MATERNAL AND CHILD MORTALITY IN HANOI CITY, VIET NAM

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Abstract

A cross-sectional survey-based for maternal, newborn and child mortality was performed for all 233 communes, and then identified eligible communes for both completeness and accuracy in the Hanoi city. Mortality rates were 1.29 per 1,000 live births for newborn and 4.38 per 100,000 live births during 2005-2010 for maternal mortality, U3MR 0.67 per 1,000 live births; and U5MR 0.44 per 1,000 live births. Rural districts had significantly increased risk of newborn and infant mortality. A decreased time trend of newborn and infant mortality has been detected between 2005-2006 and 2009-2010 in Hanoi city.

1. Background

"Parenthood brings with it the strong desire to see our children grow up happily and in good health. This is one of the few constants in life in all parts of

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the world. Yet, even in the 21st century, we still allow well over 10 million children and half a million mothers to die each year, although most of these deaths can be avoided" - Dr. Lee Jong-wook, Director-General WHO's message [1]. Maternal and children health should be a significant examination and improving anytime and anywhere in the world, as well as in Hanoi city, Viet Nam.

Referred to Millennium Development Goals: The United Nations Millennium Development Goals are 8 goals, reduce child motility and improve maternal health are two of these 8 goals. In the Greater Mekong-Subregion, WHO report in 2005 has stated that Under-5 mortality rate per 1,000 was 23, 91 and 140 in Vietnam, Laos and Cambodia, respectively [1]. To prevent child mortality and improve maternal health, there are many inputs that include science, preventive medicine, health policy and other facts and figures. Above data of Under-5 mortality rate per 1,000 was estimated for nationwide, however, this fact might be changes in developing urbanization in a big city.

Existing local condition will support to address maternal and child mortality in developed urbanization in Viet Nam. Such as, the Socialist Republic of Viet Nam with an estimated population of 86 million [2], has placed significant emphasis on economic development, particularly since the introduction of the "doi moi" (or economic reform) in 1986. As a consequence, Viet Nam has achieved much in a short timeframe. For example, the percentage of the population living on less than a dollar a day has fallen from 39.9% to 4.1% over a 15 year period from 1993 to 2008 and so too, have the health indices improved with life expectancy for men now 70.2 years and for women 75.6 years [3]. However, the measurement of health indices is reliant on a health information system that is reliable, timely, and in the context of a low-middle income country such as Viet Nam, affordable. A national mortality reporting system is the cornerstone of such an information system; yet in many low and middle income countries, mortality reporting systems either do not exist, or if they exist, have significant limitations including misclassification of the cause of death, under-reporting, lack of timeliness and incomplete capture of mortality [4].

For many countries, civil registration and vital statistics systems are considered the gold-standard for mortality statistics, as data on deaths recorded as a result of legal requirement tend to be completed [5]. Civil registration was initiated in Viet Nam in 1956 and despite the 50 years of collecting mortality data, only limited information has been published [5]. However, a recent study assessed the civil registration and vital statistics system in Viet Nam and reported that the system had significant limitations including a lack of completeness, particularly for early neonatal deaths and deaths of temporary residents and/or migrants. The death certificate provided by the authorities

does not require the signature of the doctor and therefore, the cause of death is poorly recorded [5].

Beyond Viet Nam's civil registration and vital statistics system, a national mortality reporting system has also been introduced. Under the auspices of the Ministry of Health, the A6 mortality reporting system relies on commune-level health officials providing basic demographic data and information on the cause of death, which is recorded in an official book referred to as the A6 (see [6,7]). The data from the A6 is collated by the district-level health service and the information is then forwarded to the provincial and central-level governments. The commune-level officials play a significant role in maintaining the current mortality reporting system and in turn, are able to actively use the information gained to plan commune-level health services.

A recent study entitled "Evaluating and enhancing the national mortality reporting system in Vietnam" (in using Verbal Autopsy as the reference quality) confirmed that the agreement between A6 and Verbal Autopsy output was 85% for injury, 79% for cancer, 72% for CVD, and 100% for newborn mortality [8]. The findings suggested that utilization and sensitivity analysis of the A6 database is feasible and it is reliable in terms of completeness.

