Determinants of Infant and Child Mortality in Mongolia

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Introduction

Since the turn of the century infant and child mortality in more developed ountries has steadily declined and at the present time it has been reduced to less than 10 deaths per 1000 births in many of these countries. Most developing countries have witnessed considerable decline in mortality levels since World War II. However, the rate of decline has decelerated since the 1970s.

Numerous studies have been conducted in African, Latin American and Asian countries using available data from WFS and DHS in order to explain the slow-down trend in mortality decline. They revealed that, apart from health interventions, socioeconomic, biodemographic and environmental factors play an important role in the decline of infant and child mortality in these countries (see for example Caldwell, 1979; Rutstein, 1983; Hobcraft et al., 1984; Palloni and Millman, 1986).

This kind of study is new for Mongolia, because very little is known about the differentials and determinants of infant and child mortality in the country. The only paper, written by Neupert (1995), gives us a general idea about the levels and main possible determinants of early age mortality in Mongolia. According to his estimation the infant mortality rate is 92 deaths per 1000 births and under-five mortality is 136 per 1000, and during the past two decades early-age mortality has declined by only 10 per cent (Neupert, 1995). Neupert also mentioned the main possible determinants of early age mortality in Mongolia; however, the paper is based only on macro-level information and analysis.

More comprehensive study is needed in order to assess the degree to which national development policies and strategies can be related to the trends in infant and child survival. Also there is a need to identify the most vulnerable groups, who appear to have been left behind, or are lagging in participation in the benefits accruing from social and economic development.

This study has three objectives: first, to investigate the differentials of infant and child mortality by socioeconomic, demographic and environmental characteristics; second, to identify the main possible determinants that affect the level of infant and child mortality; and third, to discuss policy implications.

Data source and methodology

The study utilises data from the 1994 Demographic Survey of Mongolia (DSM) which was conducted during the period August to December 1994 by the Mongolian National University with the technical assistance of the United Nations Fund for Population Activities. The main objective of the survey was to provide information on the levels and patterns of fertility, infant and child mortality, fertility preferences, and family planning.

The sample design adopted for the survey was a multistage stratified, clustered and random sample of households and individuals. The sample covers 1763 households, out of which 2030 women and 1026 men in the age range of 15-49 were chosen. For this study 4685 children were taken from the birth history data for women.

The data from the DSM has several limitations. First of all, it has a relatively small sample size, which constrains some detailed analysis. Due to the limited data available from the survey, this study is limited only to socioeconomic, demographic and environmental factors that affect the level of infant and child mortality. Data was not available on some important issues, such as access to health services and nutritional status among mothers and children.

The dependent variable in this study was survival status of infant and child. This was a dichotomous variable consisting of two categories: alive or dead. Infant mortality was measured as a death under the age of one, and child mortality was measured as death between age one and five.

Various socioeconomic, demographic and environmental variables that have been believed to have an effect on the level of infant and child mortality were taken as independent variables. Socioeconomic variables were measured at three levels: individual level (mother's education and mother's employment status), household level (availability of consumer goods in the household, number of cows owned by the household), and community level (place of residence). At the individual level, only mother's characteristics were taken as an indicator of socioeconomic status, because father's characteristics were not available in the data set.

Age of mother at birth, birth order of the child, sex of the child and birth cohort of the child were considered as demographic variables that affect infant and child mortality. From environmental variables, the type of housing and type of water supply have been studied. The study assumes that all three groups of independent variables, namely socioeconomic, demographic, and environmental, have an independent effect on the level of infant and child mortality.

The nature and strength of the relationship between dependent and independent variables have been studied using univariate and bivariate analysis. Multivariate analysis was applied in order to observe the simultaneous effect of independent variables on infant and child mortality. For assessing the relative importance of independent variables in relation to infant and child mortality, logistic regression analysis was used. Births before 1972 were excluded from the study in order to avoid recall errors.

Background characteristics of the study population

As mentioned before, 4685 children were taken from birth history data for women; 25.9 per cent of them were from Ulaanbaatar[1], 24 per cent from aymak centres[2] and 50.1 per cent from rural areas. The sex ratio of children was 100 females to 102 males.

With respect to age structure of mother, it was similar in urban and rural areas. However, the percentage of mothers having primary or less education was much higher in rural areas than in aymak centres or Ulaanbaatar. It was 18.6, 5.7, and 4.6 per cent in rural areas, aymak centres, and Ulaanbaatar respectively. The total fertility rate was 4 children per woman in rural areas and 3.4 children per woman in aymak centres. However, this rate was lower in Ulaanbaatar, with only 2.8 children per woman.

