



RESEARCH ARTICLE

POPULATION BASED CANCER INCIDENCE IN VARIOUS GEOGRAPHICAL REGIONS OF NEPAL – 2015

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ABSTRACT

In recent years, due to the application of modern technology for the diagnosis of cancer, numbers of cancer cases are found to be increasing day by day in Nepal. But it is hard to assess the burden of cancer in national context based on available data. The available hospital based information neither shows the magnitude of the problem nor there has been any community-based study in the past. First time in Nepal, population based Cancer registry (PBCR) was started in 15 districts of three ecological regions; Mountain, Hills and plan land, which covered the 25.8% of total population of the nation.

This study includes data from fifteen districts of the country located in Terai, Hills and Himalaya. Therefore, upshot of this study can be used to deduce an overall situation of cancer in Nepal. For the process of population based cancer registration, cancer cases were reported from various data source institutions in the year 2015. Among them, the cases were verified by name, age, sex and topography/morphology of diseases. Out of projected areas and multiple entries were excluded from data base and total 2950 cases were analyzed for the purpose. The mean age at diagnosis was found to be 52.8 years. The most frequent form of cancer for both sexes was bronchus & lung (12.9%), followed by cervix uteri (10.9%), and breast (9.1%). Among the female cases, cervix uteri cancer (19.2%) was the most common followed by breast (15.7%) and bronchus & lung cancer (10.9%). Similarly, bronchus & lung cancer (15.6%) was the most common cancer among males, followed by stomach (6.6%) and larynx cancer (4.9%). The most prevalent age group (60-64 years) in male was found to be 12.8%, while in female of same age group was 13.4%.

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INTRODUCTION

Hospital based cancer registry has been started in Nepal since 2003 by B.P. Koirala Memorial cancer Hospital (BPKMCH). But, population based cancer registry (PBCR) was started only after one decade, in the year 2013, to accomplish the void of population based cancer registry by Cancer Prevention Control and Research Department of BPKMCH. Population based cancer registry is the process of recording new cancer patients from defined population. The information from cancer registry provides different data sources which are handy for planning, evaluation and control activities of cancers as well as epidemiological study. The PBCR provides incidence rates, characteristics of the population concerned and clues to etiology and prevention of diseases. According to GLOBOCAN 2012, an estimated 14.1 million new cancer cases and 8.2 million cancer related deaths occurred.

Table 1. Area and population covered by this study

District's Name	Male	Female	Total
Chitwan	298400	297681	658114
Makwanpue	243921	238877	528160
Bara	361920	347026	708947
parsa	322851	305630	628481
Nawalparasi	350017	352031	702048
Rupandehi	456337	445481	901818
Kapilvastu	306323	295986	602309
Dhading	204735	207581	412317
Gorkha	165830	175941	341771
Myagdi	65686	69928	135613
Tanahun	183533	195926	378559
Baglung	154590	166206	320796
Parbat	89095	95287	320796
Kaski	235364	240541	475905
Mustang	9017	8146	17163
	3447619	3442268	6889887

Total population of Nepal: 2, 66, 208, 09(2068)

Total Population of study area: 68, 89,887

Coverage:- 25.88% of total population

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Table 2. Collected Data from study areas for both sex