Viet Nam's two biggest cities, Hanoi and Ho Chi Minh city, represent the two regions of the North and South of the country, respectively. With progressed human civilization and urbanization, our living environment and health change. Regional variation and time trend of maternal and child mortality is an essential indicator in planning, decision making, and prevention implementing to control diseases in our society, as well as in a highly urban city. There are few studies on maternal and child mortality that have been done in Viet Nam to address this issue in Hanoi city to date.

2. Objective

i) To estimate maternal and child mortality during 2005-2010 and ii) to examine time trend during 6 year-period, 2005-2010 and regional variable of maternal and child mortality in the Hanoi city, Viet Nam.

3. Methods

3.1 Study design and population

The present study method has been described elsewhere [9]. Descriptive Epidemiology and community-based mortality survey was performed in the Hanoi city for 6-year period from 2005-2010 [10,11]. Hanoi city - Capital of Viet Nam

has 14 districts covered with 233 commune health stations where the estimated average population during 2005-2010 was 3,289,300 [12-15]. Three areas, the center of Hanoi city, sub-urban districts, and rural districts were grouped for ecological analysis in the present study.

3.2. Survey-based mortality data collection

Both demographic data and list of all deaths during 2005-2010 were collected from all commune health stations. The five indicators, including name, age, sex, date of death and the cause of death were collected for each case of death. The designed data collection form - the four A4 sized pages of the A6 form was prepared in Vietnamese - presented, and printed in one A3 sized page double-sided. Instructions and guidelines in Vietnamese were explained for how to register the cause of death. Based on ICD-10, we introduced the underling-cause of death and explained maternal, newborn, child, and other causes. A guideline to report the demographic data of each commune and information on each case, who has been living in their commune for at least 6 months, were prepared. Average resident population was reported for both male and female for each year. From 2005 to 2010, we annually collected mortality data from all 233 commune health stations of Hanoi city:

• the first round was conducted in 2007 for two years of 2005-2006, participated commune number was 210,

• the second round was conducted in 2008 for 2007, participated commune number was 230,

• the third round was conducted in 2009 for 2008, participated commune number was 230,

• the fourth round was conducted in 2010 for 2009, participated commune number was 180,

• the fifth round was conducted in 2011 for 2010. participated commune number was 207,

3.3. Selection criteria of eligible communes

The obtained maternal and child mortality data from 233 commune health stations were checked by telephone interview with each commune to confirm the number of cases by years and the number of residents by years. Database of survey-based maternal and child mortality from all 233 communes was checked by experts for a completeness and accuracy. For eligibility in terms of completeness, communes that have a crude mortality rate for all causes from 350 per 100,000 person-years or higher were selected. In terms of accuracy, communes that have a clear cause of death for 75% or higher of all registered cases were selected. A previous pilot survey confirmed that 92% of mortality cases were reported underling-cause of death. A mortality rate was estimated for

the communes that were eligible in both terms. Among all registered cases from 2005-2010, characteristics of maternal and child mortality from all causes (ICD-10) was examined. Specific causes of deaths were presented in ICD-10 groups based on its chapters: maternal and newborn.

3.4. Demographic data

The number of inhabitants was counted annually by each commune health station, and it was verified by comparing the results to the National Census in 1999 and 2009 [2,16].

3.5. Data handle and analysis

All obtained data was computed using Excel software. The Excel data was exported to STATA 10.0 for analysis [17]. To examine time trend of the causes of death for 6 years, every 2-year period of 2005-2006, 2007-2008, and 2009-2010 was grouped to increase the number of cases by each level of exposures. The other approach in this study was to test for any regional variation between the three areas of Hanoi city, sub-urban, and rural districts and estimate the odds ratio (OR) and 95% confidence interval (CI) by logistic regression analysis for grouped data in using STATA 10.0 [17]. Among 14 districts, 4 districts were excluded from the final data presentation due to ineligibility of the databases. The remaining ten districts were grouped into three areas of Hanoi city for regional variable analysis:

• heart of Hanoi city included Ba Dinh and Hoan Kiem districts,

• sub-urban included Tay Ho, Long Bien, Dong Da, and Hai Ba Trung districts,

• rural districts included Dong Anh, Gia Lam, Tu Liem, and Thanh Tri.

Maternal and child mortality was grouped and estimated for maternal, newborn, infant under 3-year old (U3MR), and infant under 5-year old (U5MR) mortality.