More than 60 per cent of mothers in the study population were in the category of not employed. This percentage was much high in rural areas (76.5 per cent). As with the employment status of mothers, more than 60 per cent of mothers did not receive any salary. Rural mothers tended to have much lower salary than urban mothers. The percentage of mothers whose monthly salary was 10000 tygric[3] or more was only 6.2 per cent in rural areas, 14.8 and 28.9 in aymak centres and Ulaanbaatar respectively.

According to the survey, 45.1 per cent of the study population had a refrigerator in their households. This percentage ranges between 11 and 79.4 according to their place of residence. The percentage of households using electric stove was 49.3 per cent for the whole sample and 25.7, 56.7 and 71.7 for rural areas, aymak centres, and Ulaanbaatar respectively.

According to the results from the study, *ger*[4] is the universal housing type in rural areas. Almost 95 per cent of rural population live in *ger* or wooden house (but the percentage living in wooden houses is very small); the percentage decreases to 31.3 per cent in *Ulaanbaatar*. Basically all population in rural areas use water from rivers, wells or springs. However, more than half of the *Ulaanbaatar* population use a centralised cold or hot water system. The percentage using centralised cold or hot water system in *aymak* centres was 19.1 per cent.

Socioeconomic determinants

First, the relationship between various socioeconomic variables and the level of infant and child mortality has been examined. Among socioeconomic determinants mother's and father's education, mother's and father's occupation, household income, and the place of residence were found to be the most important in other countries (for example, Omran, 1981; Rutstein, 1983; Hobcraft et al., 1984; Caldwell, 1979; Arriaga, 1980). In general, in higher socioeconomic status groups with higher income and wealth the infant and child mortality was found to be found lower than in groups with lower income and wealth. This could probably be explained by the fact that with the increase in income, individuals and families improved their access to a list of goods and services and other consumer assets that are essential for child survival, such as food, housing, clothing, and sickness care (Mosley and Chen, 1984).

Table 1: Infant and child mortality rates by socioeconomic characteristics Mongolia, 1972-1994

Variables	Number of births	Infant mortality rate	Child mortality rate	Cramar's V for infant mortality	Cramar's V for child mortality
Individual level	1	2	3	4	5
Education of mother				0.118***	0.060***
Primary or less	864	151.6	37.0		
Grade 4-8	1111	108.9	28.8		
Grade 9-10 or higher	2367	73.9	15.2		
Employment status of mother (salary in tygric)				0.052**	0.049**
No salary, not employed	2361	111.0	28.4		
Employed with less than 10000 tygric	1361	87.4	12.5		
Employed with 10000 or more tygric	516	67.8	25.2		
Household level					
Cows owned by hh				0.065	0.041
No cows	1589	86.9	17.0		
Less than 10	1408	110.1	24.2		
Less than 20	708	127.1	33.9		
20 or more	452	77.4	28.8		
Consumer goods				0.087***	0.051*
Have fridge and el/stove	1220	64.8	11.5		
Have one of them	1074	87.5	23.3		
Have none of them	2051	124.3	29.7		
Community level					
Place of residence				0.048**	0.038*
Rural	2200	110.9	27.7		
Aymak centre*	1047	92.7	22.9		
Ulaanbaatar	1089	77.1	13.8		

Notes: hh- household
        el/stove-electric stove
         * = Significant at p.05.
        ** = Significant at p.01.
        ***= Significant at p.001.
Source: Computed from Demographic Survey, Mongolia, 1994.

In the case of Mongolia the social inequalities were expected to be at a minimum, because for many years the government's policy was directed to create an extensive network of social services that are accessible to all groups of population. However, the results from bivariate analysis (table 1) between socioeconomic variables and the levels of infant and child mortality are rather puzzling. Contrary to what one would expect, there are surprisingly high inequalities among different socioeconomic groups of the population in terms of the level of infant and child mortality. For example, the level ranges between 67.8 and 111.0 infant deaths per 1000 live births and between 12.5 and 28.4 child deaths per 1000 live births respectively for the variable 'employment status of mother. Among mothers with a monthly salary of 10000 *tygric* or more the level of infant and child mortality was the lowest and among not employed mothers with no salary the level was the highest.

