

**Lao People's Democratic Republic**

---

*Committee for Planning and Cooperation  
National Statistical Centre*

*Report on*

**In-Depth Analysis on Mortality  
Differentials in Lao PDR**

**Project LAO/02/P07**

**National Statistical Centre – UNFPA**

# **In-Depth Analysis on Mortality Differentials in Lao PDR**

**UNFPA Project LAO/02/PO7:  
Strengthening the Database for Population and  
Development Planning**

**Prepared by:**

Dr. Samaychanh Boupha  
Mr. Bounthavy Sisouphanthong  
Ms. Phonesaly Souksavath  
Ms. Thirakha Chanthalanouvong  
Ms. Somchanh Phengxay

**UNFPA in Vientiane, Lao PDR:**

Ms. Nobuko Horibe  
Ms. Anne-Marie Serrano

**UNFPA Consultant:**

Mr. Aphichat Chamrathirong

## Foreword

The National Statistical Centre (NSC), under the sponsorship of the UNFPA, conducted the in-depth analysis on mortality based on the data of the Lao Reproductive Health Survey 2000 (LRHS 2000). LRHS 2000 is a nationwide sample of 21,067 households comprising 12,759 women aged 15-49, and 3,060 men (husbands) aged 15-59 years. The objective of the in-depth analysis is mainly to study the mortality differentials in Lao PDR during two birth cohorts: 1990-94 and 1994-99.

The analysis provides up-to-date information on mortality levels during a specific period, which might have not been mentioned in a number of other demographic studies on Lao PDR. The information intends to assist policy makers, programme managers and other concerned agencies in planning, designing, implementing, improving and evaluating reproductive health (RH) programmes, including family planning (FP). The other purpose is to provide information about health services in the country.

With support and technical assistance from the UNFPA field office and a UNFPA Consultant from Mahidol University in Bangkok, NSC has analysed the available data on mortality from LRHS 2000. The report provides information on estimated mortality and life expectancy at birth, maternal mortality, neonatal, post neonatal, infant, child and under-five mortality for the birth cohorts of 1990-1994 and 1994-1998 by household background characteristics; and high-risk fertility behaviour by antenatal care and assistance at delivery.

This analysis was prepared between June 2003 and June 2004 using a complex structure of mortality data files.

We would like to express our gratitude to all those who assisted in initiating and developing this report. We welcome comments and suggestions for improving our demographic research and strengthening the database for population and development in Lao PDR.

Samaychanh Boup  
Director  
National Statistical Centre

## List of Acronyms

---

<b>ANC</b>	Antenatal Care
<b>BI</b>	Birth interval
<b>BO</b>	Birth order
<b>CBR</b>	Crude birth rate
<b>CDR</b>	Crude death rate
<b>CPI</b>	Committee for Planning and Investment
<b>CMR</b>	Child mortality rate
<b>CST</b>	Country Technical Services Team for East and Southeast Asia
<b>FP/RH</b>	Family planning/Reproductive health
<b>ICPD</b>	International Conference on Planning and Development
<b>IMR</b>	Infant mortality rate
<b>Lao/97/P07</b>	Strengthening the Database for Population and Development Planning
<b>LRHS 2000</b>	Lao Reproductive Health Survey 2000
<b>MMR</b>	Maternal mortality rate
<b>NMR</b>	Neonatal mortality rate
<b>NSC</b>	National Statistics Centre
<b>PDS</b>	Population and Development Strategies
<b>PoA</b>	Programme of Action
<b>PMR</b>	Post-neonatal mortality rate
<b>RH</b>	Reproductive health
<b>TFR</b>	Total fertility rate
<b>UNFPA</b>	United Nations Population Fund
<b>U5MR</b>	Under-five mortality rate

## Table of Contents

---

	Page
	<b>FOREWORD</b>
	<b>LIST OF ACRONYMS</b>
	<b>LIST OF TABLES</b>
	<b>LIST OF FIGURES</b>
	<b>SUMMARY OF FINDINGS</b>
	<b>i-iii</b>
<b>CHAPTER 1:</b>	<b>INTRODUCTION</b> 1-4
	1.1 Population Distribution 1
	1.2 Population Policy and Reproductive Health Programme 3
	1.3 Objectives and Coverage of the In-depth Analysis on Mortality 3
<b>CHAPTER 2:</b>	<b>MORTALITY ESTIMATES AND LIFE EXPECTANCY</b> 5-10
	2.1 Mortality Estimates 5
	2.2 Life Expectancy at Birth 9
<b>CHAPTER 3:</b>	<b>MATERNAL MORTALITY</b> 11-12
	3.2 Maternal Mortality Rate 11
<b>CHAPTER 4:</b>	<b>NEONATAL, POST-NEONATAL, INFANT, CHILD AND UNDER-FIVE MORTALITY</b> 13-16
	4.1 Neonatal, Post-neonatal, Infant, Child and Under-five Mortality for the Birth Cohort of 1990-1994 13
	4.2 Neonatal, Post-neonatal and Infant Mortality for the Birth Cohort of 1994-1998 15
<b>CHAPTER 5:</b>	<b>HIGH-RISK FERTILITY BEHAVIOUR</b> 17-19
	5.1 High-risk Fertility Behaviour and Antenatal Care 17
	5.2 High-risk Fertility Behaviour and Assistance at Delivery 18
<b>APPENDIX 1:</b>	<b>REFERENCES</b> 20

## List of Figures and Tables

Figure/ table	Description	Pages
Figure S01	CBR and CDR in one year preceding the survey by sanitation	i
Figure S02	CBR and CDR in one year preceding the survey by drinking water	ii
Figure S03	NMR, PMR and IMR for the birth cohort of 1994-1998 by electricity	iii
Figure S04	NMR, PMR and IMR for the birth cohort of 1994-1998 by drinking water	iii
Figure S05	NMR, PMR and IMR for the birth cohort of 1994-1998 by distance of household from health services	iii
Table 1.01	Weighted and out-weighted distribution of households and women by province	4
Figure 2.1	CBR and CDR by household characteristics	5
Table 2.01	CBR, CDR per 1,000 during one year preceding the survey by region, residence and province	6
Table 2.02	CBR, CDR per 1,000 during one year preceding the survey by region, residence and household background characteristics	7
Table 2.03	CBR, CDR per 1,000 during one year preceding the survey in urban areas by household background characteristics	8
Table 2.04	CBR, CDR per 1,000 during one year preceding the survey in rural areas by household background characteristics	9
Table 2.05	Life expectancy at birth by region and household background characteristics	10
Figure 2.2:	Life expectancy at birth in years based on the national average by household characteristics	10
Table 3.01	Maternal Mortality Ratio during one year preceding the survey by residence, region and household background characteristics	12
Figure 3.1:	Maternal Mortality Rate (MMR) by background characteristics	12
Table 4.01	NMR, PMR, IMR, CMR and U5MR for the birth cohort of 1990-1994	14
Table 4.02	NMR, PMR, IMR for the birth cohort of 1994-1998	16
Figure 4.1	Percentage of deaths among last three births since 1995, by status of ANC and assistance at delivery by health personnel	17
Figure 5.1:	Percentage of deaths among last three births from March 1995 by status of antenatal care	17
Table 5.01	Percentage of deaths among last three births from March 1995 by status of antenatal care and assistance at delivery by health personnel	18
Figure 5.2:	Percentage of deaths among last three births since March 1995 by status of assistance at delivery	19

