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Mortality inequality in 1-59 months children across Iranian provinces: National Hospital Medical Records System

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ABSTRACT

Objective: To determine inequality in mortality in 1- 59 months children across Iranian provinces using hospital medical records system.

Methodology: After designing and examining a national questionnaire in hospitals for mortality data collection of children 1-59 months, 40 Medical Universities were asked to fill in the questionnaires and return to the main researcher in the health ministry in 2009.

Results: Mortality in 1-59 months children was unequally distributed across Iranian hospitals. Cough, drowsiness, and eating and drinking problem were the most important reasons of hospitalization in both genders. There were significant differences between boys and girls in vomiting (p=0.005), drowsiness (p=0.024), and bleeding (p=0.004). Most of the patients had very bad and not suitable situation at entrance (p=0.211). There was a significant difference between two sexes in vaccination (p=0.019). There was no significant difference between boys and girls on first weight in hospital, last weight, breaths per minute, and pulse rate per minute (p > 0.05). The first five most important diagnosis were congenital, accident (girls) pulmonary (boys), cardiovascular, CNS and metabolic diseases.

Conclusions: Our results suggest that inequality in 1-59 months mortality based on hospital medical records system needs more attention in Iran as a whole and in most of its provinces by policy-makers. Investigating why inequality is higher in some provinces deserves special attention. In addition, it is advisable to conduct provincial representative surveys to provide recent estimates of heath inequalities and to allow monitoring over time.

KEY WORDS: National mortality registration system, Children mortality, Hospital medical records.

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INTRODUCTION

More than 8 million children die annually worldwide[1] and child mortality has received substantial attention as an important section of the United Millennium Development Goals (UNMDG).[2] In fact, over the recent decades, and particularly since the World Summit for Children in 1990[3], there has been increasing interest in measuring child mortality, both as a health indicator and as a basic measure of human development.[4] This interest has brought special attention to the challenge of improving child survival, including an emphasis on understanding why some communities are making progress and others are not.[5-7] Some researchers have recommended that decreases in children mortality

could be at least partly attributed to the improved measurement of children mortality.[8] Thus, increased policy discussion of investment in children health is resulting in more local measurements of children mortality.[9] However, despite considerable efforts, our knowledge on the impact of intervention strategies for many countries is not strong.[4] A vital registration system which could record all births and deaths is the optimal way to monitor children mortality; however, very few developing countries have complete vital registration systems.[10]

Child mortality is often used as an indicator of population health.[11] Moreover, in developing countries, data on child mortality are relatively reliable compared to other measures of population health.[11] In fact, children mortality is a key health outcome in developing countries.[12] In countries with complete vital registration systems which records all births and deaths, children mortality could directly be calculated. In the absence of a complete vital registration system; however, child mortality must be estimated using live births.

Furthermore, health policy makers always need appropriate and up-to-date information about mortality, in order to evaluate the efficacy of current system and to design of suitable intervention studies. With increasing concern about equity in children survival, it is as important to be able to measure and monitor child mortality at the subnational level (i.e. at province level), as current birth histories are often inappropriate for this purpose. There is a special emphasis on the health of Iranian children and therefore many preventive measures are being carried out to improve their health. Therefore, in 1997, the study on the registration of death and its cause was carried out in Bushehr Province as a pilot study. In 1999, Semnan, Eastern Azarbayejan and Chahar Mahal and Bakhtiary provinces were added to this project. Another six provinces in 2000 and rest of the provinces have been added in 2002. The primary results of the mentioned studies have revealed that despite favorable results of current activities of improvement of national health and declining mortality in children, the current information system needs revision.[13]

The main aim of this study was to explore the current process of health services on mortality among 1-59 months children based on hospital medical records. There was also an assumption that there was an inequality among different universities, which are covering health of residents of different Iranian provinces. As it is unknown to what extent 1-59 months mortality has been equally distributed within the country, this study was designed to describe the inequality in 1-59 months mortality in Iranian hospitals.

METHODOLOGY

Data: Birth history data and data on determinants of 1-59 months mortality were obtained from Iranian Demographic and Health Surveys (DHS), which are nationally representative surveys among ever-married women aged 15-49 years.[13,14]

It should be noted that since 1985, the responsibility of health management of Iranian population has been shifted to Universities of Medical Sciences. In 2009, there were 40 medical universities (in 30 Iranian provinces). In the primary step, a national qualitative health survey (including new questionnaire for gathering better information) has been carried out among health experts of three selected medical universities: Shahid Beheshti, Semnan and Arak. Based on their comments, the primary designed quantitative questionnaires have been revised. Then, the revised questionnaires were filled in Arak. After resolving the observed practical problems, the final questionnaire was prepared and sent to 40 medical universities in order to be filled in all parts of Iran in 2009. The requested data on mortality of children 1-59 months in different parts of Iran have been collected and sent to the main researcher in the health ministry.