The variable 'availability of consumer goods', which has been used to indicate the level of socioeconomic well being of a household, also had a significant effect on the level of infant and child mortality. Households using consumer goods, such as a refrigerator and electric stove, have much lower infant and child mortality than households not using them. The large differences in the level of infant and child mortality which have been observed in examining the variable 'availability of consumer goods' can possibly be attributed to greater family purchasing power and higher living standards, and the prevention of microbial contamination of weaning foods due to refrigeration and electric cooking.

The variable 'number of cows owned by household', which has been used also as an indicator of the general well being of the household, does not have any significant relationship with infant and child mortality. This was even true after separate study by urban and rural place of residence.

The education of the mother is probably one of the most often used socioeconomic variables in studying child survival (Cleland, 1990; Caldwell, 1979, 1981, 1986; Caldwell and McDonald, 1981; Cochrane et al., 1980; Martin et al., 1983). In general, the literature shows that the higher the level of mother's educational attainment, the lower the risk of her children dying. The independent effect of maternal education on child mortality was strongly emphasised by Caldwell; he argued that '..education serves two roles: it increases skills and knowledge as well as the ability to deal with new ideas, and provides a vehicle for the import of different culture' (Caldwell, 1979:409). He also argues that education makes women less 'fatalistic' about illness and more capable of manipulating the modern world; it also changes the traditional balance of familial relationships with a profound effect on child care.

Women's education in Mongolia is high compared to many other developing countries; the level is similar to the level in countries with significantly lower under-five mortality rates. According to official statistics, 90 per cent of adult women are literate and more than one-third of women have completed secondary education (State Statistical Office of Mongolia (SSOM), 1994). As a result of the high educational level among women, they have had a high degree of participation in the labor force. The policy of encouraging women to work while at the same time encouraging large families could have detrimental effects on maternal and child health.

Table 1 shows that the education of the mother had the strongest and most significant effect on the level of infant and child mortality in Mongolia. A surprising fact was that the level of infant and child mortality was generally high among all educational groups; not surprisingly it was highest among mothers with primary or lower educational level. Moreover, the difference in the level of mortality between the lowest and highest educational groups is quite large, which suggests that with an increase in the level of mother's education, the infant and child mortality could be reduced.

As expected, the level of infant and child mortality was found to be higher in the rural areas than in urban areas or cities. The urban and rural differences are likely to be related to the concentration of such medical and health provisions as hospitals, physicians, water supply, and sanitation in urban areas (United Nations, 1982). The socioeconomic status of population

is also generally higher in urban than rural areas because of higher income and better opportunities. *Ulaanbaatar* had the lowest level of infant and child mortality, whereas the rural areas had the highest level (table 1). However, the reverse was true when households had a consumer item and mothers had education of grade 4-8 and a salary of 10000 *tygric* or more.

Demographic and environmental factors

Table 2 shows the results from the bivariate analysis between demographic and environmental variables and infant and child mortality. In many studies maternal factors related to infant and child mortality generally include the age of mother at birth, the birth interval, and the birth order of the child. Young maternal age, a short birth interval, and first order births or births beyond the fourth or fifth order have especially detrimental effects on infant and child survival (Mosley, 1983; Rutstein, 1983; Hobcraft, 1992; Hobcraft et al., 1985; Palloni and Millman, 1986).

The age of the mother at birth had a significant relationship with infant mortality in Mongolia. The relationship between age of mother at birth and the level of infant mortality is U shaped. It was high among mothers aged 15-24; then it decreases, but it increases again in the age group 35-49 years.

The study suggests that the effect of birth order on the level of infant mortality was statistically not significant in Mongolia. The sex of the child had a very significant effect on the level of infant mortality. This can be explained by the fact that, biologically, a male child is more exposed to the risk of dying than a female child. However, further study is needed in order to explain the large difference in the level of infant mortality between the two sexes.

The above mentioned variables, namely age of mother at birth, birth order and sex of the child however, did not have any significant relationship with the level of child mortality in Mongolia. Among the demographic variables, only the birth cohort of the child had a significant relationship with child mortality. Children born during the period 1989-1994 had the lowest level of child mortality.