## In-depth Analysis on Mortality Differentials in Lao PDR

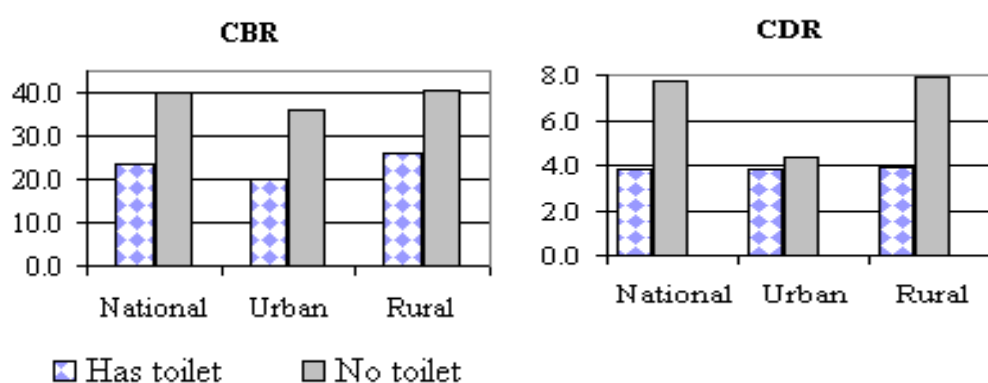
### Summary of Findings

The National Statistical Centre (NSC), under the sponsorship of UNFPA, is responsible for in-depth data analysis of the Lao Reproductive Health Survey 2000 (LRHS 2000). This analysis revises mortality by urban/rural residences, regions and provinces. It also examines examples of mortality regarding selected factors that have a significant effect on mortality. The household background characteristics are: type of house, electricity, sanitation (toilet), drinking water and distance from house to health services. The analysis consists of five chapters, summarized below.

The introductory part of the analysis, including the background of the study and the data used is developed in Chapter One. Since LRHS 2000 did not closely examine the factors affecting mortality, this study intends to determine how mortality is affected by household background characteristics.

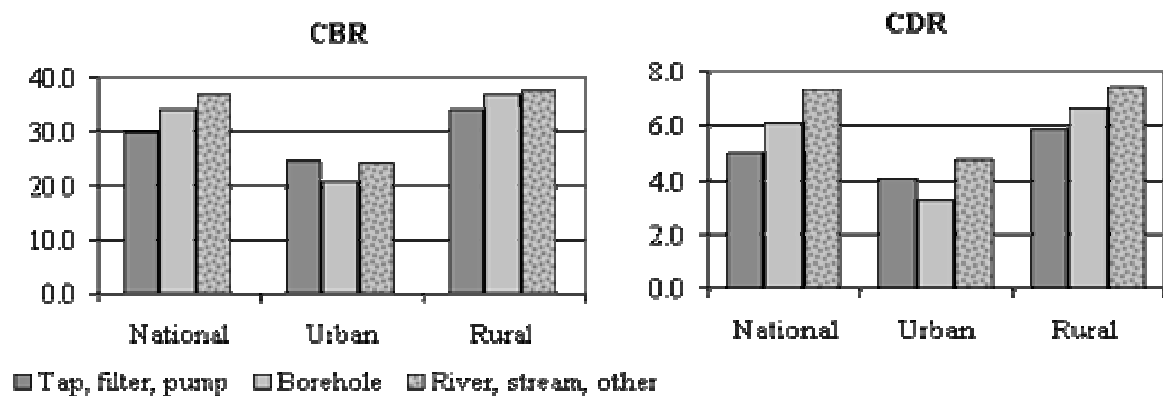
The topics of estimated mortality and life expectancy are developed in Chapter Two, with an overview of general estimates of birth and death at national, regional and provincial levels. The chapter briefly presents the crude birth rate (CBR), crude death rate (CDR), the rate of natural growth, and the maternal mortality rate (MMR) by household background characteristics. Life expectancy is developed in the last part of the chapter. Figures S01 and S02 give an impression of CBR and CDR at national level in urban/rural areas in the year preceding the survey by sanitation and drinking water conditions.

**Figure S01: CBR and CDR per 1,000 people in the year preceding the survey, by sanitation**



The analysis shows that consistently high birth and death rates are found among those living in bamboo houses without electricity, toilets or safe water, and which are located far from health services. The birth rate in urban households with no toilet is 36.2 and with no safe water, 24.1. The death rate in urban households with no toilet is 4.3; 4.8 in urban households with no access to safe drinking water.

**Figure S02: CBR and CDR per 1,000 people during one year preceding the survey by access to drinking water**

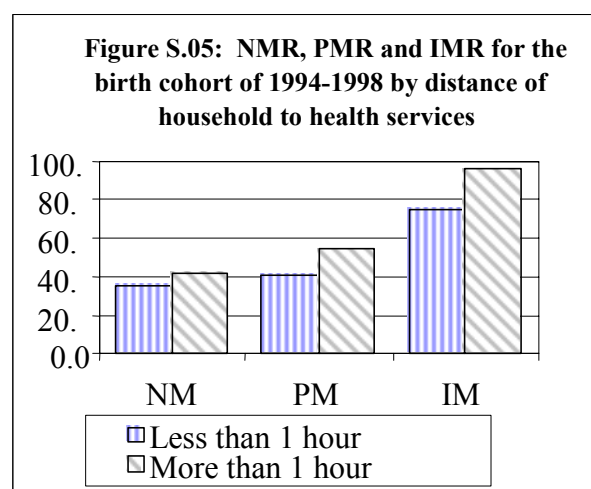
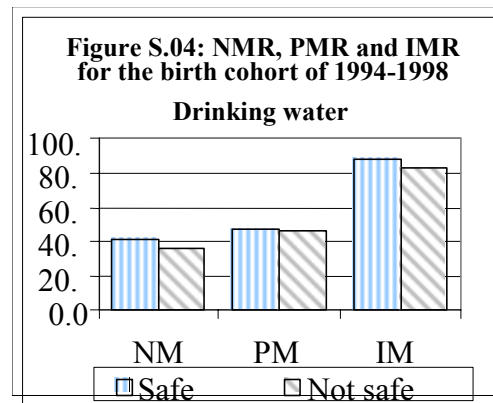
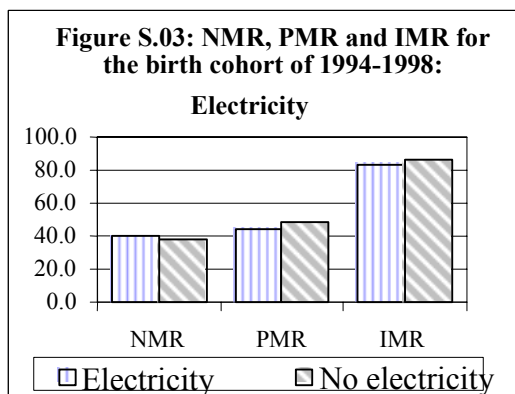


High rates of birth and death in rural areas are also found when the house is made of bamboo, has no electricity, toilet or safe drinking water and is located far from health services. The rate of natural growth in rural areas is high (3 percent) compared to urban areas (2 percent).

Chapter Three provides a summary of deeper analysis of maternal mortality during the 12 months preceding the survey. This study estimates maternal mortality rates based on type of house, sanitation, electricity, safe drinking water and distance to health services. Lower rates of MMR are found among households with access to electricity (181 per 100,000 live births) and with toilets (288 per 100,000 live births).

Chapter Four presents estimates of neonatal, post-neonatal, infant, child, and under-five mortality for two birth cohorts: 1990 to 1994 and 1995 to 1998. In addition to the main report of the LRHS 2000, the study shows differentials in these mortality estimates by access to electricity, toilets, safe drinking water, distance to health services, and mothers' school attendance, level of education and access to mass media.

One of the findings of the chapter is that the mortality rate is higher in the early years of life than later. Based on household background characteristics, the NMR, PNR, IMR, CMR, U5MR in the two birth cohorts present higher rates among women who live in bamboo houses, have no electricity, toilets or safe drinking water, live far from health services and have no education. See figure S03, S04 and S05 for a summary of NMR, PNR and IMR in the birth cohort 1994 to 1998.



Finally, Chapter Five focuses on high-risk fertility behaviour among currently married women and the birth of the last three children from March 1995; by status of antenatal care and assistance at delivery. There was a high percentage of deaths among children born in the five years preceding the survey to mothers who had no antenatal care, especially those who were too old (13.6%), with high birth order – having had four or more births – (10.7%), and for first births (10.3%).

