RESEARCH COMMUNICATION

Survey-based Cancer Mortality in the Lao PDR, 2007-08

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Abstract

Background: The Lao PDR is a landlocked country with 5,920,000 inhabitants for which very few epidemiological studies on cancer have been performed. The aim of the present study was to examine cancer mortality in 2007-2008. Methods: A descriptive cancer epidemiology protocol was designed with a data collection form and guideline for both demographics and list of all deaths from all 757 local Health Centers of 17 provinces/ cities. Five indicators, name, age, sex, date of death and the cause of death (ICD-10), were collected for each case. The age-specific cancer mortality rate and ASRs per 100,000 were estimated. Results: There were 448 cancer cases reported from Health Centers within 7 of 17 provinces/cities. Number of person-years was 654,459 for the two-year period. Cancer mortality rates of all sites (ASR) were 116.7 and 97.2 per 100,000 in males and females, respectively. The five most common cancers causing mortality per 100,000 were liver (52.2), followed by colorectal (19.0), lung (17.3), stomach (6.9), and leukemia-lymphoma (7.2) in males and liver (28.4); followed by colorectal (19.0), lung (14.0), cervical uteri (9.2) and stomach (7.1) in females. Conclusions: Liver and colorectal cancers were the first and second most common, respectively, in both males and female.

Keywords: Statistics - survey-based cancer mortality - the Lao PDR

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Introduction

Bordered by Thailand, Myanmar, China, Viet Nam and Cambodia, the Lao People's Democratic Republic (Lao PDR) is a landlocked country, 236,800 Km^2 in size, populated 5,920,000 inhabitants (2005). Most people reside in the Mekong Delta River in the West. Its eastern border with Viet Nam is dominated by the Viet Nam mountain chain. For grassroots health care system, there are 757 local Health Centers within 141 districts of 17 provinces/cities.

From 2000, Lao PDR has introduced a unique national mortality reporting system which relies on Health Centers that provide basic demographic data and information on the cause of death in monitoring population and Family planning. Mortality registration is weekly summarized in Health Centers and monthly summarized in District Health Centers and the information is then forwarded to the provincial and central-level governments. Very few epidemiological studies have been performed in the Lao PDR related to mortality, especially due to cancer. Due to a lack of available data, IARC's estimation of cancer incidence and cancer mortality in 2008 for Lao PDR was done by using data from China and Thailand (IARC, 2008), therefore, the real cancer problem in the country is not well addressed. The aim of the present study was to actively examine cancer mortality in the Lao PDR for the two-year period 2007-2008.

Materials and Methods

Descriptive cancer epidemiology was designed for the present study. Data collection forms of both demographic data and list of all deaths during 2007-2008 were prepared to collect data from all 757 local Health Centers within 141 districts of 17 provinces/cities. Five indicators included name, age, sex, date of death and the cause of death were collected for each case of death. A guideline to report demographic data of each commune and information of each case was prepared in the designed form and sent by express mail service to all heads of 757 local Health Centers throughout country (see Figure 1 for a Laos map).

The present method was tested and performed in Viet Nam, because mortality reporting systems in both Lao PDR and Viet Nam are almost similarly regarding official Commune Health Stations in Viet Nam and local Health Centers in the Lao PDR. For quality of mortality data collected by Commune Health Stations in Viet Nam, Ministry of Health of Viet Nam has conducted mortality study at Soc Son District of Hanoi city to validate the

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Figure 1. Lao PDR Mapping

quality of mortality registration in comparing with the results of verbal autopsies (standard) in 2003. For liver cancer, sensitive was 86% and predictive positive value was 92%. The present method was performed and described in our previous publications elf where (Ngoan, 2006a; 2006b; Ngoan et al., 2007; 2008). Referred to recent study to validate cancer mortality reported by the Commune Health Stations in Viet Nam by the WHO's designed Verbal Autopsy, agreement between two methods was 79% for all cancer sites, 77% for both liver cancer and colorectal cancers(Ngoan et al.). Therefore, the present method was validated to be feasible and reliable.

For health care facilities in taking care for cancer patients, central and province Hospitals were numbered of 4 and 17 in the Lao PDR, respectively in 2008. In addition, most cancer patients have visited hospitals in Thailand and Viet Nam for an advanced diagnosis and treatment because there has been favorable transport routs and free VISA between three countries.

The present study presented for data obtained from "A Good Health Center Database". Criteria to select Health Center databases from all 757 local Health Centers within 141 districts of 17 provinces/cities was: i) Health Center databases have estimated crude death rate per 100,000 from all causes ranked from 350 to 580, because this rate has been estimated by the Ministry of Health of Lao PDR; ii) Selected Health databases have over 90% of the list of death having a specific cause of death; and ii) Available demographic data. The selected Health databases were used to estimate cancer mortality rates in the Lao PDR in 2007-2008.