Cases of maternal and newborn deaths were coded O00-O99 and P00-P96, respectively. To estimate and convert the maternal mortality rate per 100,000 live births and newborn mortality rate per 1,000 live births, we estimated the number of live births for each district based on the average crude birth rate per 1,000 that was assessed from the City Office of Family Planning's annual publications for number of person-years of eligible communes [6].

4. Results

4.1. Eligible communes

There were 35 of 233(15%) communes selected to be eligible for a final analysis and presentation with person-year number of 2,608,919 for 6 years period, 2005-2010 (Table 1).

Table 1 Selection of Eligible communes for final analysis and estimation of mortality rate

Hanoi city	Number of communes		Person-year, 2005-2010
	Number	%	
All communes	233	100%	19,720,599
Eligible communes	35	15%	2,608,919

4.2. Newborn and maternal mortality

With the 2,608,919 person-years, the estimated number of live births was 45,719. The number of newborn deaths among those aged 0-28 days was 59, and the number of maternal deaths was 2 cases, giving an estimated newborn mortality rate of 1.29 per 1,000 live births and a maternal mortality 4.38 per 100,000 live births,

Table 2 Estimated newborn mortality rate

No	District	Average crude birth rate (per 1,000)	Person-year of eligible communes	Number of live birth	0-28 days mortality	
					Case	Rate (per 1,000)
1	Ba Đình	18.67	666,489	12,442	0	0.00
2	Hoàn Kiếm	19.24	98,991	1,904	1	0.53
3	Tây Hồ	16.99	48,074	817	0	0.00
4	Long Biên	17.39	71,436	1,243	6	4.83
5	Cầu Giấy	13.63	0	0	0	
6	Đống Đa	18.37	266,220	4,890	1	0.20
7	Hai Bà Trưng	15.80	509,950	8,056	3	0.37
8	Hoàng Mai	14.26	0	0	0	
9	Thanh Xuân	14.71	0	0	0	
10	Sóc Sơn	18.68	0	0	0	
11	Đông Anh	18.10	537,803	9,732	41	4.21
12	Gia Lâm	18.03	33,130	597	1	1.67
13	Từ Liêm	12.70	93,221	1,184	2	1.69
14	Thanh Trì	17.12	283,605	4,854	4	0.82
			2,608,919	45,719	59	1.29
Number of maternal mortality was 2 cases, giving rate per 100,000 was 4.38 / 100,000 live births, 2005-2010 at eligible communes.						

4.3. Regional variation and time trend of newborn mortality

The heart of Hanoi city was used as the reference group to analyze the regional variation. The rural district area had significantly increased risk of newborn mortality. (OR=16.05, 95% CI=6.39-40.23, P < 0.001). For time trend, with the reference time period as 2005-2006, a significant decline of newborn mortality rates was seen for the recent period of 2009-2010, (OR=0.28, 95% CI=0.13-0.58, P < 0.001).

Table 3 Variation and change in newborn mortality rates per 1,000 live births by area and time

Area and time	Number of live birth	Case	Rate (per 1,000)	OR	95% CI		P
			Area				
Heart of Hanoi	27,292	5	0.18	1.00	*Reference*		
Sub-urban	2,059	6	2.91	15.95	4.86	52.31	0.000
Rural Districts	16,367	48	2.93	16.05	6.39	40.33	0.000
			Time				
2005-2006	14,480	30	2.07	1.00	*Reference*		
2007-2008	15,499	20	1.29	0.62	0.35	1.10	0.101
2009-2010	15,740	9	0.57	0.28	0.13	0.58	0.001

4.4. Infant mortality

Children under 3 years old: For children aged less than 3 years, the number of cases was 19, 7, 51 in the areas of heart of Hanoi, sub-urban, and rural districts, respectively. There were 29, 34, and 14 cases for 2005-2006, 2007-2008, and 2009-2010, respectively. The estimated mortality rate was 0.67 per 1,000 for infants less than 3 years old.

The rural district area had significantly increased risk of infant mortality among those less than 3 years old (OR=4.37, 95% CI=2.58-7.40, P < 0.001).

A significantly decreasing trend of infant mortality was seen in 2009-2010 when compared to that in 2005-2006 (OR=0.44, 95% CI=0.23-0.84, P < 0.001).

Children under 5 years old:

For children aged less than 5 years, the number of cases was 25, 7, 57 occurred in the areas of heart of Hanoi, sub-urban, rural districts, respectively. It was 34, 39, and 16 for 2005-2006, 2007-2008, and 2009-2010, respectively. The estimated mortality rate was 0.44 per 1,000 for infants less than 5 years old.

