG) is to reduce child mortality. Furthermore, this study supports the target of MDG to reduce child mortality by two-thirds. For example it was seen that in 1990, 93 children of every 1,000 was dying before the age group of five but by 2015, the number was reduced to 31 of every 1,000. This study will help to attain this goal by identifying significant factors affecting mortality rate and thus will provide information on how to enhance effectiveness of different health programs and initiatives to be undertaken.

LITERATURE REVIEW

Various studies have revealed the relationship between the rate of child mortality and some personal and environmental characteristics. Some of these characteristics are health workforce density, country population, geographical location, total health expenditure, national average income per capita and immunization status.

A study by Hanvoravongchai (*2009*) found out that health workforce density is a significant determinant of mortality rate in Thailand, controlling the effects of education and other community characteristics. It also shows that nurses, but not physicians, contribute significantly to child survival when differential effects of health worker subgroups are evaluated.

According to the Department of Geography, University of Liverpool, U.K., the population density affects child mortality rates. The denser is the area,

the easier is the transmission of some infections. However, neither geographical location nor climatic inequalities influenced the mortality rate (*Razum and Breckenkamp, 2007*).

With regards to the national average income per capita and health expenditure, it was concluded in the study of Tandon (*2005*) that there is strong evidence of relationship between economic growth and the decline in the child mortality. Growth increases the capacity and ability of individuals to demand and utilize better health care, housing, nutrition, etc.

According to The World Bank (*2009*), if the medical expenses and services are increased, mortality rate significantly decreases. In addition, child mortality rate is reduced when the immunization of the children is fulfilled. Immunization programmes can protect the lives of nearly 4 million children (*UNICEF, 2008*). The literatures reviewed indicate that certain widely accepted factors that catalyze the rate of child mortality in various countries are sometimes not supported by empirical data. For this reason, we pose the following research hypotheses for testing:

Hypotheses

H1: The higher the (i) health workforce density (*Hanvoravongchai, 2009*) (ii) total health expenditure (*Tandon, 2005*) and (iii) national average income per capita, (*The World Bank 1997*), the lower is the child mortality rate of the country.

H2: When the population density of the country is low, then the child mortality rate is low. (*Department of Geography, University of Liverpool, U.K., 2007*).

H3: The greater the compliance to immunization, the lesser is the child mortality rate (*UNICEF, 2008*).

H4: Geographical location is not a factor in child mortality rate (*Oliver Razum and Jurgen Breckenkamp, 2007*).

METHODOLOGY

Data mining was utilized in this study. Available data and statistics were retrieved regarding child mortality rates all over the world along with health workforce density, population density, geographical location, total health expenditure, national average income per capita and immunization status by the guidelines of WHO. The profiles of the countries were presented according to these identified characteristics.

In order to determine the factors that significantly influence the child mortality rate, multiple regression was utilized. During the data processing, statistical software specifically minitab version 12 was used.

Child mortality rate refers to the total number of deaths among children below five years old per 1000 population (0-5years old).

Health workforce density is defined as the total number of physicians, nurses and midwives per 1, 000 of the population.

Population density however is defined as the number of people per unit area per square kilometre that is calculated per country which may include or exclude cultivated or potentially productive area. The classifications were: (1) for 0-50,000 (low), (2) for 50,000-100,000 (moderate) and (3) for more than 100,000 (high).

Geographical location is classified into seven (7) continental regions namely: Africa, Asia, Europe, North America, South America, Oceania and other countries (Australia, New Zealand, Polynesia and Micronesia).

Total health expenditure is the sum of general government expenditure and private expenditure on health in a given year (in international dollars). The total health expenditure as percentage of Gross Domestic Product (GDP) are classified into three categories; (1) for less than 500 (low); (2) for 500-1,000(moderate) and (3) for more than 1,000 (high).

National average income per capita is defined as the average of value added by all resident producers plus any product taxes (less subsidies) not included in the evaluation of output plus net receipts of primary income that is divided by total population. They were coded as follows: (1) for 3,400 or less (low), (2) for more than 3,400 but less than 19,000 (moderate) and (3) for more than 19,000 (high).

Immunization status is defined as complete primary immunization among one-year old infants.

RESULTS

The countries were grouped into three parts according to their child mortality rates, namely: high, moderate and low child mortality rate and then the profile was summarized and presented in the table below.

Table 1. Global Profile

Child Mortality Rate	Health Workforce Density	Population Density	Geographical Location (Continent)	Total Health Expenditures	National Average Income per capita	Immunization Status
High	Low	Low	Africa	Low	Low	High
Moderate	Low	Low	Africa	Low	Low	High
Low	Low	Low	Europe/North America/Ocenia	Low	Low	High

The characteristics of countries with high, moderate and low mortality are similar except when geographic location is considered. European countries appeared to have the least child mortality along with North American countries and Oceania which is in direct contrast to the African countries which registered moderate to high child mortality rates.

A multiple regression analysis was performed to determine which of the identified factors really influenced the child mortality rate.

Table 2. Factors Affecting the Child Mortality Rate

Predictor	Coef	SE Coef	T	P
Constant	256.80	16.07	15.98	0.000
Geograph	-12.99	1.658	-7.84	0.000
Total He	-0.00	0.001	-0.17	0.864
National	-0.00	0.0001	-0.18	0.855
Immuniza	-1.95	0.1815	-10.76	0.000
Health W	-1.77	0.7061	-2.52	0.013
Populati	-0.00	0.000	-1.25	0.215

S = 34.37   R-Sq = 56.2%   R-Sq(adj) = 54.8%

Results indicate that among the six characteristics identified; only three have significant influence on the child mortality rates in the different countries. These are geographical location, immunization status and health workforce density. Together, these factors explain about 56.2% of the variance in child mortality worldwide.

DISCUSSIONS

1. Multiple regressions revealed that among the six characteristics mentioned, only three have considerable influence on the child mortality rates namely: geographical location, immunization status and health workforce density as reflected in the tables (table 1 and 2). It is noted that immunization status highly correlates with the health workforce density while the geographical location is independent from these two variables.

2. The child's immunization status influenced their survival. Therefore, if the child is fully immunized, the child mortality rate will reduce significantly. This confirmed the study of UNICEF (2008) that immunization programs can protect the lives of children under 5 years old. Hence, immunization is effective in strengthening the child's resistance against infection.

3. Hanvoravongchai (2009) pointed out that the involvement of large number of health workers for the purpose of child care will ensure a drop in child mortality consistent with the findings in Thailand. Evidently, the health workers were concerned in providing services to their clientele such as encouraging immunization compliance and health education.

4. Geographical location is a factor in child mortality rate. Most of the underdeveloped countries like Africa have moderate to high child mortality rates in contrast with the developed countries like Europe, North America and Oceania with lowest mortality rates. Visibly, the economic condition of the country would affect the health care delivery services which in turn influence the health of the populace. However, this study confirmed that neither geographical location nor climatic inequalities influenced the mortality rate (Razum and Breckenkamp, 2007).

CONCLUSION

Health indeed is both a personal and social responsibility. Health service delivery system such as health workforce density and immunization status and geographical factors determines the child mortality of the countries around the world. A limited access to healthcare in the underdeveloped countries influence the health of its populace especially in children. Thus, government initiatives play a vital role in radically reducing child mortality rate.

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