It was found out that no child had died in the case of young mothers giving birth with the assistance of health personnel. Even in the case of old mothers who already had a number of children, only 2.9% of children died. However, among women with short birth intervals (11.1%), high birth orders (10.2%), and with old mothers with both short birth intervals and high birth orders (8.0%), there were a high percentage of children who died during non-assisted delivery. Significantly, the study also reveals that the risk of death for children is greater when there is no antenatal care (10.3%) and no assistance at delivery by health personnel (9.5%).

# CHAPTER 1

## INTRODUCTION

The Lao People's Democratic Republic (Lao PDR) shares common borders in the north with China, in the south with Cambodia, in the west with Thailand and in the east with Vietnam. The country is divided into three regions and 16 provinces, plus Vientiane Capital and one special region. The northern provinces include Phongsaly, Luangnamtha, Oudomxay, Bokeo, Luangprabang, Huaphanh and Xayabury. The central provinces include Vientiane Capital, Xieng Khuang, Vientiane, Borikhamxay, Khammuane, Savannakhet and Xaysomboun Special Region. Saravane, Sekong, Champasack and Attapeu make up the southern provinces. (See the Map).

### 1.1 Population Distribution

According to the 1995 population census, the population of Lao PDR stood at 4.6 million in that year, and was estimated at 5.6 million in 2003. According to the census and the Lao Reproductive Health Survey 2000 (LRHS 2000), the growth rate between 1995 and 2000 was 2.8 percent per year.

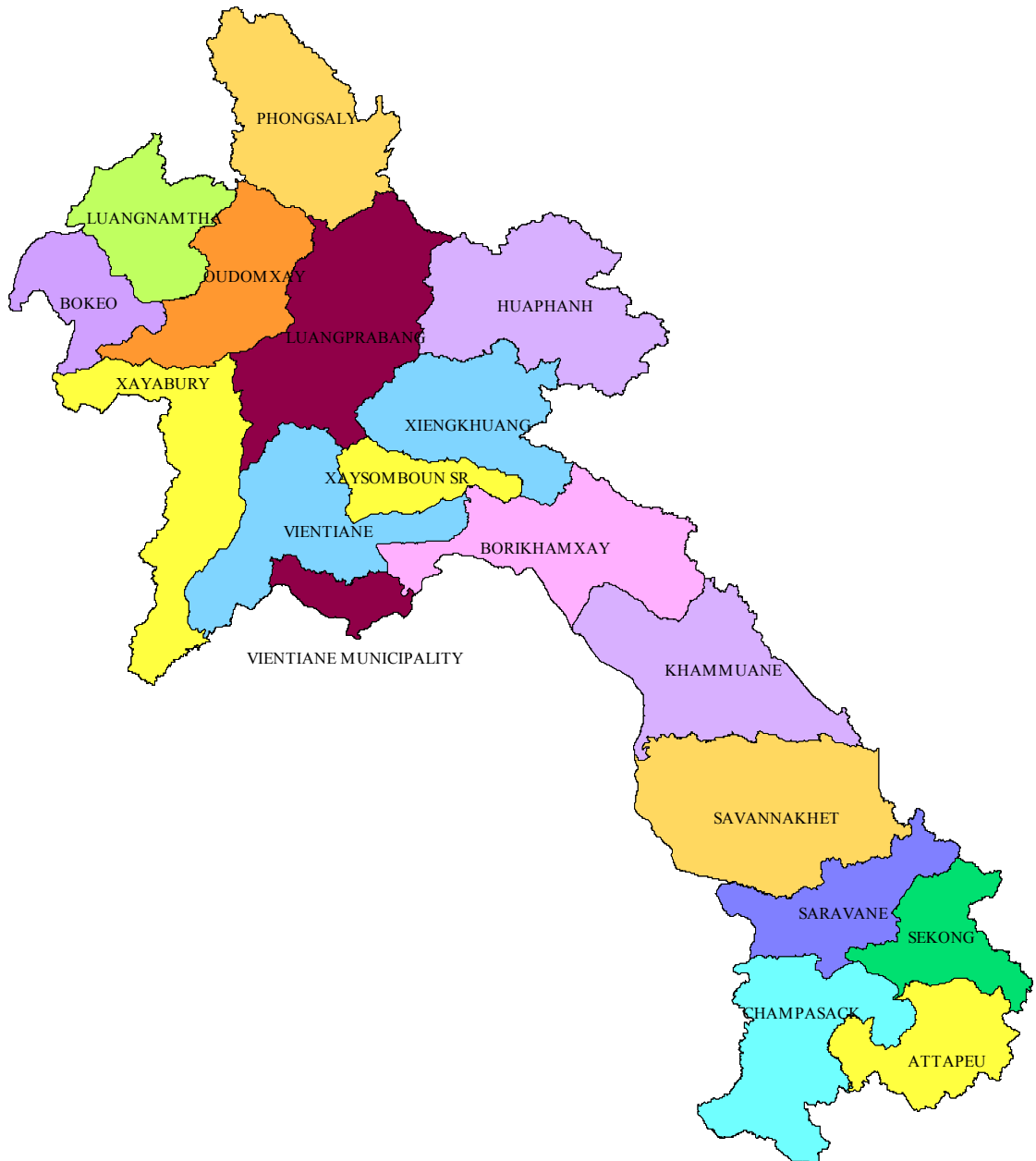
The Lao population is young and will remain so unless the total fertility rate (TFR) declines significantly from its present high level. About 44 percent of the population is under the age of 15, while almost 54 percent of the population is less than 19 years old. With 53 percent of the population between the ages of 15 and 64, a rapid growth in the number of 15 to 24 year-olds entering the labour market can be expected over the period beyond 2000.

Based on the crude birth and death rates from LRHS 2000, the rate of natural increase is 27.7 per 1,000 people, which gives an approximate growth rate of about 2.8 percent per year for 1999, provided migration is negligible. This relatively high rate of natural increase or growth is the result of the slow decline of the birth rate (or fertility) and a rapid decline in the death rate (or mortality). The crude birth rate (CBR), crude death rate (CDR) and growth rate of Lao PDR are the highest among countries in the region. Without a rapid decline in fertility, the Lao population will double in about 25 years. (See Table 1.01)

While the population is small and the density low, there are several important implications of current and prospective rates of population growth. Basic social services will need to be provided as well as employment opportunities for the growing population. At the same time, there will be the challenge of increasing the level of services to acceptable levels for the entire population.

# Map of Lao PDR

---



## **1.2 Population Policy and Reproductive Health Programme**

In June 1999, the Government of Lao PDR adopted the National Population and Development Policy. The policy deals with five key areas defining the specific objectives for each area and the strategies for their implementation. These areas include (1) reproductive health, (2) improvements in the status of women and children, (3) the status of ethnic populations, (4) economic development and (5) data collection.

Under reproductive health, the policy seeks to expand primary health care, reproductive health and family planning services to the whole country, especially rural areas. It targets increased access to information and services through the private sector, as well as local community participation to empower people to decide on the size of their families in accordance with their social and economic conditions. The policy attaches special importance to adolescents and provides opportunities for health and sex education in order to reduce the number of early pregnancies among females of less than 18 years of age and to prevent the transmission of sexually transmitted diseases (STDs), including HIV/AIDS.

## **1.3 Objectives and Coverage of the In-depth Analysis on Mortality**

The objective of the in-depth analysis is to study the differentials and determinants of mortality in Lao PDR during two periods: from 1990 to 1994 and 1994 to 1999. The analysis provides up-to-date information on mortality levels over a specified period, which might not exist in a number of demographic studies. The information is intended to assist policy makers, programme managers and other concerned agencies in planning, designing, implementing, improving and evaluating reproductive health (RH) programmes, including family planning, nationwide.