Another group of variables which has been believed to have an effect on the level of infant and child mortality in Mongolia is environmental variables. The results can be seen from table 2. From the literature it is clear that the degree to which a child is exposed to infectious agents depends on the quality of the environment. Therefore, a household with inadequate means of human-waste disposal contributes an added risk to the child. Food and drinking water are more likely to be contaminated under poor environmental conditions. Studies in Malaysia (Da Vanzo et al., 1983); Sri Lanka (Trussell et al., 1983); and Brazil (Merrick, 1985) have found links between the source of household water and type of toilet facility and the risk of child mortality. Some studies suggest that the number of rooms occupied by the household has a strong effect on the level of infant and child mortality (Kim,1974). This can probably be explained by the fact that the degree of prevalence of acute respiratory diseases is very high in a crowded environment.

Environmental factors are expected to be found very relevant for Mongolia, because housing and sanitary conditions for the vast majority of the population are unsatisfactory. People in Mongolia live in two types of dwelling: apartments and *ger*. A very small proportion of the population lives in wooden houses. People living in apartment blocks have full services including a centralised cold or hot water supply and central heating system. However, people living in *ger* areas do not have adequate public services such as a supply of piped water, sewage disposal and modern toilet facility with flushing.

They also have the problem of crowding into one single room, so transmission of airborne bacteria is very easy. As expected, the people living in *ger* areas had very high infant

and child mortality (table 2). People using spring/well or river water also had a much higher rate of infant and child mortality than people using a centralised cold or hot water system (table 2).

Table 2: Infant and child mortality rates by demographic and environmental factors, Mongolia, 1972-1994

Variables	Number of births	Infant mortality rate	Child mortality rate	Cramar's V for infant mortality	Cramar's V for child mortality
Demographic variables	1	2	3	4	5
Age of mother at birth (years)				0.039*	0.019
15-24	2009	110.0	25.88		
25-34	2035	86.0	20.15		
35-49	308	103.9	22.73		
Birth order				0.048	0.026
1	1190	81.51	17.65		
2 or 3	1602	102.37	25.59		
4 or 5	890	94.38	21.35		
6 or more	676	125.74	28.11		
Sex of the child				0.061***	0.017
Male	2202	116.26	25.43		
Female	2154	80.32	20.43		
Birth cohort of the child				0.032	0.068*
1972-1976	547	111.52	14.63		
1977-1982	1030	111.65	38.83		
1983-1988	1328	91.87	24.85		
1989-1994	1453	90.85	13.08		
Environmental variables					
Type of housing				0.059**	0.028
Wooden house or ger	3305	108.32	25.42		
Apartment	1028	67.12	15.56		
Type of water supply				0.048**	0.019
Central cold or c/hot	617	63.21	19.45		
Spring/well river/show	3728	104.35	23.61		

Notes: As for table 1.
Source: Computed from the Demographic Survey, Mongolia, 1994

Further analysis

Next, the analysis examined the simultaneous effect of some socioeconomic, environment and demographic variables on the level of infant and child mortality. First, the mother's individual characteristics were controlled by the mother's age at birth in order to examine whether the effect of these variables is significant or not in all age groups of mothers (table 3). When mother's education was controlled by mother's age at birth, the effect of mother's education appears to have remained significant in all age groups (table 3). However,

when the mother's employment status was controlled by the mother's age at birth, the effect of the variable 'employment status' was reduced to insignificance except in the age group 15-24.

Table 3 : Infant mortality rates by mother's individual characteristics controlling for age of mother at birth, Mongolia, 1994

| | Age of mother at birth | | | | | |
| | 15-24 | | 25-34 | | 35-49 | |
Educational status	Number of births	Infant mortality rate	Number of births	Infant mortality rate	Number of births	Infant mortality rate
Primary or lower	268	197.8	457	126.9	139	143.9
Grade 4-8	553	121.2	486	98.8	71	84.5
Grade 9-10 or higher	1180	84.8	1085	61.8	97	61.9
Cramar's V		0.122***		0.097***		0.121*
Employment status of mother salary in *tygric*						
Not employed, no salary	1229	126.9	986	94.3	144	83.3
Employed with less than 10000	498	80.3	734	87.2	125	112
Employed with 10000 or more	242	78.5	249	48.2	25	-
Cramar's V		0.073**		0.052		0.074

Notes: - = Rates based on 5 or less deaths
        * = Significant at p.05.
        **=Significant at p.01.
        ***=Significant at p.001.
Source: Computed from the Demographic Survey, Mongolia, 1994

Then, the simultaneous effect of mother's individual characteristics and the place of residence was examined (table 4). The effect of mother's education still remained unchanged after controlling for place of residence. Although there were differentials in the level of infant and child mortality by mother's employment status after controlling for place of residence, its effect became insignificant again. Therefore, it can be concluded that the mother's educational level plays a more important role in reducing infant and child mortality than the employment status.

