FACTORS AFFECTING CHILD MORTALITY IN MONGOLIA (RHS 2008)

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Abstract

This study aimed to identify the factors affecting child mortality in Mongolia using the secondary data Reproductive Health Survey 2008 by the National Statistical Office of Mongolia. The unit of analysis is 3,924 children who were born in the five years prior to the survey. Bivariate and multivariate analysis were employed. The results show that children who were breastfed were 96 per cent less likely to die than those who were never breastfed. In addition, children whose mothers were aged 30-49 years old were 81 per cent less likely than the children whose mothers were aged 20 years old or less, children whose birth weight was greater than 2,500 gm were 71 per cent less likely to die than those with a birth weight of less than 2,500 gm, and female children were 48 per cent less likely to experience death than male children. Thus, family planning programs should be strengthened to prevent teenage pregnancy, and should carry out more actions to raise awareness of benefits of breastfeeding.

KEY WORDS: Under five child mortality, infant mortality, reproductive health

INTRODUCTION

First five years of human life is vulnerable and determining period of one's life to survive. UN reports that, globally, 8.8 million children a year, or 22,000 a day, die before they reach five years old, and pneumonia, diarrhea, and under-nutrition are the main three factors affecting child deaths which can be prevented. Therefore, United Nations set the Millennium Development Goal 4 (MDG 4) to reduce the under-five mortality rate (U5MR) by two-thirds between 1990 and 2015.

Child mortality rate has been substantially decreasing in the past two decades in Mongolia. According to RHS 2008, U5MR was 24.9 per 1,000 live births. The Government of Mongolia has set a goal of reducing U5MR to 21 per 1,000 live births by 2015. Despite the progress toward reducing child mortality, infant mortality rate still remains with high age-specific death rates and a high IMR at the level of other developing countries (RHS, 2008).

Few theories related with child mortality were developed especially in the context of developing countries. Mosley and Chen framework, and UNICEF framework suggest that maternal, environmental, nutritious, external and personal factors can have impact on child mortality. According to the 'Macro-social change theory,' inequality and unequal distribution of resources affect human life quality which leads to child mortality (Paterno, 2007).

It is almost common knowledge that children born to young or older mothers have more chance of child mortality than the other age groups (Bongaarts, 1987; Davis, 1988; Sullivian et al, 1994). Moreover, mother's education has inverse relationship with the state of child survival; the lower the mother's education level is, the higher the risk of child mortality is. (Haines, 1978; Caldwell, 1979; Cochrane, 1980). Income has direct impact on mother and child health, so the higher the income per capita, the better the nutrition of food, hygienic situation, and accessibility to health services which all have impact on child health (Girma & Genebo, 2002; Kabubo et al., 2006; Mahgoub et al., 2006). Due to unequal distribution and shortage of health facilities and resources, and lower educated inhabitants

in rural areas, child mortality is higher there than it is in urban areas (Kabir et al, 1986; MoH, 2005; Hill, Dodd et a. 2006).

It is a consistent finding among the field of health and demographic studies that low birth weight (LBW) is a major cause of child mortality (Institute of Medicine, 1985; Cramer, 1987; Kiely & Susser, 1992; McCormick, 1985; Wilcox & Skjaerven, 1992). Similarly, child's gender is determining factor for child mortality; female children are biologically stronger than male children, so they tend to survive better than boys. There is a tendency that a child born in the highest or lowest birth order is more at risk of death (Ahmed, 1986; Bongaarts, 1987). Another significant factor for child survival is breastfeeding, because breast milk has the healthiest form of nutrition for children, and can prevent child mortality (Butz et al, 1982; Edmond, 2006).