The National Statistics Center (NSC), under the sponsorship of UNFPA, conducted an in-depth analysis on mortality that is based on the data of LRHS 2000. LRHS 2000 is a nationwide representative sample of 21,067 households comprising 12,759 women aged 15 to 49 and 3,060 men (husbands) aged 15 to 59. (For details, see the report of LRHS 2000).

The analysis takes into account estimates including child and maternal mortality on the basis of selected background characteristics. Furthermore, it also studies two birth cohorts for infant and child mortality, and high-risk fertility behavior. In the study, two models were developed for two birth cohorts in the multivariate analysis on the determinants of infant and child mortality using a logistic regression technique.

**Table 1.01: Weighted and out-weighted distribution of households and women by province**

Province	Number of households		Number of women	
	Out-weighted	Weighted	Out-weighted	Weighted
<b>North</b>				
Phongsaly	1 192	694	779	408
Luangnamtha	1 145	568	682	332
Oudomxay	1 157	947	723	561
Bokeo	1 152	547	659	319
Luangprabang	1 190	1 642	761	957
Huaphanh	1 168	1 010	679	625
Xayabury	1 192	1 389	747	791
<b>Central</b>				
Vientiane M.	1 197	2 547	800	1 671
Xiengkhuang	1 177	821	680	472
Vientiane P.	1 188	1 326	740	766
Borikhamxay	1 155	779	649	434
Khammuane	1 175	1 389	715	791
Savannakhet	1 194	2 946	765	1 901
Xaysomboun SR	1 152	210	670	140
<b>South</b>				
Saravane	1 155	1 200	600	715
Sekong	1 093	274	659	179
Champasack	1 199	2 357	754	1 442
Attapeu	1 186	421	697	255
<b>Total</b>	<b>21 067</b>	<b>21 067</b>	<b>12 759</b>	<b>12 759</b>

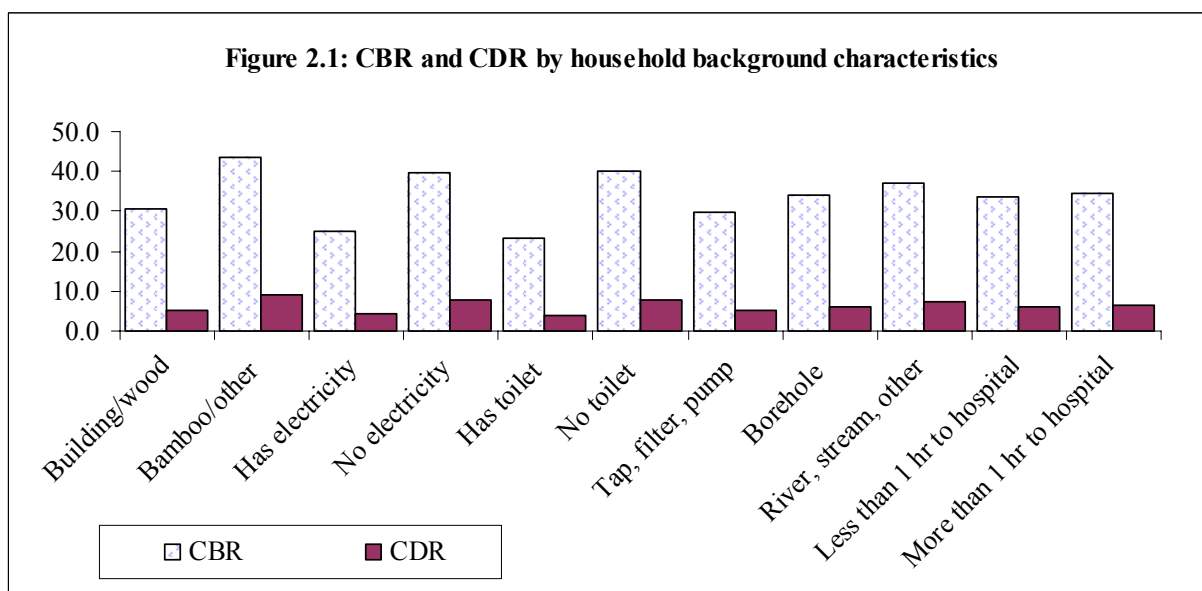
## CHAPTER 2

### MORTALITY ESTIMATES AND LIFE EXPECTANCY

This chapter gives an overview of general birth and death estimates at national, regional and provincial levels, and briefly presents the crude birth rate (CBR), crude death rate (CDR), the rate of natural increase and maternal mortality rate (MMR) by household background characteristics. These characteristics represent basic facilities including the type of house, electricity, toilet, drinking water and distance to health services. Life expectancy at birth is also examined in relation to the above-mentioned background characteristics.

#### 2.1 Mortality Estimate

As Table 2.01 shows, there are significant differentials in birth and death at provincial and regional levels, and between urban and rural areas. The crude birth rate quite substantially varies from province to province. It ranges from 19.8 in Vientiane Capital to 44.6 in Xaysomboun Special Region. The lowest death rate is found in Xayabury with 3.4 and the highest is in Khammuane province. The high rate of natural increase will always appear when there is a big difference between birth and death. Therefore, from the same table it can be seen that the lowest rate is in Vientiane Capital and the highest in Attapeu province.



**Table 2.01: Crude birth rate (CBR), crude death rate (CDR) per 1,000 people during 12 months preceding the survey; by region, residence and province**

Province (self-weighted)	Mid year population	Number of births	Number of deaths	CBR	CDR	Rate of natural increase
<b>Region</b>						
Central	59 195	1 951	367	33.0	6.2	2.7
North	40 713	1 394	250	34.3	6.1	2.8
South	24 489	889	168	36.3	6.9	2.9
<b>Residence</b>						
Urban	24 898	588	97	23.6	3.9	2.0
Rural	99 499	3 646	688	36.6	6.9	3.0
<b>North</b>						0.0
Phongsaly	7 433	210	34	28.3	4.6	2.4
Luangnamtha	6 592	191	34	29.0	5.2	2.4
Oudomxay	7 087	263	52	37.1	7.3	3.0
Bokeo	6 359	209	27	32.9	4.2	2.9
Luangprabang	6 893	263	61	38.2	8.8	2.9
Huaphanh	7 782	341	52	43.8	6.7	3.7
Xayabury	6 971	177	24	25.4	3.4	2.2
<b>Central</b>						
Vientiane Capital	6 761	134	25	19.8	3.7	1.6
Xiengkhuang	8 052	308	60	38.3	7.5	3.1
Vientiane	6 908	225	39	32.6	5.6	2.7
Borikhamxay	6 691	247	24	36.9	3.6	3.3
Khammuane	6 656	246	72	37.0	10.8	2.6
Savannakhet	7 186	269	46	37.4	6.4	3.1
Xaysomboun SR	7 198	321	48	44.6	6.7	3.8
<b>South</b>						
Saravane	6 640	264	55	39.8	8.3	3.2
Sekong	6 094	260	30	42.7	4.9	3.8
Champasack	6 968	228	45	32.7	6.5	2.6
Attapeu	6 752	300	43	44.4	6.4	3.8
<b>Country (weighted)</b>	<b>124 397</b>	<b>4 234</b>	<b>785</b>	<b>34.0</b>	<b>6.3</b>	<b>2.8</b>

The results clearly show that consistently high birth and death rates are found among households who have bamboo houses, have no electricity or toilet, drink water from a borehole, river, stream or other outdoor source, and are located far from health services. (See Table 2.02 and Figure 2.1).