Using the designed questionnaire, in addition to age and sex of deceased children, some other information has also been collected across the country, based on hospital medical records. It included the reason of hospitalization, situation at entrance to the hospital (suitable, not suitable, very bad and unknown), (first) diagnosis, difficulty in referral, vaccination, having history, availability of growth card, growth trend (declining, increasing, no change, and unknown), weighting gain, complete registration, situation in the ward, need to blood transfusion, need to electroshock, revival, having emergency signs, the reason for no offer, discharge reason, and diagnosis (based on ICD-10 categories). For quantitative variables mean, standard deviation, median, mode, first quartile and third quartile have been calculated such as: entrance (month, day, and hour), exit (month, day, and hour), Physician's order (month, day, and hour), hospitalization (month, day, and hour), first weight in the hospital, last weight, breaths per minute, and pulse rate per minute.

Statistical analysis: All questionnaires were entered inside the pre-designed program (Microsoft

Access 2007). After determining the distribution of 1-59 months mortality among the medical universities, these distributions were considered to interfere the correlations with other variables. Chi-square test has been applied for nominal and ordinal variables. ANOVA and t-student test have been used for measuring the difference among quantitative variables among groups. SPSS for Windows (version 19.0) has been used for the analysis.

Table-I: Distribution of 1-59 months mortality across Iranian universities by sex in 2009.

University	*Boy*	*Girl*	*Total*
Western Azarbayejan	162	116	278
Eastern Azarbayejan	169	142	311
Ardebil	54	71	125
Isfahan	187	151	338
Iran	102	105	207
Ilam	38	22	60
Babol	24	15	39
Bushehr	11	16	27
Birjand	46	45	91
Tehran	120	92	212
Jahrom	9	9	18
Chahar Mahal & Bakhtiary	27	20	47
Razavi Khorasan	315	328	643
Northern Khorasan	89	67	156
Khozestan	267	254	521
Rafsanjan	12	10	22
Zabol	32	30	62
Zanjan	11	14	25
Sabzevar	9	14	23
Semnan	19	10	29
Sistan & Baluchestan	143	153	296
Shahrood	13	17	30
Shahid Beheshti	79	80	159
Fars	127	131	258
Fasa	2	2	4
Ghazvin	56	39	95
Qom	48	47	95
Kashan	21	14	35
Kordestan	75	77	152
Kerman	108	97	205
Kermanshah	87	69	156
Kohgiluiyeh & Boyer Ahmad	40	30	70
Golestan	49	48	97
Gonabad	8	3	11
Gilan	58	51	109
Lorestan	92	68	160
Mazandaran	34	33	67
Markazi (Arak)	28	42	70
Hormozgan	87	88	175
Hamedan	50	50	100
Yazd	50	64	114
Total	2978	2734	5712

RESULTS

Mortality in 1-59 months children was unequally distributed across Iranian hospitals. Table-I shows unequal death distribution of Iranian children in 2009. Most of the deceased children were male. The largest number of deaths was in Razavi Khorasan (643 deaths) and smallest number of deaths in Fasa (4 deaths).

The hospitalization characteristics of Iranian deceased children 1-59 months in different universities for both sexes have been shown in Table-II. The most common month, day and hour of admission to hospital were June, 14th of month and noon, respectively. These items for discharge were June, 14, and 10 in morning, respectively. None of them were significant between boys and girls.

Table-III demonstrates hospital medical records characteristics of 1-59 months deaths of Iranian children. Cough, drowsiness, and eating and drinking problem were the most important reasons of hospitalization in both genders. There were significant differences between boys and girls in vomiting ($p=0.005$), drowsiness ($p=0.024$), and bleeding ($p=0.004$). Most of the patients had very bad and not suitable situation at entrance ($p=0.211$). There was a significant difference between two sexes in vaccination ($p=0.019$). Growth trend of most children was unchanged or unknown. There was no significant difference between boys and girls on first weight in hospital, last weight, breaths per minute, and pulse rate per minute ($p>0.05$). There was an available history for most of deceased children and many of them were advised to refer to more extensive care. The most important emergency signs were pulmonary, shock and coma respectively. The main reason of discharge was death. Based on ICD-10 categorization, the first 5 most important diagnosis were congenital, accident (girls) pulmonary (boys), cardiovascular, CNS and metabolic diseases.

