Mortality Inequality in 1-59 Months Children Across Iranian Provinces: Referring System and Determinants of Death Based on Hospital Records

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ABSTRACT

Background: To determine inequality in mortality in 1-59 months children across Iranian provinces focusing on referring system and determinants of death.

Methods: After designing and examining a national questionnaire for mortality data collection of children 1-59 months, 40 medical universities have been 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 provinces (universities). The recommended refer was 3466 but only 1620 patients were referred. The first five important determinants of death were congenital (671 children or 20.9%), accident (547 children or 17.1%), pulmonary diseases (370 children or 11.5%), cardiovascular (266 children or less than 8.3%), central nervous system (263 children or 8.2%), and infectious and parasitic diseases (245 children or 7.6%), respectively.

Conclusions: Our results suggest that inequality in 1-59 months mortality based on the hospital records, and specially referring system, needs more attention in Iran. In addition, it is advisable to conduct provincially representative surveys to provide recent estimates of hospital access inequalities and to allow monitoring over time.

Keywords: Children mortality, hospital records, Iran, national mortality registration system, referring system

Original Article

INTRODUCTION

Over the past few decades, and particularly since the World Summit for Children in 1990,[1] there has been growing interest in measuring child mortality, both as a health indicator and as a basic measure of human development.[2] More than 8 million children die each year all over the world[3] and child mortality has received special attention as part of the United's Millennium Development Goals (UN MDG).[4] This fact has brought renewed attention to the challenge of improving child survival, including, a focus on understanding why some populations are making progress and others are not.[5-7] Some researchers have suggested that decline in child mortality can be at least partially attributed to the

improved measurement of child mortality.[8] Thus, increased policy discussion of investment in child health is leading to calls for more timely and more local measurements of child mortality.[9] However, despite considerable efforts, our knowledge on the impact of intervention strategies for many countries is weak.[2] A vital registration system that captures all births and deaths is the optimal way to monitor child mortality; however, a 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 comparatively reliable compared with other measures of population health.[11] In fact, child mortality is a key health outcome in developing countries.[12] In countries with complete vital registration systems that capture all births and deaths, child mortality can be directly calculated, considering that one of the most important indices of health in each age group is its own mortality rate. In the absence of a complete vital registration system, however, child mortality must be estimated using live births.

Furthermore, with increasing concern about equity in child survival, it is arguably as important to be able to measure and monitor child mortality at the subnational level, which complete birth histories are clearly inappropriate for this purpose. 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. There is a special emphasis on the health of Iranian children and therefore, many preventive activities are carrying out to improve their health. Therefore, in 1997, the study on the registration of death and its cause has been 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 is to explore the current process of referring system on mortality among 1-59 months children based on hospital records. There is also an assumption that there is 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 is going to describe the inequality in 1-59 months mortality in Iran.

METHODS

Birth history data and data on determinants of 1-59 months mortality were obtained from Iranian Demographic and Health Surveys, 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 in Iran has been delivered to Universities of Medical Sciences. In 2009, there were 40 medical universities (in 30 provinces) in Iran. 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 have been filled in Arak. With resolving the observed practical problems, the final questionnaire has been prepared and was 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 records. These information include, recommended refer, referred patients, Suitable CardioPulmonay Resuscitation (CPR), on time CPR, physician's recommended treatment, on time treatment, on time diagnosis, possibility of another diagnosis, available diagnosis in close hospital, necessity of referring, the reason of not referring (no request for refer, unavailable admission in target hospital and unavailable facilities for transfer), transferred patients, need for special surveillance, receiving special surveillance, diagnosis based on International Classification of Diseases- 10th revision or ICD-10 categories (accident, congenital, pulmonary,

cardiovascular, infectious and parasitic diseases, central nervous system (CNS), gastroenteritis, metabolic disorders, blood diseases, cancer, urinary diseases, mental/behavioral diseases, around birth death and other reasons), correct diagnosis (based on laboratory results), reports of complications during hospitalization and true complications during hospitalization.

All questionnaires have been entered inside the pre-designed program (Microsoft Access 2007). After determining the distribution of 1-59 months mortality in 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 Students *t*-test have been used for measuring the difference of continuous variables among groups. SPSS for Windows (version 19.0) has been used for the analysis.

RESULTS

Mortality in 1-59 months children was unequally distributed across provinces (universities). Table 1 shows unequal distribution of children's deaths across Iran in 2009. Most of the deceased children were male in many of provinces. The largest number of deaths was in Razavi Khorasan (643 deaths) and smallest number of deaths in Fasa (4 deaths).