**Table 2.02: Crude birth rate (CBR) and crude death rate (CDR) per 1,000 people during 12 months preceding the survey by region, residence and household background characteristics**

<b>Background Characteristics</b>	<b>Mid-year population</b>	<b>No. of Birth</b>	<b>No. of Death</b>	<b>CBR</b>	<b>CDR</b>	<b>Rate of natural increase</b>
<b>Region</b>						
Central	59 195	1951	367	33.0	6.2	2.7
North	40 713	1394	250	34.3	6.1	2.8
South	24 489	889	168	36.4	6.9	3.0
<b>Residence</b>						
Urban	24 898	588	97	23.6	3.9	2.0
Rural	99 499	3646	688	36.6	6.9	3.0
<b>Type of house</b>						
Concrete/wood	92 806	2855	499	30.8	5.4	2.5
Bamboo/other	31 591	1379	286	43.7	9.1	3.5
<b>Electricity</b>						
Yes	47 271	1176	199	24.9	4.2	2.1
No	77 125	3058	586	39.6	7.6	3.2
<b>Toilet</b>						
Yes	45 079	1056	174	23.4	3.9	2.0
No	79 317	3178	611	40.1	7.7	3.2
<b>Drinking water</b>						
Tap, filter, pump	36 187	1076.5	181.3	29.7	5.0	2.5
Borehole	36 290	1235.7	221.2	34.1	6.1	2.8
River, stream, other	51 919	1921.8	382.8	37.0	7.4	3.0
<b>Distance to hospital</b>						
Less than 1 hr	68 112	2294	412	33.7	6.1	2.8
More than 1 hr	56 285	1940	373	34.5	6.6	2.8
<b>Total</b>	<b>124 397</b>	<b>4234</b>	<b>785</b>	<b>34.0</b>	<b>6.3</b>	<b>2.8</b>

The study also examines how these rates were affected by the household's background characteristics in urban and rural areas separately. In urban areas, the study assumes that households have more advance facilities such as access to better sanitation and public facilities such as electricity and health care services. Therefore, in the urban areas there are only two characteristics considered in the study: toilets and drinking water. In rural areas, all household's background characteristics are taken in account.

Urban households with neither toilets nor safe water (bottled water, pipe water, well or borehole) had high birth rates (36.2 and 24.1) and death rates (4.3 and 4.8) respectively compared with urban households which had toilets and access to safe drinking water. (See Table 2.03).

**Table 2.03: Crude birth rate (CBR), crude death rate (CDR) per 1,000 live births during 12 months before the survey in urban areas; by household background characteristics**

<b>Background Characteristics</b>	<b>Mid-year Population</b>	<b>No. of Birth</b>	<b>No. of Death</b>	<b>CBR</b>	<b>CDR</b>	<b>Rate of natural increase</b>
<b>Toilet</b>						
Yes	19 415	389	74	20.0	3.8	1.6
No	5 482	199	24	36.2	4.3	3.2
<b>Drinking water</b>						
Safe	22 812	537	87	23.5	3.8	2.0
Not safe	2 086	50	10	24.1	4.8	1.9
<b>Total</b>	<b>24 898</b>	<b>588</b>	<b>97</b>	<b>23.6</b>	<b>3.9</b>	<b>2.0</b>

Similarly, high rates of birth and death in rural areas were found among those who live in bamboo houses with no electricity, toilets or safe drinking water and who are located far from health services. In this group, the rate of natural growth is high: 3 percent compared to 2 percent in urban areas. (See table 2.04)

The survey data indicates that there is a wide disparity in fertility (CBR) and mortality (CDR) between urban and rural areas. The survey results indicate that urbanization alone does not totally explain the differentials in CBR and CDR. Facilities such as better sanitation and health services are also significant in lowering the level of birth and death.

There is a need to reduce high levels of birth and death and narrow the disparities between urban and rural areas. This implies better sanitation and access to health services, the implementation of effective family planning and RH policies and programmes, including behavioral change interventions.

**Table 2.04: Crude birth rate (CBR), crude death rate (CDR) per 1,000 of population in one year preceding the survey in rural areas by household background characteristics**

<b>Background Characteristics</b>	<b>Mid-year population</b>	<b>No. of Birth</b>	<b>No. of Death</b>	<b>CBR</b>	<b>CDR</b>	<b>Rate of natural increase</b>
<b>Type of house</b>						
Building/wood	69 804	2 321	412	33.3	5.9	2.7
Bamboo/other	29 695	1 325	277	44.6	9.3	3.5
<b>Electricity</b>						
Yes	26 164	722	122	27.6	4.7	2.3
No	73 335	2 924	566	39.9	7.7	3.2
<b>Toilet</b>						
Yes	25 664	668	101	26.0	3.9	2.2
No	73 835	2 979	587	40.3	8.0	3.2
<b>Drinking water</b>						
Safe	49 666	1 775	315	35.7	6.3	2.9
Not safe	49 833	1 872	373	37.6	7.5	3.0
<b>Distance to hospital</b>						
Less than 1 hour	44 726	1390	264	31.1	5.9	2.5
More than 1 hour	54 773	2257	424	41.2	7.7	3.3
<b>Total</b>	<b>99 499</b>	<b>3647</b>	<b>688</b>	<b>36.7</b>	<b>6.9</b>	<b>3.0</b>

## 2.2 Life expectancy at birth

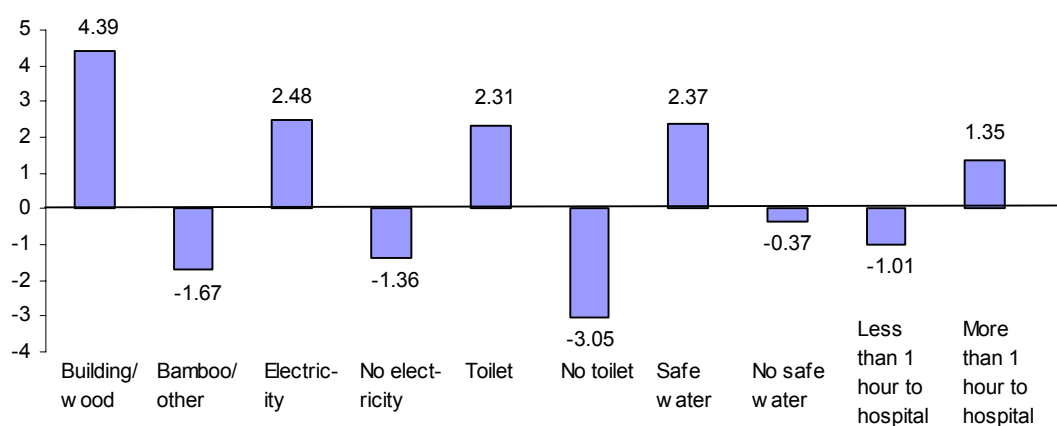
Life expectancy at birth is one of the significant indicators of the health and sanitation situation. According to LRHS 2000, the study used age-specific mortality rates in the last 12 months preceding the survey to estimate life expectancy. The data under study was adjusted and computed using MORTPAK software. The estimates by background characteristics of households are given in Table 2.05.

As shown in Table 2.05, life expectancy at birth of people living in the central region (59.6 years) is higher than in the north (57.1 years) and the south (57.6 years).

People living in concrete or wooden houses with access to electricity, toilet facilities and safe drinking water (using taps, filters, pumps and boreholes), and who live reasonably close to health services, have a higher life expectancy at birth than those who live in bamboo houses and do not have access to those facilities.

**Table 2.05: Life expectancy at birth by region and household background characteristics**

Background Characteristics	Mid-year population	Life expectancy at birth
<b>Region</b>		
Centre	59 195	59.6
North	40 713	57.1
South	24 489	57.6
<b>Type of house</b>		
Concrete/wood	92 806	63.1
Bamboo/other	31 591	57.0
<b>Electricity</b>		
Yes	47 271	61.2
No	77 125	57.3
<b>Toilet</b>		
Yes	45 079	61.0
No	79 317	55.7
<b>Drinking water</b>		
Safe	72 477	61.1
Not safe	51 919	58.3
<b>Distance to hospital</b>		
Less than 1 hour	68 112	57.7
More than 1 hour	55 274	60.1
<b>Total</b>	<b>124 397</b>	<b>58.7</b>

**Figure 2.2. The number of years of life expectancy at birth, lower and higher than the national average by household characteristic**

## CHAPTER 3

### MATERNAL MORTALITY

Birth delivery and complications during pregnancy are the main causes of maternal mortality. In the earliest report of the LRHS 2000, it was mentioned that due to the limitations of the sample size for estimated maternal mortality, the results should be interpreted with caution. Such limitations are especially crucial in this chapter where estimated maternal mortality by household background characteristics is presented.