One problem is that the simultaneous effect of socioeconomic, demographic and environmental variables on the level of child mortality could not be examined properly due to the small sample size, which leads to sampling error. Availability of consumer goods in the households also had a large independent effect on the level of infant and child mortality in Mongolia. This became clear after controlling this variable by the place of residence (table 5). Important finding in this regard is that rural households with consumer goods, such as

refrigerator and electric stove had much lower infant and child mortality rates than their urban counterparts.

Table 4: Infant and child mortality rates by mother's individual characteristics controlling for place of residence, Mongolia, 1994

	Rural areas			Aymak centres			Ulaanbaatar		
Educational status	Number of births	Infant mortality rate	Child mortality rate	Number of births	Infant mortality rate	Child mortality rate	Number of births	Infant mortality rate	Child mortality rate
Primary or less	684	152.1	38.0	111	153.2	45.1	69	144.9	-
Grade 4-8	708	96.1	25.4	235	106.4	42.6	156	166.7	-
Grade 9-10 orhigher	800	87.5	21.3	696	77.6	12.9	861	55.8	11.6
Cramar's V		0.091***	0.043*		0.084*	0.096**		0.159***	0.042*
Employment status of mother									
Not employed, no salary	1520	115.1	33.8	481	99.8	22.9	344	107.6	-
Employed with less than 10000 tygric	468	111.1	-	421	87.9	21.4	467	57.8	-
Employed with 10000 or more tygric	125	40.0	-	139	86.3	-	251	71.7	27.9
Cramar's V		0.056*	0.667***		0.022	0.016		0.082*	0.066

Notes: As for table 3

Source: Computed from the Demographic Survey, Mongolia, 1994

Table 5: Infant and child mortality rates by availability of consumer goods controlling for place of residence, Mongolia, 1994

	Rural areas			Aymak centres			Ulaanbaatar		
Availability of consumer goods	Number of births	Infant mortality rate per 1000	Child mortality rate per 1000	Number of births	Infant mortality rate per1000	Child mortality rate per 1000	Number of births	Infant mortality rate per 1000	Child mortality rate per 1000
Fridge and electric stove	217	55.3	-	409	70.9	14.7	591	60.9	8.5
One of them	415	89.2	16.9	289	86.5	34.6	366	84.7	21.9
None of them	1568	124.4	32.5	349	123.2	22.9	129	124.0	-
Cramar's V		0.073**	0.046**		0.078*	0.054*		0.078*	0.053*

Notes: As for table 3
Source: Computed from the Demographic Survey, Mongolia, 1994

Although there were differentials in infant mortality rates by type of housing and type of water supply after controlling by place of residence (table 6), the relationship was statistically not significant, which suggest the differentials observed in these variables could mainly be attributed to the different level of socioeconomic development in urban and rural areas.

Table 6: Infant mortality rates by type of housing, type of water supply controlling for place of residence, Mongolia, 1994

Type of housing	Rural areas		Aymak centres		Ulaanbaatar	
	Number of births	Infant mortality rate (1000)	Number of births	Infant mortality rate (1000)	Number of births	Infant mortality rate (1000)
Wooden house or ger	2090	112.9	798	100.3	409	95.4
Apartments	101	69.3	246	69.1	677	65.0
Cramar's V		0.031		0.046		0.056
Type of water supply						
Central cold/hot	6	-	165	54.6	442	65.6
Spring/well/river	2194	111.2	882	99.8	644	83.9
Cramar's V		0.019		0.057		0.034

Notes: As for table 3

Source: Computed from the Demographic Survey, Mongolia, 1994

Multivariate logistic regression analysis

Logistic regression analysis was applied in order to examine the relative importance of each variable that had a significant relationship with the level of infant and child mortality. With respect to infant mortality, the most significant association was observed with mother's education, availability of consumer goods in the household, age of mother at birth, and sex of the child. Mother's education, availability of consumer goods in the households, and the birth cohort of the child had the most significant relationship with the level of child mortality. The place of residence had a significant association with infant and child mortality, and it was generally higher in rural than in urban areas. However, this association was not monotonic in all cases. For example, in the situation where rural households had higher socioeconomic status the infant and child mortality was lower than in urban areas. Therefore, the variable 'place of residence' was not included in the logistic regression analysis.