The hospital records characteristics of Iranian deceased children 1-59 months in different universities have been shown in Table 2. The recommended refer was 3466 but only 1620 patients were referred. For 3417 (95.4%) patients, CPR were done in which 3315 (92.1%) were on time. Physicians recommended treatment for 3275 (91.3%) of patients; however, only 1648 (66.1%) of patients had on time treatment. The diagnosis was on time only in 671 patients (19.2%) while there was the possibility of another diagnosis in 664 (18.9%) of patients. In 1471 (60.1%) children, diagnosis in their close hospital was available. In 295 (33.1%) patients, refer was necessary. The most important reasons of not referring were unavailable admission in target hospital. There was also no request for referring in 178 (36.3%) children. For 103 (21%) patients, facilities for transfer were not available. Only 173 children were transferred. Special surveillance was necessary for 2168 (71.6%) of patients; however, only 773 children were received this special surveillance.

Table 1: 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 and 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 and 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 and 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

Based on laboratory results, 2993 (95.7%) of all diagnosis were correct. From 815 reported complications during hospitalization, 691 of them had real complications. Finally, based on ICD-10 categories, the first five important determinants

Table 2: Hospital records characteristics of Iranian deceased children 1-59 months in 2009

Characteristic	Number/Total (%)
Recommended refer	3466/3621 (95.7)
Referred patients	1620/3806 (42.6)
Suitable Cardiopulmonary resuscitation	3417/3580 (95.4)
On time CPR	3315/3600 (92.1)
Physician's recommendation treatment	3275/3589 (91.3)
On time treatment	1648/2494 (66.1)
On time diagnosis	671/3498 (19.2)
Possibility of another diagnosis	664/3518 (18.9)
Available diagnosis in near hospital	1471/2448 (60.1)
Necessary refer	295/891 (33.1)
The reason of no refer	
No request for refer	178/491 (36.3)
Unavailable admission in target hospital	210/491 (42.8)
Unavailable facilities for transfer	103/491 (21)
Transferred patients	173/226 (21.0)
Need for special surveillance	2168/3028 (71.6)
Receiving special surveillance	773/1845 (41.9)
Diagnosis	
Accident	547/3205 (17.1)
Congenital	671/3205 (20.9)
Pulmonary	370/3205 (11.5)
Cardiovascular	266/3205 (8.3)
Infectious-Parasite	245/3205 (7.6)
Central nervous system	263/3205 (8.2)
Gastroenteritis	164/3205 (5.1)
Metabolic	226/3205 (7.1)
Blood	101/3205 (3.2)
Cancer	93/3205 (2.9)
Urinary	46/3205 (1.4)
Mental-Behavioral	9/3205 (0.3)
Around birth	53/3205 (1.7)
Others	151/3205 (4.7)
Correct diagnosis (laboratory results-based)	2993/3127 (95.7)
Complication reports during hospitalization	815/2780 (29.3)
True complications during hospitalization	691/800 (86.4)

of death were congenital (671 children or 20.9%), accident (547 children or 17.1%), pulmonary diseases (370 children or 11.5%), cardiovascular (266 children or less than 8.3%), CNS (263 children or 8.2%), and infectious and parasitic diseases (245 children or 7.6%), respectively.

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. It shows that there is a lack of referring system related to children mortality across Iran as a whole and within most of its provinces. Mortality in 1-59 months seems to be unequally distributed across provinces (universities).

Various major health programs and initiatives focus on children mortality; and most UN member states have agreed to the UN Millennium Development Goal (MDG) of reducing the under-five mortality by two-thirds between 1990 and 2015.[6] Therefore, reducing regional disparities in mortality within countries is an important objective of national governments and international organizations.[15,16] Although, in the recent years, there have been carried out many studies on inequality and spatial distribution of children mortality in developing countries;[17-25] however, not much is known about how inequalities change across Iranian provinces, 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, however, to show the distribution of children 1-59 months mortality across Iran, which can help health planning and policy-making for promotion of health in Iranian provinces, especially, in the hospitals.

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.

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 Afghanian immigrants. Furthermore, in some provinces, nutritional standards less improved, women's literacy less increased, and the number of health-care facilities have not been 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 and more

facilitated hospitals with more medical experts and more skilled physicians.

Our study implies that widening socio-economic inequalities in Iranian provinces (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 in inequalities in children 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 are known to be far lesser 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 children mortality as well as the contribution of each factor to different provinces focusing on hospital records.

The referring system did not show a good process in Iran; i.e. although for most of deceased children referring was recommended; only part of them was referred. There are many barriers to have an efficient referring system such as: cooperation between different health-care workers, out-to-date transferring facilities, inefficient insurance policy that lead to not admission in target hospitals, and so on.

Recommended treatment by first physician was received by deceased children on time. It might be because of the distance between first place and target place. It could also be due to wrong belief that special hospital could cure patient much better than the closer hospital. There are also some administrative disadvantages of hospitals' management in Iran.

CONCLUSIONS

Our results suggest that inequality in 1-59 months mortality based on the hospital records needs more attention in Iran as a whole and in most of its provinces by policy-makers. Specially, referring system needs special attention. In addition, it is advisable to conduct provincially representative surveys to provide recent estimates of hospital access inequalities and to allow monitoring over time.

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