#### 3.1 Maternal Mortality Rate

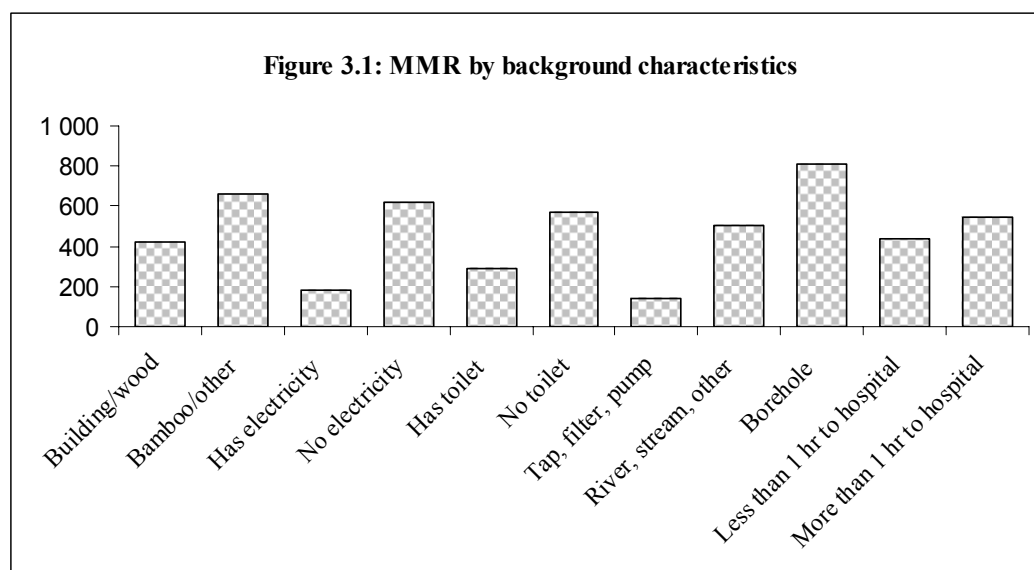
The main causes of maternal mortality include accidents during delivery and health complications related to women's pregnancy and after birth delivery during the next 49 days. The main LRHS 2000 report provided an estimate of the maternal mortality rate with a 95 percent confidence limit; the true mortality ratio is estimated to be between 480 and 580 per 100,000. It should be noted that estimates for MMR are not reliable or stable since only 22 cases were reported. At the national level, MMR was estimated at 530 per 100,000 live births. This rate was much higher in rural areas (580 per 100,000 live births) than in urban areas (170 per 100,000). Among the regions, the highest maternal mortality rate was found in the South with 700 per 100,000 live births. The lowest, at 440 per 100,000 live births, was in the Central region including the capital city.

The study further developed its analysis of the maternal mortality rate by focusing on selected household background characteristics including housing characteristics, sanitation, electricity, safe drinking water and distance to health services. This will provide a preliminary view of how maternal mortality is affected by those factors. The analysis of Table 3.01 shows that the high maternal mortality rate occurs among those who live in bamboo houses (659 per 100,000 live births), have neither electricity (621) and nor toilets (569), use borehole drinking water (809) and are located far from health services (442). It should be noted that lower rates of MMR are found among households with access to electricity and toilets (181 and 288 per 100 000 live births respectively). See Table 3.01 and Figure 3.1.

Generally, MMR in Lao PDR remains high compared to other neighbouring countries. In order to reduce it, the country needs to improve people's sanitation facilities and provide access to antenatal care given by skilled obstetrical health personnel.

**Table 3.01: Maternal Mortality Ratio during one year preceding the survey by residence, region and household background characteristics**

<b>Background Characteristics</b>	<b>No. of Birth</b>	<b>No. of MD</b>	<b>MMR</b>
<b>Residence</b>			
Urban	588	1.0	170
Rural	3 646	21.3	580
<b>Region</b>			
Central	1 951	8.5	440
North	1 394	7.6	540
South	889	6.2	700
<b>Type of house</b>			
Building/wooden/wood	2 855	12.0	421
Bamboo/other	1 379	9.1	659
<b>Electricity</b>			
Yes	1 176	2.1	181
No	3 058	19.0	621
<b>Toilet</b>			
Yes	1 056	3.0	288
No	3 178	18.1	569
<b>Drinking water</b>			
Tap, filter, pump	1 076	1.5	138
River, stream, other	1 922	9.6	501
Borehole	1 236	10.0	809
<b>Distance to hospital</b>			
Less than 1 hr	1 901	8.4	442
More than 1 hr	2 333	12.7	545
<b>Total</b>	<b>4 234</b>	<b>22.3</b>	<b>530</b>



## CHAPTER 4

### NEONATAL, POST-NEONATAL, INFANT, CHILD AND UNDER-FIVE MORTALITY

This chapter presents the estimates of neonatal, post-neonatal, infant, child, and under-five mortality for two birth cohorts: 1990-1994 and 1995-1998. It also shows the differentials in these mortality estimates by urban and rural residences; region; type of house; access to electricity, toilets, safe drinking water and distance to health services; plus mothers' access to mass media, their school attendance and educational level.

In this study, neonatal, post-neonatal, infant and child mortality rates are estimated directly from the pregnancy history. These rates are defined as follows:

- Neonatal mortality rate (NMR): the probability of dying during the first month of life;
- Post-neonatal mortality rate (PMR): the probability of dying after the first month of life but before age one;
- Infant mortality rate (IMR): the probability of dying before the first birthday;
- Child mortality rate (CMR): the probability of dying between one and five years of age; and
- Under-five mortality rate (U5MR): the probability of dying between birth and five years of age.

#### **4.1 Neonatal, post-neonatal, infant, child and under-five mortality for the birth cohort 1990-1994**

This section presents neonatal, post neonatal, infant, child and under-five mortality rates for the birth cohort of 1990-1994. This study makes possible the analysis of the probability of death of infants and children from 1990-1999. The analysis thus provides intricate data on under-five mortality with the possibility of dying during the first five years.

Table 4.01 shows that among the birth cohort of 1990-1994, at the national level, the NMR was 37.6 per 1,000 live births, the MR was 48.1, IMR was 85.7, CMR was 40.9 and U5MR was 126.6. This shows that the mortality rate is higher in the early years of life than later. Urban-rural differentials in mortality rates of this birth cohort show a familiar pattern: lower rates in urban than in rural areas. Likewise, NMR and PMR are lower in urban areas than in rural (32.0 vs. 38.2) and (35.3 vs. 35.3) respectively. The IMR, CMR and U5MR in urban areas are also lower than those in rural areas (67.3 vs. 88.4), (27.8 vs. 42.9) and (95 vs. 131.3) respectively. Among the three regions, NMR of 44.6, CMR of 46.5 and U5MR of 130.7 characterize the northern region. These rates are higher than those in the southern and central regions.

