RESEARCH ARTICLE

Changes in the Distribution of Cancer Incidence in Nepal from 2003 to 2013

Krishna Kanta Poudel¹*, Zhibi Huang², Prakash Raj Neupane³, Roberta Steel⁴

Abstract

Background: Cancer incidence data are vital for cancer control planning in any nation. This retrospective study was conducted to compare the cancer incidence of all sites between the first cancer registry report and the most recent example in Nepal. Material and Methods: The cases in the first (2003) and latest (2013) national cancer registry reports, accumulated by all the hospital based cancer registries in Nepal were taken for the research. The frequencies, crude incidences and age specific incidences (per 100,000) of the five major cancers were calculated for both males and females. Result: The most common cancer type for males in both years 2003 and 2013 was lung. Stomach was the third most common cancer in 2003 while it was the second in 2013. Similarly, the first four major cancers (cervix, breast, lung and ovary) did not change between 2003 and 2013 in females. The total cancer incidence rate increased from 12.8 in 2003 to 30.4 per 100,000 in 2013 for males and from 15.1 to 33.3 in females. Conclusion: The most common cancers in males in 2003 and 2013 were the bronchus and lung. Similarly, the most common cancer in females was cervix at both time points. The cancer incidence rate in females was higher than in males both in 2003 and 2013.

Keywords: Cancer- incidence- sites- sex- age- Nepal

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Introduction

Cancer is considered to be a leading cause of death not only in developed, but also in developing countries and the main factors leading to the increase in cancer were found to be, aging and growth of population (Torre et al., 2015). Both these, along with other well known risk factors such as; smoking, obesity, physical inactivity were compounded due to changing reproductive patterns of urbanization and economic prosperity. In 2012 globally, 14.1 million new cancer cases and 8.2 million deaths occurred as of GLOBOCAN. Studies had shown that nearly 57% of cases and 65% of cancer deaths had been accounted throughout the world (Torre et al., 2015). In 2012, the most common cancer found in males were; lung, prostrate, colorectal, stomach and liver whereas for female the most common were; breast, colorectal, lung, cervix and stomach. Annually more than 60% of the world’s total new cases of cancer occur in; Asia, Africa and Central South America and after 20 years, the incidence of cancer is expected to increase by about 70% (WHO fact sheet, 2015).

In Nepal, there were altogether seven hospital-based cancer registries up until 2012 put, from 2013 the number of hospital based cancer registries increased up-to 12 which contributed to the collection and documentation of cancer cases throughout the country (National Cancer Registry Report, 2003), (National Cancer Registry Report, 2013). The goal of this research is to identify trends by recording and document by site, year and sex, the changes of cancer incidence in Nepal. As this study attempts to find out the real hospital-based cancer incidence in Nepal, we have calculated the crude incidence of all cancers by sites. Methodology for this research will include using available data from the first hospital based national cancer registry report (2003) and the most recent national cancer registry report (2013). As Nepal did not have the population based cancer registry, we have taken the population (denominator) from the census and cases from the hospital.

Material and Methods

This study has retrieved the data from all the hospital-based-cancer registry (B P Koirala Memorial Cancer hospital, Bhaktapur Cancer Hospital, Bir hospital, TU Teaching Hospital, Kanti Children Hospital, BP Koirala Institute of Health Science, Manipal Teaching Hospital, Shree Birendra Hospital, Civil Service Hospital, Patan Hospital, Paropakar Maternity and Women Hospital and Nepalgunj Teaching Hospital ) in 2003 and 2013 of Nepal. We have added the cancer cases of 2003 together