Distribution of cases in descending order by site for both sex				
ICD-10	Cancer sites	No. of cases	Percentage	
C34	Bronchus and lung	381	12.9	
C53	Cervix uteri	323	10.9	
C50	Breast	267	9.1	
C16	Stomach	169	5.7	
C56	Ovary	125	4.2	
C32	Larynx	99	3.4	
C71	Brain	96	3.3	
C23	Gall bladder	92	3.1	
C67	Bladder	81	2.7	
C20	Rectum	75	2.5	
C22	Liver and intrahepatic bile duct	68	2.3	
C15	Esophagus	65	2.2	
C91	Leukemia/lymphoid	63	2.1	
C92	Leukemia/myeloid	56	1.9	
C02	Other and unspecified parts of tongue	56	1.9	
C18	Colon	55	1.9	
C85	NHL	52	1.8	
C73	Thyroid gland	47	1.6	
C64	Kidney	41	1.4	
C77	Lymph nodes (different site)	41	1.4	
C81	Hodgkin's disease	38	1.3	
C12	Pyriiform sinus	37	1.3	
C06	Other and unspecified parts of mouth	36	1.2	
C95	Leukemia unspecified	35	1.2	
C61	Prostate gland	34	1.2	
C25	Pancreas	32	1.1	
C76	Other and ill-defined sites	30	1.0	
C80	Unknown primary site	30	1.0	
**	Unspecified	30	1.0	
C41	Bones, joints and articular cartilage of other and unspecified sites	29	1.0	
C49	Connective, subcutaneous and other soft tissues	26	0.9	
C11	Nasopharynx	20	0.7	
C54	Endometrium	18	0.6	
C40	Bones, joints and articular cartilage	18	0.6	
C24	Other and unspecified parts of biliary tract	17	0.6	
C30	Nasal cavity and middle ear	17	0.6	
C90	Multiple myeloma	15	0.5	
C60	Penis	15	0.5	
C44	Skin other	14	0.5	
C03	Gum	14	0.5	
C62	Testes	14	0.5	
C52	Vagina	12	0.4	
C07	Parotid gland	12	0.4	
C09	Tonsil	11	0.4	
C43	Skin melanoma	10	0.3	
C19	Rectosigmoid junction	9	0.3	
C26	Other and ill-defined digestive organs	9	0.3	
C51	Vulva	8	0.3	
C38	Heart, mediastinum, and pleura	8	0.3	
C31	Accessory sinus	8	0.3	
C17	Small intestine	8	0.3	
C69	Eye and adnexa	8	0.3	
C05	Palate	7	0.2	
C57	Other and unspecified female genital organs	6	0.2	
C48	Retroperitoneum and peritoneum	6	0.2	
C08	Other and unspecified major salivary glands	5	0.2	
C37	Thymus	5	0.2	
C72	Spinal cord, cranial, nerves, and other parts of CNS	5	0.2	
C70	Meninges	4	0.1	
C10	Oropharynx	4	0.1	
C13	Hypopharynx	4	0.1	
C21	Anus and anal canal	4	0.1	
C74	Adrenal gland	4	0.1	
C00	Lip, oral cavity and pharynx	4	0.1	
C14	Other and ill-defined sites in lip, oral cavity and pharynx	4	0.1	
C55	Uterus	3	0.1	
C04	Floor of mouth	3	0.1	
C58	Placenta	2	0.1	
C47	Peripheral nerves and autonomic nervous system	1	0.0	
C65	renal pelvis	1	0.0	
C68	other and unspecified urinary organs	1	0.0	
C42.2	Spleen	1	0.0	
C63	Other and unspecified male genital organs	1	0.0	