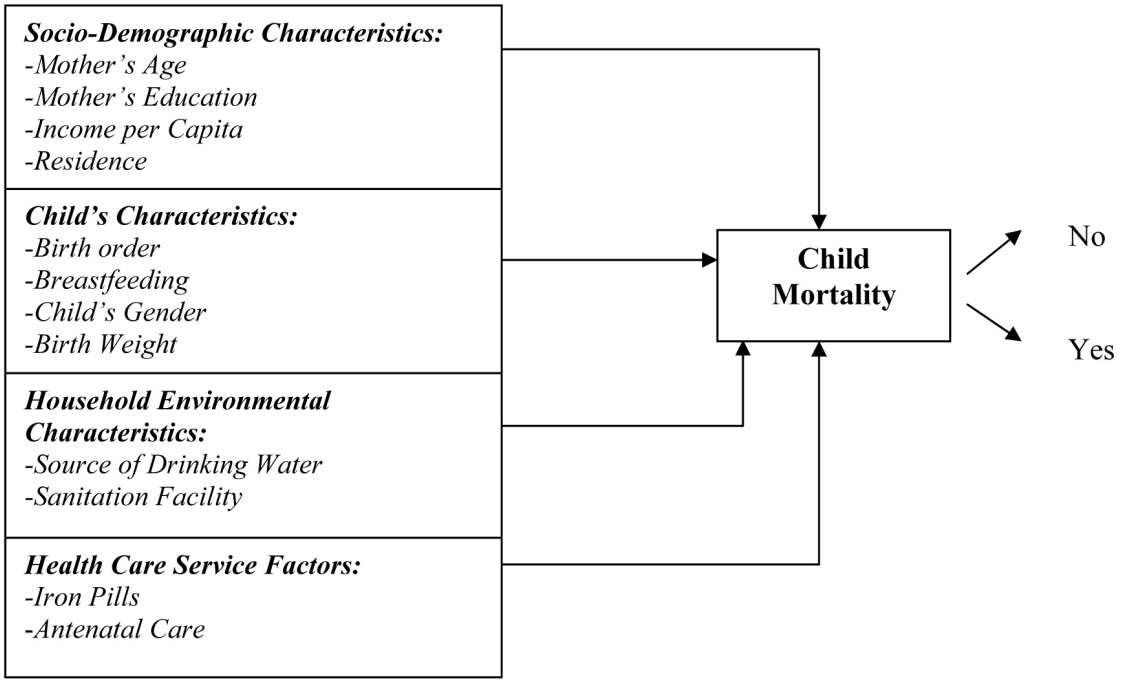
One of the leading factors to child mortality is diarrhea which is caused by inadequate quality and quantity of water and sanitation (WHO, 2011). Safe drinking and non-contaminated water is crucial to child survival because that prevents infectious diseases and diarrhea among children. The number of people who share toilet facilities, and, ways of disposing children's feces all matter in the fact of child mortality.

As for health care services, women are recommended to do at least four antenatal care visits during their pregnancy because that can contribute to child survival, but also on the later outcome of child's health (Goldenberg et al., 1992; Friscella 1995). Interestingly, the fact that daily iron pill intake during and after pregnancy is crucial for avoiding anemia which often results in low birth weight leading to child mortality.

CONCEPTUAL FRAMEWORK

Based on the reviewed theories and studies in the past, the following conceptual framework has been developed for further analysis.

Figure 1: **Conceptual framework of factors affecting child mortality**



DATA SOURCE AND METHODS

This study used a secondary data of 'Reproductive Health Survey 2008 (RHS)' by National Statistical Office of Mongolia. In the RHS, 9,402 women of 15-49 years old and 3,362 husbands were interviewed. Under this study, 3,924 children who were born in the five years prior to the survey were analyzed. There were 51 cases of under-five child mortality among the selected children for the study.

Bivariate analysis was employed to explore relationships between socio-demographic, child, household environmental and health care service factors affecting and child mortality using crosstabulation with Pearson's chi-square test. Binary logistic regression was used to determine odds of independent variables to affect child mortality. STATA 10.0 and SPSS 11.5 statistical software packages were employed to analyze the data of the study.

RESULTS OF THE STUDY

Bivariate analysis

From below Table 1, it can be seen that the mother's age had statistically significant relationship with child mortality ($p \leq 0.05$). Mothers whose age were less than 20 tended to experience child mortality more than two times higher than the mothers whose age were 20-29, and more than 4 times than the mothers whose age were 30 years old and more.