Regarding household background characteristics; NMR, PMR, IMR, CMR and U5MR present higher rates among women who live in bamboo houses, have no electricity, toilet or safe drinking water, live far from health services, and have no education. (See table 4.01)

**Table 4.01: NMR, PMR, IMR, CMR and U5MR for the birth cohort of 1990-1994**

<b>Background Characteristics</b>	<b>Population mid-year</b>	<b>Number of births</b>	<b>Number of deaths</b>	<b>NMR</b>	<b>PMR</b>	<b>IMR</b>	<b>CMR</b>	<b>U5MR</b>
<b>Residence</b>								
Urban	1 189	267	21	32.0	35.3	67.3	27.8	95.0
Rural	8 098	1 586	298	38.4	50.0	88.4	42.9	131.3
<b>Region</b>								
North	3 115	545	83	44.6	39.5	84.1	46.5	130.7
Centre	4 202	880	180	34.3	55.9	90.2	35.5	125.7
South	1 970	428	57	33.5	45.2	78.7	43.7	122.4
<b>Type of house</b>								
Concrete/wooden/wood	5 803	1 034	167	37.6	40.7	78.2	36.9	115.1
Bamboo/other	3 485	819	152	37.6	60.3	97.9	47.4	145.2
<b>Electricity</b>								
Yes	3 171	465	70	33.7	39.7	73.5	30.9	104.4
No	6 118	1 388	251	39.6	52.5	92.0	45.9	138.0
<b>Toilet</b>								
Yes	4 009	651	82	34.4	39.7	74.1	33.9	108.0
No	5 279	1 202	238	40.0	54.4	94.3	46.0	140.4
<b>Drinking water</b>								
Safe	4 403	811	147	34.5	47.2	81.8	36.6	118.3
Not safe	4 885	1 042	173	40.3	48.9	89.3	44.6	133.9
<b>Distance to the hospital</b>								
Less than 1 hour	5 014	771	146	36.9	46.7	83.6	38.5	122.1
More than 1 hour	4 273	1 082	173	38.4	49.6	88.0	43.5	131.5
<b>Access to mass media</b>								
Yes	6 197	1 228	239	31.1	47.4	78.6	34.5	113.1
No	3 091	625	81	50.5	49.5	100.0	53.4	153.3
<b>Attendant school</b>								
Yes	5 825	1 158	179	33.1	42.4	75.5	33.5	109.0
No	3 463	695	141	45.0	57.5	102.5	53.1	155.6
<b>Educational level</b>								
Secondary and higher	1 449	294	42	36.6	24.8	61.4	16.6	78.0
Primary	4 375	864	137	32.2	48.5	80.7	39.3	120.0
None education	3 463	695	141	45.0	57.5	102.5	53.1	155.6
<b>Total</b>	<b>9 287</b>	<b>1 853</b>	<b>319</b>	<b>37.6</b>	<b>48.1</b>	<b>85.7</b>	<b>40.9</b>	<b>126.6</b>

#### 4.2 Neonatal, post-neonatal and infant mortality for the birth cohort of 1994-1998

Child mortality and under-five mortality are not mentioned in this section since during this period the birth cohort under study was not finalised and the RH survey was conducted in 2000. Therefore, the section will provide only the estimates of NMR, PMR and IMR.

Table 4.02 reveals that at the national level the NMR, PMR and IMR among the birth cohort of 1994-1998 are 38.5, 46.7 and 85.1 respectively. Compared to the earliest birth cohort of 1990-1994, PMR and IMR of the recent cohort have decreased from 48.1, 85.7 to 46.7 and 85.1 respectively. Urban-rural differentials in mortality rates of this recent cohort also show an expected pattern: lower rates in urban than in rural areas. Likewise, urban NMR and IMR are lower than those in rural areas – 29.7 vs. 39.4 and 53 vs. 89 respectively. The IMR in rural areas is double that than in urban areas (23.3 vs. 49.6). Comparing the three regions, the IMR in the North (88.5) is higher than in the South (83.8) and the Centre (83.4).

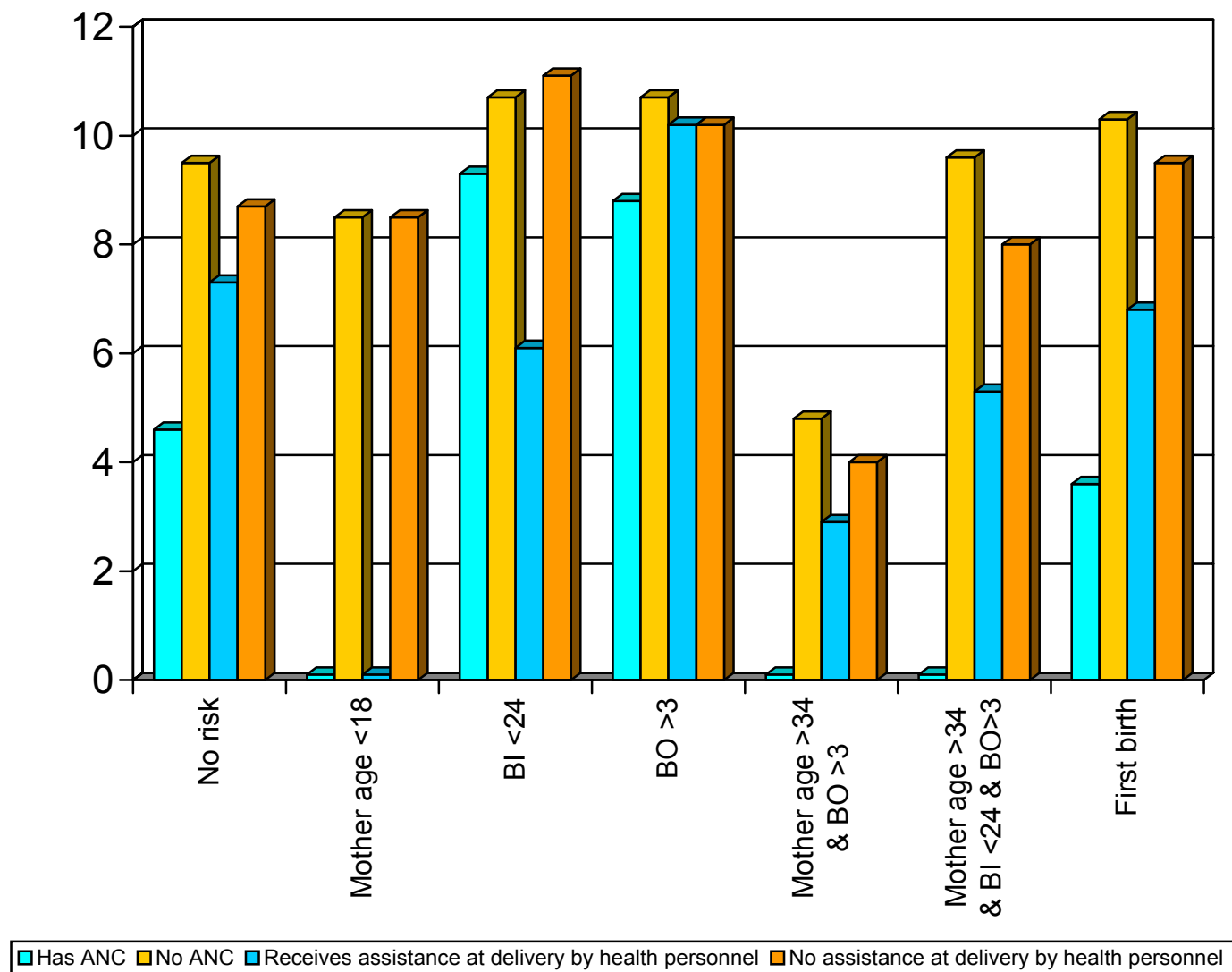
There appears to be a direct correlation between the NMR, PMR, and IMR and living conditions. We can see in Table 4.02 that these rates are higher when women live in bamboo houses, have no electricity, toilet or safe drinking water, live far from health services, and have no or little education. (See table 4.02)

Consequently, it is important to note that better types of living conditions: house; electricity, toilet, safe drinking water; access to health services, education and mass media help to reduce mortality at each stage of life. In addition, the evident downward trend in mortality rates, especially in urban areas, indicates that the use of maternal and child health (MCH) services – more accessible in urban areas – has increased. In particular, antenatal care/services and nutritional conditions have improved. We can also assume that better access and quality of RH/MCH services in rural areas will accelerate the reduction of mortality rates in future.