C75	Other endocrine glands and related structures	1	0.0	
Total		2950	100.0	

Table 4. Collected Data from study area for females

ICD-10			
C53	Cervix uteri	323	19.2
C50	Breast	264	15.7
C34	Bronchus and lung	183	10.9
C56	Ovary	125	7.4
C16	Stomach	85	5.1
C23	Gall bladder	64	3.8
C71	Brain	45	2.7
C73	Thyroid gland	38	2.3
C32	Larynx	37	2.2
C20	Rectum	33	2.0
C15	Esophagus	29	1.7
C22	Liver and intrahepatic bile duct	26	1.5
C92	Leukemia/myeloid	24	1.4
C67	Bladder	22	1.3
C91	Leukemia/lymphoid	22	1.3
C64	Kidney	21	1.3
C85	NHL	20	1.2
C18	Colon	19	1.1
C54	Endometrium	18	1.1
C02	Other and unspecified parts of tongue	17	1.0
C95	Leukemia unspecified	15	0.9
C25	Pancreas	14	0.8
C77	Lymph nodes (different site)	13	0.8
C76	Other and ill-defined sites	13	0.8
C80	Unknown primary site	13	0.8
C49	Connective, subcutaneous and other soft tissues	13	0.8
C52	Vagina	12	0.7
C24	Other and unspecified parts of biliary tract	11	0.7
C44	Skin other	11	0.7
C81	Hodgkin's disease	10	0.6
**	Unspecified	9	0.5
C12	Pyiform sinus	8	0.5
C06	Other and unspecified parts of mouth	8	0.5
C41	Bones,joints and articular cartilage of other and unspecified sites	8	0.5
C51	Vulva	8	0.5
C30	Nasal cavity and middle ear	7	0.4
C90	Multiple myeloma	7	0.4
C11	Nesopharynx	6	0.4
C40	Bones, joints and articular cartilage	6	0.4
C38	Heart, mediastinum, and pleura	6	0.4
C57	Other and unspecified female genital organs	6	0.4
C07	Parotid gland	5	0.3
C43	Skin melanoma	5	0.3
C19	Rectosigmoid junction	5	0.3
C31	Accessory sinus	4	0.2
C48	Retroperitoneum and peritoneum	4	0.2
C03	Gum	3	0.2
C09	Tonsil	3	0.2
C17	Small intestine	3	0.2
C08	Other and unspecified major salivary glands	3	0.2
C70	Meninges	3	0.2
C55	Uterus	3	0.2
C37	Thymus	2	0.1
C72	Spinal cord, cranial, nerves, and other parts of CNS	2	0.1
C10	Oropharynx	2	0.1
C13	Hypopharynx	2	0.1
C21	Anus and anal canal	2	0.1
C74	Adrenal gland	2	0.1
C58	Placenta	2	0.1
C69	Eye and adnexa	1	0.1
C04	Floor of mouth	1	0.1
C47	Peripheral nerves and autonomic nervous system	1	0.1
C65	renal pelvis	1	0.1
C68	other and unspecified urinary organs	1	0.1
C61	Prostate gland	0	0.0
C60	Penis	0	0.0
C62	Testes	0	0.0
C26	Other and ill-defined digestive organs	0	0.0
C05	Palate	0	0.0
C00	Lip, oral cavity and pharynx	0	0.0
C14	Other and ill-defined sites in lip, oral cavity and pharynx	0	0.0
C42.2	Spleen	0	0.0
C63	Other and unspecified male genital organs	0	0.0
C75	Other endocrine glands and related structures	0	0.0
Total		1679	100.0