The study population by age groups was estimated using the age structure of Lao PDR national Census in 2005 and presented as person-year by sex and age groups of 1-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, and 70+. Cancer cases were coded following ICD-10 (see Figure 2) . Age-specific cancer mortality rate per 100,000 was estimated by sex and by cancer sites. World-

Table 1. Number - Rate/100,000 of Cancer Cases by Sites and Age Groups in Laos, 2007-2008, for Males

Site	ICD-10	Age group										
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70+	Crude	%	ASR
Oral, Tongue	C00-10	0	0	0	0	1	4	1	1	7		
		0.0	0.0	0.0	0.0	3.4	23.1	9.5	12.5	2.2	3.0	3.7
Stomach	C16	0	0	0	2	4	0	4	4	14		
		0.0	0.0	0.0	4.9	13.8	0.0	37.9	49.9	4.4	6.0	6.9
Colon, Rectal	C18-20	1	0	2	2	5	5	9	14	38		
		1.4	0.0	3.4	4.9	17.2	28.9	85.3	174.7	12.0	16.2	19.0
Liver	C22	0	1	1	6	20	22	26	26	102		
		0.0	1.3	1.7	14.6	68.8	127.0	246.4	324.5	32.1	43.6	52.2
Gallbladder	C23-24	0	0	0	0	0	2	1	0	3		
		0.0	0.0	0.0	0.0	0.0	11.5	9.5	0.0	0.9	1.3	1.7
Lung	C33-34	0	0	2	0	2	6	5	19	34		
		0.0	0.0	3.4	0.0	6.9	34.6	47.4	237.1	10.7	14.5	17.3
Heart, Thoracic, Thymus	C37-38	0	0	0	0	0	0	1	0	1		
		0.0	0.0	0.0	0.0	0.0	0.0	9.5	0.0	0.3	0.4	0.7
Bone	C40-41	0	0	0	0	1	1	3	2	7		
		0.0	0.0	0.0	0.0	3.4	5.8	28.4	25.0	2.2	3.0	3.9
Pleural cancer, Mesothelioma	C38.3,C45	0	0	0	1	1	1	0	0	3		
		0.0	0.0	0.0	2.4	3.4	5.8	0.0	0.0	0.9	1.3	1.2
Soft tissues	C46-49	0	0	0	0	1	0	0	0	1		
		0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.3	0.4	0.4
Breast	C50	0	0	0	0	0	1	0	0	1		
		0.0	0.0	0.0	0.0	0.0	5.8	0.0	0.0	0.3	0.4	0.5
Male genital	C60-63	0	0	0	0	1	0	0	0	1		
		0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.3	0.4	0.4
Brain	C71	3	0	1	0	0	0	0	0	4		
		4.1	0.0	1.7	0.0	0.0	0.0	0.0	0.0	1.3	1.7	1.2
Leukemia, Lymphoma	C81-96	2	2	4	0	1	2	4	2	17		
		2.7	2.5	6.8	0.0	3.4	11.5	37.9	25.0	5.3	7.3	7.2
Un-specified	US	0	0	0	0	1	0	0	0	1		
		0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.3	0.4	0.4
Total		6	3	10	11	38	44	54	68	234		
		8.1	3.8	17.1	26.7	130.8	253.9	511.7	848.7	73.6	100	116.7

Table 2. Number - Rate/100.000 of Cancer Cases by Sites and Age Groups in Laos, 2007-2008, for Females