Child ever breastfed had the strongest statistically significant relationship with child survival. There was only 3 per cent of children who never breastfed, but 18 per cent of the total children who never breastfed experienced child mortality ($p \leq 0.001$).

Birth order of the child had statistically significant relationship with child mortality ($p \leq 0.05$). Children born in the order one or four and higher experienced death by 0.78 per cent more than children born in the order two or three.

Table 1: **Crosstabulation between child mortality and selected characteristics**

Characteristics	Child Mortality		Total		Chi-square
	No	Yes	%	N	
Place of residence					4.04
Ulaanbaatar	98.93	1.07	100.00	1,309	
East	99.14	0.86	100.00	347	
West	98.05	1.95	100.00	870	
South	98.71	1.29	100.00	233	
Central	98.80	1.20	100.00	1,165	
Mother's age					10.66*
<20 years	96.48	3.52	100.00	142	
20-29 years	98.38	1.62	100.00	1,909	
30+ years	99.20	0.80	100.00	1,873	
Mother's education					0.83
Uncompleted secondary	98.51	1.49	100.00	1,143	
Complete secondary	98.64	1.36	100.00	1,401	
Tertiary	98.91	1.09	100.00	1,380	
Monthly income per person (₮)					3.74
<102,535	98.51	1.49	100.00	3,017	
≥102,535	99.34	0.66	100.00	907	
Ever breastfed					256.68***
No	81.48	18.52	100.00	108	
Yes	99.19	0.81	100.00	3,816	
Birth order					4.63*
1 & 4+	98.29	1.71	100.00	1,875	
2 - 3	99.07	0.93	100.00	2,049	
Child's gender					4.28*
Male	98.34	1.66	100.00	2,045	
Female	99.10	0.90	100.00	1,879	
Child's weight					19.95***
<2,500 gm	95.03	4.97	100.00	181	
≥2,500 gm	98.88	1.12	100.00	3,743	
Source of drinking water					11.04**
Central/local piped	99.23	0.77	100.00	780	
Well	98.88	1.12	100.00	2,493	
Spring/mineral/rain/snow/river	97.39	2.61	100.00	651	
Sanitation facility					1.07
Non-standard	98.60	1.40	100.00	2,991	
Standard	99.04	0.96	100.00	933	
Iron pill intake					0.18
<90 pills	98.66	1.34	100.00	3,058	
≥ 90 pills	98.85	1.15	100.00	866	
ANC visit *					6.26*
<4 visits	97.18	2.82	100.00	319	
≥4 visits	98.83	1.17	100.00	3,605	
Total				**3,924**	

*Note: *** p≤0.001, **p≤0.01, *p≤0.05*

Another factor that had statistically significant relationship with child mortality was child's gender ($p \leq 0.05$). Male children died more than female children with 0.76 per cent higher.

Child's weight had quite strong statistically significant relationship with child mortality ($p \leq 0.001$). Children who weighed less than 2,500 gm at birth tended to die with 3.85 per cent more than children who weighed more than 2,500 gm.

Another factor that had quite strong statistically significant relationship with child mortality was source of drinking water ($p \leq 0.01$). Households who got their water from central or local pipe had child mortality with 0.35 per cent less than the household who got water from well. However, the percentage of experiencing child mortality among households who got water from central or local pipe was 1.84 per cent less than that of the household who got water from spring/mineral/rain/snow/river.

Antenatal care had statistically significant relationship with child mortality ($p \leq 0.05$). Mothers who had less than four antenatal care visits tended to experience child mortality with 1.65 per cent more than that of those who had more than four antenatal care visits.