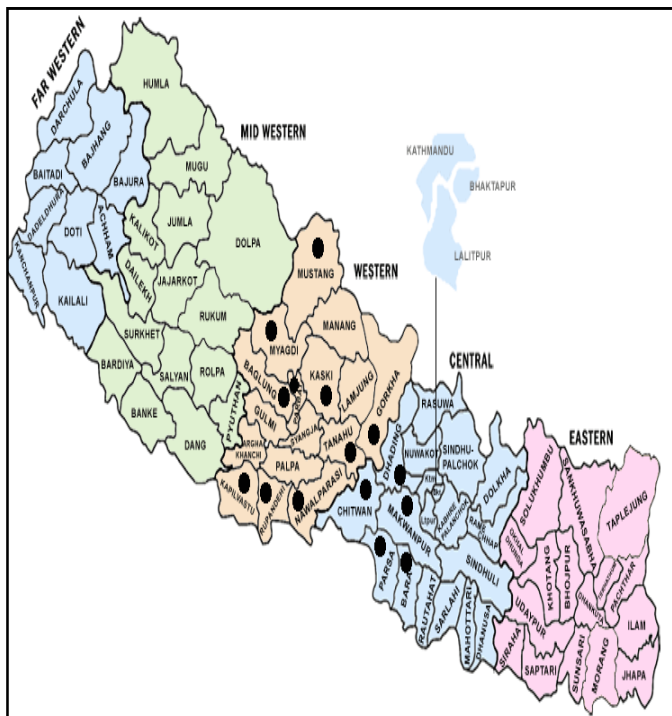


Figure 1. Three Geographical areas (Mountain, Hills and Tarai) of 15 districts

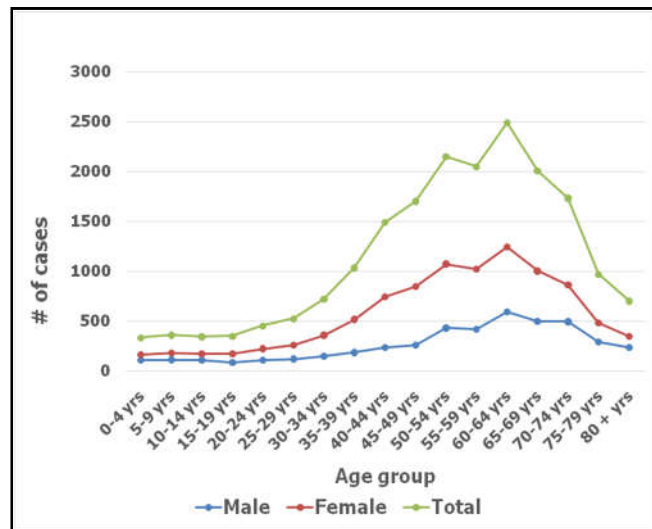


Figure 2. Age Distribution of Cancer Cases for both sexes

MATERIALS AND METHODS

This is retrospective analysis. The information of all age groups were collected from various diagnostic and curative care centers. Informations include name, age, sex, occupation, religion and district were collected and recorded from the major diagnosis procedures i.e. histopathological, haematological and radiological as well as therapeutical procedures of cancers between 1st January to 31st December, 2015. The mortality data due to cancer was also collected from office of the vital events registration unit of each DDC/VDCs/Municipalities of relevant districts as well as project areas. Collected data were coded according to ICD O 3rd and ICD-10 published by IARC/WHO and proceeds for analysis using SPSS 19.0 version.

Data Sources

- District Hospital, Medical College and other hospitals.
- District Public Health Office and other relevant organizations.
- DDC/VDC/Municipality of project are i.e. office of vital event registration.
- Privatet hospitals, Diagnostic lab, hospice etc.

RESULTS

During the study period, net 2950 cases were recorded as summarized in Table 2. Female cancer cases 56.9% were more common than in male 43.1%. Most cancer cases were reported from Chitwan 12.7% followed by Kaski 12.5% and rupandehi 9.6%. The number of cases by site (ICD-10) and percentage of various cancer cases for males and females are given in Table. In addition, data for the age distribution of the most common cancers are given in Figure 2 for males and females, separately.

DISCUSSION

This study was undertaken at BP Koirala memorial cancer hospital, Bharatpur, Chitwan, Nepal. BPKMCH is a national cancer institute of the nation. Secondary data of national cancer registry programme and data sources of study areas i.e. 15 district of three geographical region (Mountain, Hills and Plan land) are included. This hospital played vital role to control cancer by providing curative and preventive services and also conducting different programs like research and survey. To fulfill the above role, National level cancer registry program (HBCR & PBCR) is managed under the department of cancer prevention, control and research in this institution. To run the national level cancer registry program, different institutions of fifteen districts are the main sources of data collection i.e.

- District Hospital, Medical College and other hospitals.
- District Public Health Office and other relevant organizations.
- DDC /VDC/Municipality of project are i.e.office of vital event registration.
- Privatet hospitals, Diagnostic lab, hospice etc.

Our study showed that Cancer of bronchus and lung was the most common topography (12.9%) followed by cancer of cervix uteri (10.9%) and breast cancer (9.1%) for both sex. Cancer of cervix uteri (19.2%) was the top ranking cancer site for women followed by breast cancer (15.7%) and bronchus & lung cancer (10.9%). Similarly, cancer of bronchus & lung (15.6%) was ranked as a top leading cancer site for men followed by stomach cancer (6.6%) and cancer of larynx (4.9%). Stomach cancer (5.7%) was found to be the fourth most leading cancer site and ovarian cancer (4.2%) ranked five most position for both sex. Whereas, cancer of ovary (7.4%) was forth most common cancer and cancer of stomach (5.1%) ranked as a fifth most common cancer site for female. Similarly, cancer of urinary bladder (4.6%) was the fourth most common cancer site and brain cancer (4.0%) ranked as a fifth most common cancer site for male. Regarding the first leading cancer site overall, in the bronchus & lung, this is also the case for many Indian registries and Karachi (Curado et al., 2007; Forman et al., 2012). Bronchus & lung cancer generally predominating in males, presumably because of smoking