Site	ICD-10	Age group										
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70+	Crude	%	ASR
Stomach	C16	0	0	1	1	2	2	4	5	15		
		0.0	0.0	1.6	2.3	6.5	10.9	35.6	58.7	4.5	7.0	7.1
Colon, Rectal	C18-20	0	0	1	2	5	8	7	17	40		
		0.0	0.0	1.6	4.6	16.2	43.6	62.4	199.6	11.9	18.7	19.0
Liver	C22	0	0	2	3	11	14	12	18	60		
		0.0	0.0	3.2	6.9	35.7	76.3	106.9	211.4	17.8	28.0	28.4
Pancreas	C25	0	0	0	0	0	0	1	0	1		
		0.0	0.0	0.0	0.0	0.0	0.0	8.9	0.0	0.3	0.5	0.6
Lung	C33-34	0	2	2	0	2	6	6	12	30		
		0.0	2.4	3.2	0.0	6.5	32.7	53.5	140.9	8.9	14.0	14.0
Bone	C40-41	1	0	1	1	0	1	0	0	4		
		1.3	0.0	1.6	2.3	0.0	5.4	0.0	0.0	1.2	1.9	1.3
Skin	C43-44	0	0	0	0	0	0	1	0	1		
		0.0	0.0	0.0	0.0	0.0	0.0	8.9	0.0	0.3	0.5	0.6
Pleural cancer, mesothelioma	C38.3, C45	0	0	1	0	2	0	0	0	3		
		0.0	0.0	1.6	0.0	6.5	0.0	0.0	0.0	0.9	1.4	1.0
Soft tissues	C46-49	0	0	0	0	1	0	0	0	1		
		0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.3	0.5	0.4
Breast	C50	0	0	1	1	6	5	0	0	13		
		0.0	0.0	1.6	2.3	19.5	27.2	0.0	0.0	3.9	6.1	5.3
Female genital	C51-58	0	0	1	4	3	5	6	1	20		
		0.0	0.0	1.6	9.2	9.7	27.2	53.5	11.7	5.9	9.3	9.2
Ovary	C56	0	0	0	0	1	0	0	0	1		
		0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.3	0.5	0.4
Brain	C71	0	1	0	0	0	0	1	0	2		
		0.0	1.2	0.0	0.0	0.0	0.0	8.9	0.0	0.6	0.9	0.8
Leukemia, Lymphoma	C81-96	1	1	4	3	3	1	2	4	19		
		1.3	1.2	6.5	6.9	9.7	5.4	17.8	47.0	5.6	8.9	7.1
Un-specified	US	0	0	0	1	1	1	0	1	4		
		0.0	0.0	0.0	2.3	3.2	5.4	0.0	11.7	1.2	1.9	1.6
Total		2	4	14	16	37	43	40	58	214		
		2.6	4.7	22.7	36.8	120.2	234.3	356.5	681.0	63.6	100.0	97.2

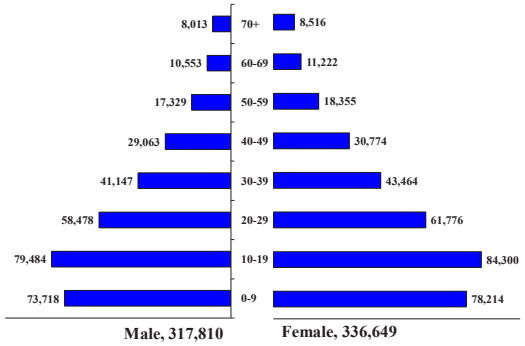

Figure 2. Study Population Pyramid (2007-2008)

age-standardized cancer rate per 100,000 was estimated (ASR). All obtained data of cancer deaths as well as demographic information was computed using Excel software. The Excel data was exported to STATA 8.0 for cancer analysis.

Results

There were 448 cancer cases reported by Health Centers from 7 of 17 provinces/cities in 2007-2008. For study population size, number of person-year was 654,459 for two-year period. There were 14 groups of cancer sites reported and coded ICD-10. Cancer mortality rates of all sites (ASR) were 116.7 and 97.2 per 100,000 in males and females, respectively (see Tables 1 and 2).

The five most common cancer mortality rates per 100,000 in males were liver with ASR 52.2; followed by colorectal 19.0; lung 17.3; stomach 6.9; and leukemia-lymphoma 7.2. Seven most common cancer mortality rates per 100,000 in females were liver with ASR 28.4; followed by colorectal 19.0; lung 14.0; cervical cancer 9.2; stomach 7.1; leukemia-lymphoma 7.1; and breast 5.3. Comparison with Globocan data are shown in Figures 3 and 4).

Four cancer sites of liver, lung, stomach and colorectal has responded to 80.3% and 67.7% of all cancers in males and females, respectively. For age groups, cancer mortality rates were sharply increased from 130.8 and 120.2 per 100,000 for aged 40+, to 848.7 and 681.0 per 100,000 for aged 70+ in both males and females, respectively. Average