DISCUSSION

This study is one of the first to show the spatial distribution of the inequality of 1-59 months mortality within a developing country. Furthermore, it fills a gap concerning the lack of information on children mortality across Iran. It also shows that there is a lack of health services related to children mortality in hospitals. Mortality

Table-II: Hospitalization characteristics of Iranian deceased children 1-59 months in 2009.

Characteristic		*Boys (N= 1746)*	*Girls (N=1474)*	*P-value*
Enter	Mean	5.72	5.69	0.832
Month	S.D.	3.68	3.63	
	Q1*	3	3	
	Median	6	6	
	Q3$	9	9	
	Mode	0	0	
Day	Mean	14.12	14.17	0.898
	S.D.	9.5	9.47	
	Q1*	6	6	
	Median	14	14	
	Q3$	22	23	
	Mode	0	0	
Hour	Mean	11.90	12.06	0.546
	S.D.	7.39	7.44	
	Q1*	6	7	
	Median	12.78	12.5	
	Q3$	18	18	
	Mode	0	0	
Exit	Mean	5.63	5.55	0.554
Month	S.D.	3.76	3.63	
	Q1*	2	2	
	Median	6	6	
	Q3$	9	9	
	Mode	0	0	
Day	Mean	13.72	13.92	0.544
	S.D.	9.62	9.54	
	Q1*	5	5	
	Median	13	14	
	Q3$	22	22	
	Mode	0	0	
Hour	Mean	9.85	9.65	0.470
	S.D.	7.74	7.51	
	Q1*	2	2.14	
	Median	9.77	9.32	
	Q3$	16.4	15.45	
	Mode	0	0	
Physician's order	Mean	5.45	5.48	0.828
	S.D.	3.8	3.7	
Month	Q1*	2	2	
	Median	5	5	
	Q3$	9	9	
	Mode	0	0	
Day	Mean	13.53	13.83	0.378
	S.D.	9.76	9.67	
	Q1*	5	5	
	Median	13	14	
	Q3$	22	23	
	Mode	0	0	
Hour	Mean	11.68	11.52	0.195
	S.D.	7.76	7.72	
	Q1*	3	4.24	
	Median	12	12	
	Q3$	17.5	18	
	Mode	0	0	
Hospitalization	Mean	5.41	5.5	0.507
Month	S.D.	3.82	3.74	
	Q1*	2	2	
	Median	5	5	
	Q3$	9	9	
	Mode	0	0	
Day	Mean	13.35	13.63	0.416
	S.D.	9.81	9.65	
	Q1*	4	5	
	Median	13	13	
	Q3$	22	22	
	Mode	0	0	
Hour	Mean	11.01	11.3	0.303
	S.D.	7.85	7.77	
	Q1*	2.3	3.3	
	Median	12	12	
	Q3$	17.53	18	
	Mode	0	0	

*: Q1= 1st quartile $: Q3= 3rd quartile.

in 1-59 months seems to be unequally distributed across Iranian hospitals.

Various important health programs focus on children mortality; and most UN member states have agreed to the UN Millennium Goal (MDG) of reducing the under-five mortality by two-thirds between 1990 and 2015.[6] Therefore, reducing disparities in mortality within countries is an important objective of national governments and international organizations.[15,16] Although in the recent years, many studies have been performed on inequality and spatial distribution of children mortality in developing countries[17-25]; however, not much is known about how inequalities change across Iranian hospitals, and what the determinants of these changes are.

It should be noted that the objective of our study was not to rank provinces according to their inequality, but to show the distribution of children 1-59 months mortality across Iranian hospitals which can help health planning and policy-making for promotion of health in Iran, especially in the hospitals.

There are some explanations for the observed inequality. For instance, the large number of death in children of Razavi Khorasan might largely be explained by differences in access to first care facilities, especially for Afghan immigrants, and the number of hospitals and population coverage in this medical university. Furthermore, in some provinces (and in turn hospitals), nutritional standards are less improved, women's literacy is less, and the number of health care facilities have not expanded yet. These changes were paralleled by different patterns of children mortality in different provinces. Moreover, during recent years, the Iranian population in some provinces has better access to better well equipped and well staffed hospitals with more medical experts and more skilled physicians.

Our study implies that widening socioeconomic inequalities in Iranian universities are not inevitable; declining inequalities may occur as well, certainly in absolute terms. An equitable distribution of primary health care development might be an important factor for preventing widening inequalities in child mortality. We can deduce the reasons for the existing conditions from experts as well as from local information in some provinces, but there is little research-based evidence to provide clear explanations, especially in urban areas. For instance, utilization of health care facilities in Sistan and Baluchestan is known

Table-III: Hospital records characteristics of Iranian deceased children 1-59 months in 2009.