The results from the logistic regression analysis are shown in table 7 and 8. Infants born to mothers with educational level of primary or lower were almost two times more likely to die than the infants born to mothers with education of grade 9-10 or higher. Infants whose mothers had education of grade 4-8 were 1.33 times more likely to die than the infants who were in the reference category.

With respect to age of mother at birth the highest risk of her child dying was in the age group 15-24. Female infants were 0.68 times less likely to die than male infants. Infants born in households with one (either refrigerator or electric stove) consumer item were 0.82 times less likely to die than infants born in households with none. The highest chance of surviving for infants was observed in the households with both consumer items.

Table 7: Logistic regression of the effect of selected independent variables on the level of infant mortality, Mongolia, 1994

Variables	Logistic coefficient	Odds ratio
Education of mother		
Grade 9-10 or higher	-	1.00
Grade 4-8	0.2874*	1.33
Primary or lower	0.7121***	2.04
Age of mother at birth		
15-24	-	1.00
25-34	-0.3295**	0.72
35-49	-0.3334	0.72
Sex of the child		
Male	-	1.00
Female	-0.3854***	0.68
Availability of consumer goods in the household		
None of them	-	1.00
One of them	-0.2041	0.82
Fridge and electric stove	-0.4056**	0.67
Constant	-0.2.2843	
Model chi-square	76.3810	
Degrees of freedom	7	
Number of cases	4278	

Note: Reference category is in parentheses
      * = Significant at p.05.
      ** = Significant at p.01
      ***= Significant at p.001.
        Source: Computed from the Demographic Survey, Mongolia, 1994.

With respect to child mortality, the lowest chance of a child surviving was observed among mothers with an educational level of primary or lower. The chance of surviving increased with the increase in the mother's educational level. Where households had both consumer items, the chance of surviving of a child was twice as high as in the households with no consumer goods. Children born during the period 1989-1994 had the highest chance of surviving.

Findings and discussion

One of the important findings of this study is the identification of certain determinants associated with infant and child mortality in Mongolia. There are large inequalities in terms of the early age mortality among different groups of population. This is unexpected and rather puzzling, because the policy of the government has been directed at keeping social disparities at a minimum level for many years.

Another important finding from the study was that the general level of infant and child mortality was quite high in Mongolia. The level was high even among groups that were expected to have a much lower rate of infant and child mortality. For example, among mothers with an educational level of grade 9-10 and living in urban places the level was 55.8 per 1000 live births and the level of child mortality for this group of mothers was 11.6 per 1000 live births.

Table 8: Logistic regression of the effect of selected independent variables on the level of child mortality, Mongolia, 1994

Variables	Logistic coefficient	Odds ratio
Education of mother		
Grade 9-10 or higher	-	1.00
Grade 4-8	0.3480***	1.42
Primary or lower	0.5051*	1.66
Availability of consumer goods in the household		
None of them	-	1.00
One of them	-0.0888	0.92
Fridge and electric stove	-0.7366*	0.48
Birth cohort of the child		
1972-1976	-	1.00
1977-1982	1.0042	2.73
1983-1988	0.5785*	1.79
1989-1994	-0.0754***	0.93
Constant	-3.8990	
Model chi-square	36.6810	
Degrees of freedom	7	
Number of cases	4278	

Notes: As for table 7.

Source: Computed from the Demographic Survey, Mongolia, 1994

This level is much higher than the average level in countries with a similar level of socioeconomic development, for example in China or in Cuba which have under-five mortality rates of 43 and 11 per 1000 live births respectively (UN, 1990).

The above mentioned facts suggests that the level of early-age mortality in Mongolia is not consistent with the country's degree of social development and the level of women's education. The same conclusion was made in Neupert's study (1995). The unexpectedly high level of infant and child mortality in Mongolia is probably attributable to deficiencies in health service practice in Mongolia. Proper utilisation of health services has often been found to be one of the important proximate determinants in early-age mortality in different countries (Gubhaju, 1984) and this factor seems to be important for Mongolia too.