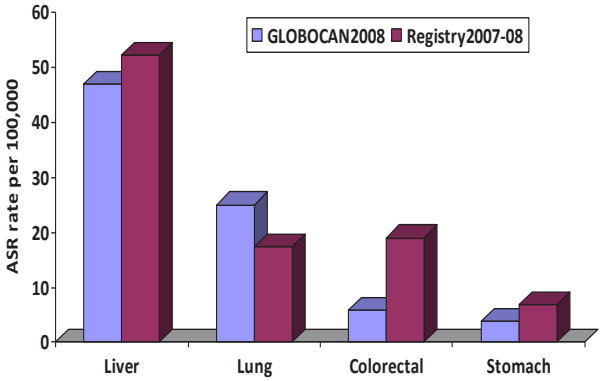

Figure 3. Estimated Cancer Mortality Rates (ASR) per 100,000 in Males

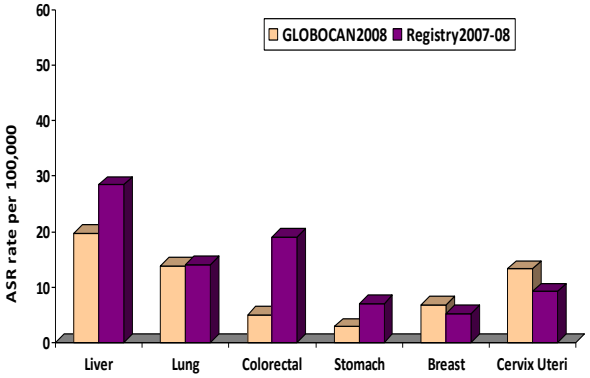

Figure 4. Estimated Cancer Mortality Rates (ASR) per 100,000 in Females

age at the endpoint of cancer was 58.4 in males and 55.9 in females.

Discussion

We found cancer mortality pattern and estimated crude and ASR mortality rates by sex and sites. In general, cancer mortality rates per 100,000 for all cancer sites was 116.7 and 97.2 that was consistent with the GLOBOCAN2008 as much as 129.1 and 98.8 in males and females, respectively. Specific feature of cancer in the Lao PDR is that liver and colorectal cancers were two most common in both males and females (IARC, 2008). Female cancer in the Lao PDR was higher than that among females in Viet Nam (ASR 98.8 versus 61.1 per 100,000). There was a lower male to female ratio (1.2) in the Lao PDR when compared to that in Viet Nam (2.3) (Ngoan & Hinh, 2010).

Liver cancer was the leading cause of death from cancer in the Lao PDR that is consistent with its findings in Khon Kaen, Thailand and Ho Chi Minh City, Viet Nam along with Mekong Delta River where liver cancer was also the most common (Quoc et al., 1998; Vatanasapt et al., 1995). The occurrence of liver cancer in the Lao PDR might be linked to the high prevalence of HBV and HCV in the country. That is, we found 8,498 study subjects have HBsAg(+) giving prevalence rate 8.6% and 860 have HCV(+) giving prevalence rate 2.6% (Ngoan et al., 2010). A mass HBV vaccination program for a new born and children would be a high priority in the Lao PDR now.

Colorectal cancer was three times higher than GLOBOCAN2008 (ASR 19.0 versus 5.8 per 100,000) in males and (ASR 19.0 versus 5.0 per 100,000) in females. It was also higher than colorectal cancer mortality in Viet Nam (7.1 and 4.9 per 100,000) and Thailand (6.4 and 6.5 per 100,000) in males and females, respectively (IARC, 2008; Ngoan et al., 2008; Ngoan & Hinh, 2010). Etiology of colorectal cancer in the Lao PDR was unknown and that should be a significant examination.

Stomach cancer was nearly two time higher than GLOBOCAN2008 (ASR 6.9 versus 3.9 per 100,000) in males and (ASR 7.1 versus 2.9 per 100,000) in females (IARC, 2008). Lung cancer mortality rate was lower than GLOBOCAN2008 (ASR 17.3 versus 25.0 per 100,000) in males. Cancer in the Lao PDR was promoted and caused by chronic infection of HBV-HCV (Liver) and *Helicobecter pylori - Hp* (stomach) and tobacco smoking (lung) in both males and females. That information suggested that primary cancer prevention is promised, because HBV infection will be controlled by a mass HBV vaccination and *Hp* will also be managed by antibiotics and Hp eradiation. Those findings suggested that, at least 50% cancers in the Lao PDR could be reduced if we promote effectively cancer prevention against tobacco smoking, HBV-HCV infection, *Hp* eradiation and stomach ulcer treatment.

The present study had certain limitations. Some cases of liver and lung cancers might be metastasis that could not be determined in our database. Sample size of 327,229 inhabitants (5.5% of 5,920,000) for two-year period, only 448 cancer cases were reported, therefore, many cancer sites were not available in our study population. A bigger sample size and a longer study period are recommended for a further cancer registration in the Lao PDR. The present findings have suggested that an estimation of cancer for the Lao PDR by using neighbor country data of Thailand and China has some limitations. Further active cancer registration in the Lao PDR should be performed.

In conclusions, in spite of some limitations, the present study findings have provided useful database in making decisions for cancer research and prevention in the Lao PDR. In the Lao PDR, liver cancer was the leading cause of death from cancer. Colorectal cancer was the second most common in both male and female and it could be significantly examined for the etiology and its risk factors.

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