¹Bhaktapur cancer hospital, ²B P Koirala Memorial Cancer Hospital, Bharatpur; Chitwan Nepal, ³Department of Epidemiology and Biostatistics, School of Public Health, Guangxi Medical University, China, ⁴Cavendish Square Wellington New Zealand. *For correspondence: k.poudel.08@aberdeen.ac.uk
within categories as per international classification of
disease for oncology (ICD-10) published by World Health
Organization (WHO, 2010). This was done to make the
number comparable with the report of 2013. We have used
world standard population in five years interval to adjust
the age. All cancer cases by age, sex, site and year were
abstracted from the medical record sections of national
cancer registry forms of all hospitals. The collected data
were entered in Excel Sheet with respect to year, age, sex
and site. The population growth rate from 2001 to 2011
published on population monograph of Nepal volume 1
and the Census population of 2001 and 2011 were used
to predict the population of Nepal of 2003 and 2013
(Population Monograph of Nepal, 2014). The frequency
and the crude incidence of all cancers of both years by
sex and site were performed. The age specific incidence
(per 100,000) of five major cancers for both sexes was
calculated. All total cases with known age, sex and site
were included in the study. All double/multiple entry cases
were excluded by cross checking name, sex, address and
hospital registered number of each patients. For statistical
analysis, SPSS (version 23.0) and Microsoft Excel 2010
were used.

Results

Summary of total cancer cases both in years 2003 and
2013 were presented in Table 1. The cases, frequencies
and the crude incidence of all cancers presenting from
January 1st to December 31st in 2003 and 2013 has been
shown in Table 2 and Table 3 respectively. The age specific
incidence of five major cancers in males in 2003 and 2013
has also demonstrated in figure 1 and figure 2 respectively.
Similarly, the age specific incidence of five major cancers
in females in 2003 and 2013 have also performed in figure
3 and figure 4 respectively. Both the result reported that
cancer has increased in Nepal by both age and sex.

Discussion

Nepal did not have a hospital-based cancer registry
programme until 2003 (National Cancer Registry Report,
2003). As a consequence, all cases might not be included in
the first cancer registry programme which was established
in 2003 and which resulted in a lower incidence rate in that
year. Our study has reported that bronchus and lung cancer
was the most common cancer in males both in years 2003
2013. The crude incidence rate of bronchus and lung
was (2.2) in 2003 while it was (5.0) per 100,000 in males
in 2013. Different studies had reported that lung cancer
was the major cancer in males (Poudel et al., 2016; Pun et
al., 2015; Pradhananga et al., 2009; Binu et al., 2007) in
Nepal because of lower education, unmarried individuals
and Rai/Limbu/Magar ethnicity (Hashibe et al., 2010),
household air pollution and tobacco consumption
(Raspanti et al., 2016; Raspanti et al., 2015), not enough
medical health education (Khatiwada et al., 2012). For
young people in western Nepal; smoking was a serious
issue (Binu et al., 2010) which was the risk factor of lung
cancer (Torre et al., 2015). However, a hospital based
retrospective study in Manipal teaching hospital indicated

Table 1. Summary of Total Cancer Cases 2003 and 2013
for Both Sex in Nepal

| Years | Total cases | Male   | Female  |
|-------|-------------|--------|---------|
| 2003  | 3251        | 1,488(46%)| 1,763(54%)|
| 2013  | 8729        | 4,011(46%)| 4,718(54%)|

Figures

Figure 1. Age Specific Incidence of Five Major Cancers
in Males in Nepal, 2003

Figure 2. Age Specific Incidence of Five Major Cancers
in Males in Nepal, 2013

Figure 3. Age Specific Incidence of Five Major Cancers
in Females in Nepal, 2003

Figure 4. Age Specific Incidence of Five Major Cancers
in Females in Nepal, 2013
**Table 2. Distribution of Cancer Sites in Males and Females in Nepal, 2003**