Characteristic	*Boys (N= 1746)*	*Girls (N= 1746)*	*P-value*
The reason of hospitalization			
Problem in eat and drink	409	377	0.156
Convulsion	259	233	0.443
Vomiting	219	236	0.005
Drowsiness	420	406	0.024
Bleeding	58	39	0.004
Abdominal pain	55	46	0.963
Cough	682	596	0.426
Diarrhea	139	130	0.379
Restlessness	210	185	0.650
Fever	402	372	0.145
Growth delay	79	77	0.356
Others	230	161	0.052
Situation at entrance			0.211
Suitable	191	157	
Not suitable	872	687	
Very bad	574	532	
Unknown	109	98	
Registered diagnosis	1580	1360	0.084
Registered first diagnosis	1504	1281	0.472
Having history	1437	1240	0.071
Difficult to refractory	768	623	0.289
Vaccination	1018	920	0.019
Availability of growth card	1239	1012	0.258
Growth trend			0.404
Declining	54	45	
Increasing	77	71	
No change	128	123	
Unknown	219	156	
First weight in hospital (g)			0.798
Mean	6837.55	6637.35	
S.D.	4026.7	3886.94	
Q1*	4000	3800	
Median	6000	5670	
Q3$	9000	9000	
Mode	10000	10000	
Last weight (g)			0.848
Mean	6851.78	6582.48	
S.D.	3935.21	3961.44	
Q1*	3970	3754.75	
Median	6000	5599	
Q3$	9500	8800	
Mode	10000	10000	
Breaths per minute			0.875
Mean	42.25	42.40	
S.D.	13.43	13.71	
Q1*	30	30	
Median	40	40	
Q3$	52	55	
Mode	40	40	
Pulse rate per minute			0.186
Mean	132.69	131.63	
S.D.	26.25	26.97	
Q1*	112	110	
Median	130	130	
Q3$	150	150	
Mode	120	120	
Weighting gain			0.195
Increasing	102	92	
Decreasing	130	106	
No change	701	635	
Unknown	491	361	
Complete registration			
Natural history	1437	1240	0.071
Request for more treatment	1386	1138	0.102
Request for special act	1215	1026	0.384
Advice to refer	1301	1094	0.465
Referred	1292	1066	0.812
Situation in the ward			0.868
Unstable	404	346	
Gradual severe	751	628	
Sudden severe	330	267	
Unknown	261	233	
Need to blood transfusion	510	432	0.866
Need to Electroshock	1311	1095	0.638
Revival	244	198	0.674
Availability of			
Blood products	1355	1104	0.709
Electroshock facilities	1344	1140	0.817
Having emergency signs			
Pulmonary	1326	1134	0.507
Bleeding	115	80	0.170
Shock	203	150	0.190
Convulsion	104	105	0.180
Coma	142	130	0.484
The reason of no refer			0.193
Unavailable treatment	12	4	
Lack of necessary facilities	33	23	
Economic issues	7	1	
Others	45	36	
Discharge reason			0.784
Advice of physician	25	21	
Parents' request	15	15	
Death	1524	1287	
Transfer to another hospital	15	10	
Diagnosis			0.736
Accident	157	115	
Congenital	241	204	
Pulmonary	204	183	
Cardiovascular	189	151	
Infectious- Parasite	119	116	
CNS	132	107	
Gastroenteritis	111	78	
Metabolic	116	95	
Blood	51	41	
Cancer	58	38	
Urinary	30	21	
Mental-Behavioral	0	1	
Around birth	17	22	
Others	56	49	

*: Q1= 1st quartile $: Q3= 3rd quartile.

to be far less than the rest of the country not only because of low availability of health care, but also as a result of people's attitude.[14] This study indicates the necessity of better defining the determinants of both inequality and levels of child mortality as

well as the contribution of each factor to different provinces focusing on hospital records.

Furthermore, based on the published report of Iranian ministry of health, more than 80% of mortality in age group of 1-59 months take place in hospitals.[13,26] Therefore, the further focus must be on the determination of inequality in hospitals. To do this, we should have standardized questionnaires to compare different hospital records. This study was the first step to examine the prepared national questionnaire.

CONCLUSION

Our results suggest that inequality in 1-59 months mortality based on hospital medical records needs more attention by policy-makers. Investigating why inequality is higher in some hospitals deserves special attention. In addition, it is advisable to conduct provincial representative surveys to provide recent estimates of hospital access inequalities and to allow monitoring over time.

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