habits, and latter in females (Curado *et al.*, 2007., Moor *et al.*, 2010., Forman *et al.*, 2012). A survey in rural communities of Nepal by Pandey *et al.* (1988) showed that, in the 20+ years age group, 85.4% of men and 62.4% of women were tobacco users. The prevalence of smokeless tobacco use, as well as smoking, is high, particularly among males and disadvantaged groups (Sinha *et al.*, 2012). More recently, it was documented that older women are also very likely to smoke, especially those with a lower socioeconomic status (Pandey and Lin, 2013). An inverse association was observed between education and lung cancer risk also observed higher the lung cancer risk among unmarried personality and lower risk in the individuals who lived in the central region compared to the west (Hashibe *et al.*, 2011). Awareness of lung cancer by tobacco use and other risk factors varied with socioeconomic status amongst residents of pokhara, Despite their awareness of smoking as a risk factor for lung cancer, most of them still continue to smoke (Chawla *et al.*, 2010). Furthermore, even medical student perceptions about the cause of lung cancer may be influenced by their smoking behavior and there was little knowledge of public health measures for smoking control (Khatiwada *et al.*, 2012). In this study cancer of cervix uteri was the second leading cancer site for both sex and top cancer topography for female. Among females cancer of cervix uteri is a common cancer site for developing countries but in developed countries breast cancer ranked as a leading cancer. (Curado *et al.*, 2007; Moore *et al.*, 2010; Forman *et al.*, 2012). There is an urgent need for a reinvigorated and tailored approach to cervix cancer prevention among the educated youth in India, Nepal and Srilanka (joy *et al.*, 2011). From this data we have found a significant increase in cancer of cervix uteri in the future, suggesting the need for more focus and resource allocation on cervical cancer screening and treatment (Sathin *et al.*, 2013). Self- collected sampling methods should be the subject of additional research in Nepal for screening HR-HPV, associated with pre-cancer lesions and cancer, in women rural communities with limited access to health services (Johnson *et al.*, 2014).

In the context of limited screening services in Nepal, the efforts should be to reduce the diagnostic delay especially patient and health care provider delay for early detection and reduction of mortality rate of cervical cancer (Gyenwali *et al.*, 2014). Risk factors for cancer of cervix uteri like early age a marriage, and early age at first birth, multiparity, poor genital hygiene and infection with HPV virus infection are common in Nepal. Health education programs which are effective not only in increasing knowledge about cervical cancer and pap smear test but also effective in positively changing attitude towards the test should be organized to increase pap smear coverage (Ranabhat *et al.*, 2014). Breast cancer was the third most common cancer for both sex and second leading cancer site in female for 2015. Cancer of breast proved to have overtaken cervical cancer in terms of incidence, as in the majority of countries of Asia (Curado *et al.*, 2007; Moore *et al.*, 2010; Forman *et al.*, 2012). The fact that young Nepalese women account for over one quarter of all female breast cancers, many being diagnosed at an advanced stage (Sharma *et al.*, 2005; Thapa *et al.*, 2013) is of particular importance. The level of awareness of breast cancer, including knowledge of warning signs and BSE (breast self examination), is sub-optimal among Nepalese women (Sathian *et al.*, 2014). Community interventions have been a focus in Bangladesh (Ansink *et al.*, 2008) and Kolkaata (Basu *et al.*, 2006) and deserve emphasis in the Nepali context. In both breast and cervical cancer cases

compliance with both screening guidelines and subsequent referral and treatment are necessary (Dinshaw *et al.*, 2007a; 2007b). It should be noted that BSE has been validated in the Nepalese setting (Tara *et al.*, 2008). In this study stomach cancer was found as a fourth most common cancer for both sex and second leading cancer for men. Whereas, stomach cancer ranked as a fifth most common cancer for female. However stomach cancer was ranked as a leading cancer in males and females. In India there was considerable variation among cancer registries in this cancer (Nandakumar *et al.*, 2005; Moore *et al.*, 2015). The relatively low incidence of gastric cancer in Nepal can be attributed to low gastric mucosal atrophy, but mountainous subjects have high risk gastric mucosal status, which could be considered a high- risk population in Nepal. (Miftahussurur *et al.*, 2015). In this study ovarian cancer found as a fifth most common cancer for both sex. Whereas, it was ranked as a forth most common cancer for female. In this study cancer of larynx found as a sixth most common cancer for both sex. Whereas, cancer of larynx was a third leading cancer for male and ranked as a top ten cancer for female. Cancer of larynx was also leading cancer sites in India and Pakistan (Curado *et al.*, 2007; Moore *et al.*, 2010; forman *et al.*, 2012). In Nepal, cancer of supraglottic larynx is reported to be the commonest subsite to harbor laryngeal malignancy, with smoking and alcohol as prevalent risk factors (Koirala, 2015). In conclusion, in males the incidence of tobacco related cancers and in females' cervix, breast and other gynaecological cancer are high in Nepal. Therefore, primary prevention of bronchus & lung and other tobacco related cancers by implementation of tobacco control and screening of cervix and breast cancer are necessary on a wider scale from government level. Findings of this study our provided useful information that can be utilized for health planning in future research.

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