| ICD-10   | Male Crude Incidence (per 100,000) | Female Crude Incidence (per 100,000) | Male Freq. (%) | Cases | Female Freq. (%) | Cases | ICD-10 |
|----------|-----------------------------------|--------------------------------------|----------------|-------|----------------|-------|--------|
| Lip      | 0.0                               | 0.2                                  | 4              | 0.1   | 0.5            | 0     | C00    |
| Base of Tongue | 0.0                           | 0.1                                  | 1              | 0.0   | 0.0            | 28    | C01    |
| Other and unspecified parts of tongue | 0.1                           | 0.7                                  | 13             | 0.2   | 1.9            | 12    | C02    |
| Gum      | 0.0                               | 0.1                                  | 2              | 0.1   | 0.8            | 8     | C03    |
| Floor of mouth | 0.0                         | 0.1                                  | 2              | 0.1   | 0.5            | 7     | C04    |
| Palate   | 0.0                               | 0.3                                  | 5              | 0.1   | 0.5            | 34    | C05    |
| Other and unspecified parts of mouth | 0.1                           | 0.6                                  | 11             | 0.3   | 2.3            | 12    | C06    |
| Parotid gland | 0.0                           | 0.1                                  | 2              | 0.1   | 0.8            | 2     | C07    |
| Other and unspecified major salarivary gland | 0.0                           | 0.0                                  | 0              | 0.0   | 0.1            | 6     | C08    |
| Tonsil   | 0.0                               | 0.2                                  | 3              | 0.1   | 0.4            | 3     | C09    |
| Oropharynx | 0.0                           | 0.1                                  | 1              | 0.0   | 0.2            | 12    | C10    |
| Nasopharynx | 0.1                           | 0.7                                  | 12             | 0.1   | 0.8            | 26    | C11    |
| Pyriform sinus | 0.1                           | 0.3                                  | 6              | 0.2   | 1.7            | 6     | C12    |
| Hypopharynx | 0.0                           | 0.0                                  | 0              | 0.1   | 0.4            | 8     | C13    |
| Other and ill defined sites in lip oral cavity and mouth | 0.0                           | 0.1                                  | 2              | 0.1   | 0.5            | 70    | C14    |
| Esophagus | 0.3                               | 1.9                                  | 34             | 0.6   | 4.7            | 110   | C15    |
| Stomach  | 0.5                               | 3.5                                  | 62             | 0.9   | 7.4            | 3     | C16    |
| Small intestine | 0.0                           | 0.1                                  | 2              | 0.0   | 0.2            | 25    | C17    |
| Colon    | 0.3                               | 2.1                                  | 37             | 0.2   | 1.7            | 0     | C18    |
| Rectosegmidjuncetion | 0.0                           | 0.0                                  | 0              | 0.0   | 0.0            | 33    | C19    |
| Rectum   | 0.2                               | 1.5                                  | 26             | 0.3   | 2.2            | 7     | C20    |
| Anus and anal canal | 0.0                           | 0.2                                  | 3              | 0.1   | 0.5            | 33    | C21    |
| Liver    | 0.2                               | 1.1                                  | 19             | 0.3   | 2.2            | 39    | C22    |
| Gall bladder | 0.6                           | 4.3                                  | 75             | 0.3   | 2.6            | 12    | C23    |
| Other and unspecified biliary tract | 0.1                           | 0.5                                  | 8              | 0.1   | 0.8            | 7     | C24    |
| Pancreas | 0.1                               | 0.9                                  | 15             | 0.1   | 0.5            | 2     | C25    |
| Ill defined digestive organs | 0.0                           | 0.1                                  | 2              | 0.0   | 0.1            | 2     | C26    |
| Nasal cavity and middle ear | 0.0                           | 0.1                                  | 1              | 0.0   | 0.1            | 17    | C30    |
| Accessory sinus | 0.0                           | 0.1                                  | 2              | 0.1   | 1.1            | 90    | C31    |
| Larynx   | 0.2                               | 1.0                                  | 18             | 0.8   | 6.0            | 0     | C32    |
| Trachea  | 0.0                               | 0.0                                  | 0              | 0.0   | 0.0            | 262   | C33    |
| Bronchus and lung | 1.5                           | 10.0                                 | 177            | 2.2   | 17.6           | 0     | C34    |
| Thymus   | 0.0                               | 0.0                                  | 0              | 0.0   | 0.0            | 3     | C37    |
| Heart, mediastinum and pleura | 0.0                           | 0.0                                  | 0              | 0.0   | 0.2            | 10    | C38    |
| Bones joint and articular cartilage | 0.1                           | 0.5                                  | 9              | 0.1   | 0.7            | 21    | C40    |
| Other and unspecified bones joints and articular cartilage | 0.1                           | 0.5                                  | 8              | 0.2   | 1.4            | 99    | C41    |
| Hematopoietic and Reticuloendothelial systems | 0.6                           | 3.9                                  | 69             | 0.8   | 6.7            | 0     | C42    |
| Skin melanoma | 0.0                           | 0.0                                  | 0              | 0.0   | 0.0            | 28    | C43    |
| Skin other | 0.2                           | 1.5                                  | 26             | 0.2   | 1.9            | 1     | C44    |
| Peripheral nerves and autonomic nervous system | 0.0                           | 0.0                                  | 0              | 0.0   | 0.1            | 15    | C47    |
| Peritoneum and retroperitoneum | 0.1                           | 0.6                                  | 11             | 0.1   | 1.0            | 17    | C48    |
| Connective subcutaneous and other soft tissue | 0.2                           | 1.0                                  | 18             | 0.1   | 1.1            | 10    | C49    |
| Breast   | 2.4                               | 15.6                                 | 275            | 0.1   | 0.7            | 0     | C50    |
| Vulva    | 0.1                               | 0.9                                  | 15             | 0.0   | 0.0            | 0     | C51    |
that head and neck were the most common types of cancer and lung cancer was the second most common cancer in males (Bhatt et al., 2009). In 2012, approximately 1.8 million new lung cancer cases were found, accounting for almost 13% of all cancers diagnosed. The highest lung cancer incidence rates among men were found in Europe, Eastern Asia, and Northern America, and the lowest rates were in sub-Saharan Africa (Torre et al., 2015).