Multivariate analysis

For the first model (Table 2), socio-demographic variables were put in the model, and binary logistic regression was run to examine the odds of having child mortality by independent variables. Interestingly, place of residence as regions had no statistically significant effect on child mortality regardless of socio-economic disparities and shortage of health care facilities in rural areas. In Mongolia, all regions except for Ulaanbaatar the capital city are considered as rural areas. However, mothers lived in Eastern region were more likely to experience child mortality 15% more than that of the mothers lived in Ulaanbaatar the capital city. The odds ratio of having child mortality in Western region was 1.78 times more, whilst the odds of child mortality in Southern and Central regions were 1.1 and 1.0 times more than that of the mothers in Ulaanbaatar. As for ages, mothers aged 30 years old or more were 79 per cent less likely to experience child mortality than those who aged less than 20 years old at $p \leq 0.01$ level. Mothers who aged between 20 and 29 had no statistically significant impact on child mortality; but, the odds of experiencing child mortality for this age group of mothers comparing to the age group of less than 20 years old were 55 per cent lower. Neither monthly income per person nor mother's education had a statistically significant relationship with child mortality.

Table 2: **Odds ratios and regression coefficients for child mortality by selected characteristics**

Characteristics	*Model 1*		*Model 2*	
	OR	*B*	*OR*	*B*
Place of residence (ref=Ulaanbaatar)				
East	0.85	-0.15	0.79	-0.23
West	1.78	0.58	0.94	-0.05
South	1.10	0.09	1.43	0.35
Central	1.04	0.03	0.81	-0.20
Mother's age (ref=less than 20 years)				
20-29 years	0.45	-0.79	0.46	-0.77
30 and more years	0.21**	-1.53	0.19**	-1.61
Mother's education (ref=uncompleted secondary)				
Complete secondary	1.08	0.07	1.19	0.17
Tertiary	1.11	0.11	1.16	0.14
Monthly income per person (₮) (ref=less than 102,535)				
More than 102,535	0.48	-0.72	0.65	-0.42
Ever breastfed (ref=no)				
Yes	------	------	0.04***	-3.22
Birth order (ref=1 & 4 and above)				
2-3			0.74	-0.30
Child gender (ref=male				
Female			0.52*	-0.65
Child weight (ref=less than 2,500 gm)				
More than 2,500 gm **			0.29**	-1.22
Source of drinking water (ref=central/local piped				
Well			1.47	0.39
Spring/mineral/rain/snow/river			3.35	1.12
Sanitation facility (ref=non-standard				
Standard			1.18	0.18
Iron pill intake (less than 90 pills				
More than 90 pills			0.68	-0.38
ANC visit (ref=less than 4 visits				
More than 4 visits			0.64	-0.45
LR chi-square		16.71*		115.25***
Pseudo R^2 (Cox and Snell)		0.03		0.21

*Note: *** p≤0.001, **p≤0.01, *p≤0.05*

However, when looked at the odds ratio of monthly income per person, the odds of having child mortality was 52 per cent lower for those who had more than 102,535₮ month than those who had less than 102,535₮. As for child mortality by mother's education, those who had complete secondary and tertiary education experienced child mortality 1.1 times lower than those who had incomplete secondary education did.

For the second model, all other independent variables were added into the model. This time Pseudo R^2 increased from 0.03 in the previous model to 0.21, as well as LR chi-square increased dramatically from 16.71 in the first model to 115.25 in the second model. The result of odds ratio logistic regression was that a child whose mother's age was 30 years old or more was 81 per cent less likely to experience child mortality than the child whose mother's age was less than 20 years old at $p \leq 0.01$ level. None of place of residence as regions, monthly income per person and mother's education had a statistically significant impact on child mortality. However, in the model two, the size of the odds of mothers experiencing child mortality in Western province decreased by two times from that of in the previous model.

Breastfeeding had the most statistically significant impact on child survival. Odds of child mortality for those who ever breastfed were 96 per cent lower than that of those who never breastfed. Birth order did not statistically significantly associate with child mortality. Birth order of the child did not have statistically significant impact on child mortality. Compared to those children who weighed less than 2,500 gm, odds of not dying for those who weighed more than 2,500 gm were 71 per cent lower. Gender of child was statistically significant to child mortality; a female child was 48 per cent less likely to die than a male child.

Neither source of drinking water nor sanitation facility had a statistically significant relationship with child mortality. Compared to those who got their water from central and local pipe, those who got from well had odds of having child mortality were 1.47 times higher, while those whose drinking water source from spring/mineral/rain/snow/river experienced child mortality 3.35 times higher than the former. The odds of child mortality for a mother without a standard sanitation facility were about 1.2 times higher than that of a mother with standard sanitation.