The rural district area had significantly increased risk of infant (less than 5 years old) mortality (OR=3.71, 95% CI=2.32-5.94, P < 0.001). A significant

decreased trend was seen for 2009-2010 when compared to that in 2005-2006, (OR=0.43, 95% CI=0.24-0.78, P < 0.001).

Table 4 Variation and change in infant mortality rates per 1,000 by area and time

Area and time	Person-years	Case	Rate (per 1,000)	OR	95% CI		P
29 days - < 3 ages							
Area							
Heart of Hanoi	67,971	19	0.28	1.00	Reference		
Sub-urban	5,269	7	1.33	4.76	2.00	11.32	0.000
Rural Districts	41,787	51	1.22	4.37	2.58	7.40	0.000
Time							
2005-2006	36,431	29	0.80	1.00	Reference		
2007-2008	38,994	34	0.87	1.10	0.67	1.80	0.719
2009-2010	39,602	14	0.35	0.44	0.23	0.84	0.013
Total	115,027	77	0.67				
29 days-<5 ages							
Area							
Heart of Hanoi	119,376	25	0.21	1.00	Reference		
Sub-urban	9,254	7	0.76	3.61	1.56	8.36	0.003
Rural Districts	73,389	57	0.78	3.71	2.32	5.94	0.000
Time							
2005-2006	63,982	34	0.53	1.00	Reference		
2007-2008	68,485	39	0.57	1.07	0.68	1.70	0.768
2009-2010	69,552	16	0.23	0.43	0.24	0.78	0.006
Total	202,019	89	0.44				

5. Discussions

The present work is the first study on the causes of maternal, newborn, U3MR, and U5MR mortality in the Hanoi largest city-capital of Viet Nam. The new findings were estimated for maternal mortality 4.38 per 100,000 live births; newborn 1.29 per 1,000 live births; U3MR 0.67 per 1,000 live births; and U5MR 0.44 per 1,000 live births.

Rural districts had a significantly higher risk of newborn (OR=16.05, 95% CI=6.39-40.23, P < 0.001), U3MR (OR=4.37, 95% CI=2.58-7.40, P < 0.001), U5MR (OR=3.71, 95% CI=2.32-5.94, P < 0.001). These facts would be explained that rural districts during 2005-2010 were poorer than that in the heart of Hanoi city regarding health care facilities, living-working-education and other environmental conditions.

For time trend, with the reference time period as 2005-2006, a significant decline of newborn mortality rates was seen for the recent period of 2009-2010, (OR=0.28, 95% CI=0.13-0.58, P < 0.001); U3MR (OR=0.44, 95% CI=0.23-

0.84, P < 0.001), and U5MR (OR=0.43, 95% CI=0.24-0.78, P < 0.001). These facts suggested that Hanoi city has been rapidly developed in improving maternal, newborn and child health by time during 2005-2010. The present study results suggested that maternal, newborn and child health in the Hanoi city in period of 2005-2010 was much improved when compared to that in 1998-2002 at Nationwide1. That is:

Indicator	Period 2005-2010	Period 1998-2002
Maternal mortality per 100,000 live birth	4.38	75.00
Newborn mortality per 1,000 live birth	1.29	12.00
U3MR	0.67	3.00-18.00
U5MR	0.44	12.00

These facts would be explained that during 2005-2010, health care in Viet Nam was much improved for maternal, newborn and child health. The other explanation was that Hanoi city's health facilities were much better than nationwide level.

The present findings were reflected the real pictures of maternal, newborn and child health in the Hanoi city during 2005-2010. The results were free of selection bias (It was cross-sectional survey-based for all 233 communes, then identified eligible communes for both completeness and accuracy; free of recall bias (Data was collected annually); free of information bias (ICD-10 has been used to register causes of mortality.

6. Conclusions

Mortality rates were 1.29 per 1,000 live births for newborn and 4.38 per 100,000 live births during 2005-2010 for maternal mortality, U3MR 0.67 per 1,000 live births; and U5MR 0.44 per 1,000 live births. Rural districts had significantly increased risk of newborn and infant mortality. A decreased time trend of newborn and infant mortality has been detected between 2005-2006 and 2009-2010 in the Hanoi city.

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