**Table 4.02: NMR, PMR, and IMR for the birth cohort of 1994-1998**

<b>Background Characteristics</b>	<b>Population Mid-year</b>	<b>Number of births</b>	<b>Number of deaths</b>	<b>NMR</b>	<b>PMR</b>	<b>IMR</b>
<b>Residence</b>						
Urban	943	180	22	29.7	23.3	53.0
Rural	7 662	1 500	281	39.4	49.6	89.0
<b>Region</b>						
North	2 871	478	87	43.9	44.6	88.5
Centre	3 777	754	153	38.7	44.8	83.4
South	1 957	446	61	30.2	53.7	83.8
<b>Type of house</b>						
Concrete/wooden/wood	5 368	901	173	38.7	42.3	81.0
Bamboo/other	3 237	778	129	38.0	54.1	91.8
<b>Electricity</b>						
Yes	2 813	349	58	39.5	44.4	83.9
No	5 791	1 331	244	37.8	47.8	85.8
<b>Toilet</b>						
Yes	3 700	566	81	37.0	40.0	77.0
No	4 906	1 112	221	39.3	51.8	91.1
<b>Drinking water</b>						
Safe	3 988	707	148	41.1	47.1	88.3
Not safe	4 619	972	155	35.9	46.3	82.3
<b>Distance to the hospital</b>						
Less than 1 hour	4 584	723	122	35.3	40.1	75.3
More than 1 hour	4 022	955	181	42.0	54.2	96.2
<b>Access to mass media</b>						
Yes	5 402	1 026	185	38.7	45.9	84.4
No	3 203	653	117	38.1	48.4	86.2
<b>Attended school</b>						
Yes	5 249	992	179	36.0	42.3	78.3
No	3 357	687	124	42.3	53.6	95.9
<b>Educational level</b>						
Secondary and higher	1 385	231	46	35.4	28.2	63.6
Primary	3 863	761	133	36.0	47.4	83.6
No education	3 357	687	124	42.3	53.6	95.9
<b>Total</b>	<b>8 604</b>	<b>1 679</b>	<b>303</b>	<b>38.5</b>	<b>46.7</b>	<b>85.1</b>

**Figure 4.1 Death percentages of last three births since 1995, by status of ANC and assistance at delivery by health personnel**



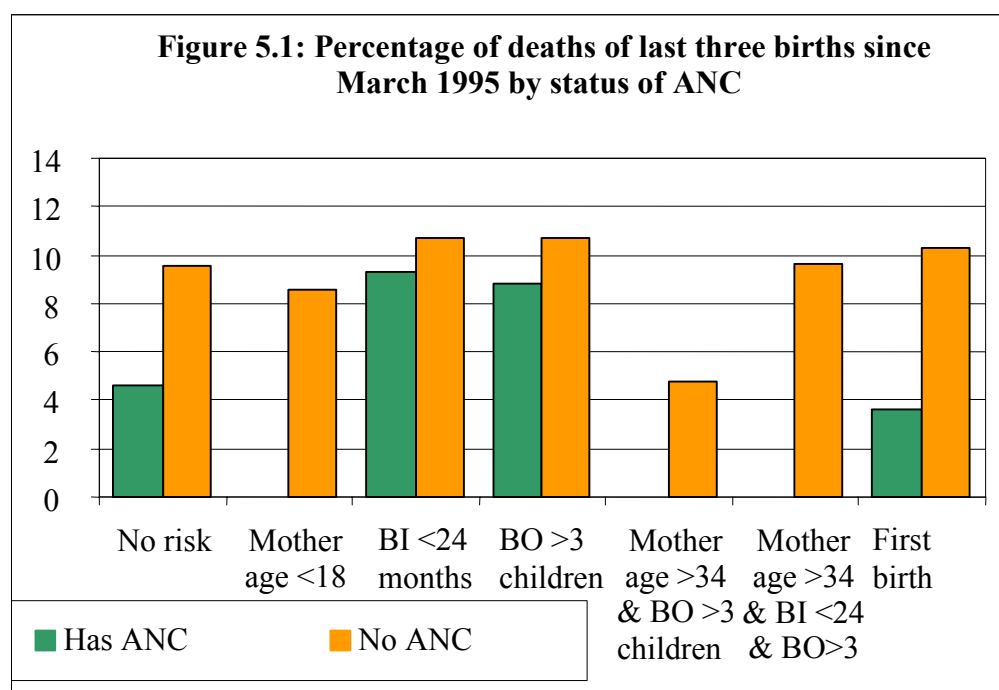
## CHAPTER 5

### HIGH-RISK FERTILITY BEHAVIOUR

This chapter focuses on high-risk fertility behaviour among married women and their last three births since March 1995, by status of antenatal care and assistance at delivery. We consider high-risk children whose mothers are too young or too old when they were born, children of high birth order and children born after a short birth interval. In this study, a mother is defined as ‘too young’ when she is below the age of 18, and ‘too old’ when she gives birth after the age of 34. ‘Of high birth order’ is defined as being the fourth or more child and a ‘short birth interval’ is when there is less than 24 months between two births.

#### 5.1 High-risk Fertility Behaviour and Antenatal Care

Table 5.01 presents the relative mortality risk for children born in the five years before the survey. The ratio of deaths in each risk category is also compared with mothers’ access or otherwise to antenatal care and whether they received assistance at delivery from health personnel. Table 5.1 reveals the significant and consistent effect of antenatal care. For all risk groups, there are a lower number of child deaths when the mothers receive antenatal care. It is significant to note that among the non-risk-mothers, more than half the child deaths could potentially have been avoided if the mothers had received antenatal care. (4.6 against 9.5). The same is also true in the case of child mortality involving high risk mothers with short birth intervals. The data also shows that the risk of child death in other risk groups – old or young mothers, more than three children, short birth intervals – is negligible if mothers receive antenatal care.



**Table 5.01: Percentage and number of deaths of last three births since March 1995 by status of antenatal care and assistance at delivery**

Risk category	Antenatal care		Assistance at delivery	
	Yes	No	Health personnel	No health personnel
No risk (Number)	4.6 (108)	9.5 (398)	7.3 (82)	8.7 (424)
Mother's age <18 (N)	0.0 (19)	8.5 (82)	0.0 (14)	8.0 (87)
Mother's age >34 (N)	0.0 (11)	13.6 (22)	a -	8.0 (25)
BI <24 (N)	9.3 (97)	10.7 (355)	6.1 (66)	11.1 (386)
BO >3 (N)	8.8 (102)	10.7 (289)	10.2 (59)	10.2 (332)
Mother's age <18 & BI <24 (N)	a -	8.3 (12)	a -	6.7 (15)
Mother's age >34 & BI <24 (N)	a -	8.3 (12)	a -	0.0 (11)
Mother's age >34 & BO >3 (N)	0.0 (48)	4.8 (187)	2.9 (34)	4.0 (201)
Mother's age >34 & BI <24 & BO >3 (N)	0.0 (27)	9.6 (104)	5.3 (19)	8.0 (112)
First birth (N)	3.6 (84)	10.3 (358)	6.8 (73)	9.5 (369)

Note: 'a' data is not shown due to a small number of cases (less than 10 persons)

## 5.2 High-risk Fertility Behaviour and Assistance at Delivery

Another important factor that affects the survival of mothers and children during delivery is assistance at birth. In the study, it is consistently found that the high risk related to ill-advised fertility behaviour has no or minimum consequence of child death if the high-risk mother receives assistance during delivery by health personnel. There were no cases of children dying at delivery as a consequence of their mothers being too young as long as health personnel assisted the mothers. Mothers with other high-risk behaviour also suffered less if they received assistance at delivery by health personnel. The big difference was among mothers with short birth intervals: the chance of their children dying was almost double if they did not receive assistance at delivery, (11.1 as compared to 6.1 percent.) See Table 5.1.

Significantly, the study reveals a very high risk of first children dying at birth when mothers had neither antenatal care (10.3%) nor assistance at delivery (9.5%). The study calls for the need for more support and active implementation of the reproductive

health programme including not only the provision of health services but also health care promotion with adequate information and educational programmes