Health care service mothers received during their pregnancy did no have statistically significant impact on child mortality. However, the odds of child mortality for those mothers who had more than four antenatal care visits were 36 per cent lower than for those mothers who had less than four antenatal care visits. Mothers who took more than 90 iron pills a day were 32 per cent less likely to experience child mortality than those who took less than 90 iron pills a day.

DISCUSSION

There is a big difference in terms of socio-economic disparity and availability of health facility between Ulaanbaatar the capital city and other regions that are considered as rural areas (MoH, 2005; Hill, Dodd et al., 2006). Ironically, place of residence had neither statistically significant relationship with nor impact on child mortality. It was found that cases of child mortality happened to the mothers whose age were less than 20 years old; and this finding was consistent with experts' observation about J shape relationship between child mortality and mother's age (Bongaarts, 1987; Davis, 1988; Sullivian et al, 1994). Only a quarter of the mothers had monthly income per capita more than 102,535 ₮; however, the income did not have any significant impact on child mortality which was different than the views about the fact that income had direct impact on child mortality (Kabubo et al., 2006; Mahgoub et al., 2006). Even though there was no statistically significant impact of mother's education on child mortality, the inverse relationship between mother's education and child mortality was observed in the result which was common finding the experts (Caldwell, 1979; Cochrane, 1980). Birth order 1 and 4 and higher had significant relationship with child mortality which was supported by other studies (Ahmed, 1986; Bongaarts, 1987). However, later on when the variable put in the model, birth order turned out not to have statistically significant impact on child mortality. Similarly source of drinking water had significant relationship with child mortality, especially those mothers whose source of drinking water was from mineral/spring/river/snow/rain experienced more child mortality because this

type of water is not from protected areas, thus might cause infection and diarrhea. The researcher expected sanitation facility would show some significant relationship with child mortality because non-standard sanitation facility may cause infectious disease and diarrhea as well. Finding from antenatal care conformed with other studies (Goldenberg et al., 1992; Friscella 1995) showing statistically significant relationship with child mortality; however, there was no statistical impact of ANC on child mortality from logistic regression in this study.

CONCLUSION

In this study, factors affecting child mortality were examined from total of 3,924 children who were born as last child in the preceding five years before the survey took place. As a result of binary logistic regression, the factor of ever breastfed had the strongest relationship with and impact on child mortality. There was only 3% of children who never breastfed, but 18 per cent of the total children never breastfed experienced child mortality. Furthermore, those who never breastfed were 96 per cent more likely to die than those who ever breastfed were. Another determining factor that had impact on child mortality was mother's age. Children born to mothers less than 20 years old died more than the children born to other age cohorts of mothers. This result was similar to J shape that the researchers had found in terms of relationship between mother's age and child mortality (Bongaarts, 1987; Davis, 1988). The factor of child's gender had impact on child mortality. Male children experienced more mortality than female children which could be due to the conventional fact that the girls are biologically stronger than boys. One of the strongest factors that affected child mortality was child weight at birth; i.e., children who weighed less than 2,500 gm at birth tended to die more than those weighed more than 2,500 gm did (McCormick, 1985; Kiely & Susser, 1992).

The main limitations of this study were, firstly, very little number of child mortality, secondly, no break down of categories on source of drinking water which could have statistically significant impact on child mortality.

RECOMMENDATION

The fact of whether a child ever breastfed or not had the highest impact on child mortality according to this study. Therefore, awareness raising activities, promotions, and IEC about benefits and importance of breastfeeding should be carried out for pregnant women through family clinic doctors during antenatal care visits, as well as at clinic and community centers. Policy makers, GOs and NGOs should pay more attention to strengthen the family planning programs to delay childbearing during very young ages (less than 20 years) which often results in low birth weight. Future researchers should aim to collect birth history of women in full, not as truncated, so that one may carry out comprehensive analysis of factors affecting child mortality, and produce effective and targeted recommendations to the policy makers.

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