Mongolia seems to have an extensive health care system throughout the country and for many years the country was proud of its health indicators, such as doctor to patient ratio and beds per 10000 population. However, these indicators may not have much relevance to the country's field reality. According to Huque (1994) there are two major problems in the Mongolian health care system: access to health services and quality of health care. With

respect to access to services the following figures are enough to describe the reality: on average one doctor per 250 square kilometre, and the distribution of medical doctors is highly skewed, with more than 50 per cent of doctors working in *Ulaanbaatar*, where only 25 per cent of the country's population live.

In remote *bag*[5], sometimes in *somon* centres[6], just one doctor is assigned to treat every case and most often they do not have surgical capabilities. So, even if mothers and children reach the health facilities, sometimes the quality of care given to them may not be adequate. Very often inaccurate diagnosis and inappropriate treatment can be observed in rural areas.

Another important drawback in the Mongolian health care system was discussed by Neupert (1995). He argued that the problem in the Mongolian health care system is mainly associated with the fact that most Mongolians perceive modern health care system exclusively in curative terms and not with regard to disease prevention (Neupert, 1995).

For 70 years during the socialist regime the health sector has provided free medical services to the whole population, and individuals could get their full payment in the case of sickness. In this situation people did not feel responsible for their health, and most of them did not follow basic preventive measures, such as proper diet, exercise, and good hygienic practice. The health system appears to have done very little with regard to health prevention and promotion activities.

During the transition to a market economy, the government policy has been directed at providing free health services to the whole population. Simultaneously, the government encourages private and co-operative practices by medical doctors. The government plan is to move gradually from free health services to a health insurance scheme. However, it is not an easy task, and the health sector is facing problems with management expertise, co-ordination and lack of resources. Very recently the implementation of a new health insurance policy started, under which government organisations and private companies have to pay for hospitalisation for their employers. However, at this stage the situation is very complicated, and it is difficult to predict the coverage of the health insurance scheme and the quality of services.

Conclusions

Findings from the study suggest that the general level of infant and child mortality in Mongolia is high by contemporary standards and there are certain socioeconomic, demographic and environmental factors that affect the level of infant and child mortality in Mongolia. Therefore, the policy of the government has to be aimed at reducing the general level of infant and child mortality. Priority should be given to the groups identified in this study as vulnerable groups having high rates of infant and child mortality. The health policy, which is directed at reducing infant and child mortality has to take into account several components.

Firstly, promoting education, especially health education among mothers, may prove to be one of the most cost-effective measures. In a country with high level of education of women it would be easy to carry out an educational campaign aimed at promoting preventive measures, proper diet, and better hygienic practices. The health sector could develop these promotional programs jointly with the educational sector.

Secondly, effective government development programs aimed at improving environmental conditions, particularly public hygiene in urban *ger* areas and rural areas will greatly reduce infant and child mortality. These should take into account improving sewage disposal systems, toilet facilities, and improving the water supply in these areas. The government needs to allocate resources for investment in public-health- related projects to be carried out by the health sector jointly with the housing and agriculture sector.

Thirdly, improvement in living standards of the population can reduce infant and child mortality. Small business opportunities need to be greatly encouraged in order to increase income, thus the general well-being of the population.

Fourthly, the use of family planning services and an educational campaign with respect to these services still need to be greatly encouraged in order to avoid pregnancies in the high-risk age groups (15-24 and 35+ years). Well-organised family planning services and their integration with other maternal and child health services could be one possible way of promoting health education among mothers.

Finally, the current health policy based on extension of curative medicine services needs to be reformulated in order to take into consideration more preventive health measures using the limited resources available. In particular, the government needs to take into account more qualitative measures rather than quantitative expansion of the health care system; for example, the current health insurance policy scheme needs to be improved. According to the current scheme, the insurance policy involves hospitals on one side and government organisations and private companies on the other. However, in a situation where there is current high unemployment, many unemployed people and people not seeking for jobs are left outside of this policy. Therefore, improvement in the health insurance policy needs to take into account more individual or personal involvement.

Footnotes

1. *Ulaanbaatar* is the capital city of Mongolia.
2. An a*ymak* is a province and *aymak* centre is a province capital. There are 18 *aymaks*.
3. *Tygric* is the Mongolian currency. 1 US $ is approximately 400 *tygrics*.
4. A g*er* is a portable single-room round tents, usually made of felt, which can accommodate a family of four to eight.
5. A *bag* is the smallest administrative unit in rural place.
6. A s*omon* centre is the centre of the administrative unit *somon* in rural areas. There are more than 300 *somon*.

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