Our study has illustrated that lung cancer was the third common cancer in females in both years 2003 and 2013.
Table 3. Distribution of Cancer Sites in Males and Females in Nepal, 2013.

| Sites                                | Male Crude Incidence (per 100,000) | Male Freq. (%) | Cases | Female Crude Incidence (per 100,000) | Female Freq. (%) | Cases | ICD-10 |
|---------------------------------------|------------------------------------|----------------|-------|--------------------------------------|------------------|-------|--------|
| Lip                                   | 0.1                                | 0.2            | 8     | 0.2                                  | 0.7              | 27    | C00    |
| Base of Tongue                        | 0.0                                | 0.0            | 1     | 0.1                                  | 0.2              | 7     | C01    |
| Other and unspecified parts of tongue | 0.4                                | 1.1            | 51    | 0.8                                  | 2.7              | 107   | C02    |
| Gum                                   | 0.1                                | 0.2            | 8     | 0.1                                  | 0.4              | 17    | C03    |
| Floor of mouth                        | 0.1                                | 0.2            | 8     | 0.2                                  | 0.6              | 26    | C04    |
| Palate                                | 0.1                                | 0.2            | 8     | 0.2                                  | 0.5              | 22    | C05    |
| Other and unspecified parts of mouth  | 0.2                                | 0.6            | 29    | 1.0                                  | 3.4              | 136   | C06    |
| Parotid                               | 0.1                                | 0.2            | 8     | 0.2                                  | 0.6              | 24    | C07    |
| Other and unspecified major salarivary gland | 0.1                        | 0.2            | 11    | 0.1                                  | 0.5              | 19    | C08    |
| Tonsil                                | 0.1                                | 0.3            | 12    | 0.2                                  | 0.6              | 26    | C09    |
| Oropharynx                            | 0.1                                | 0.2            | 10    | 0.2                                  | 0.6              | 25    | C10    |
| Nasopharynx                           | 0.2                                | 0.5            | 25    | 0.4                                  | 1.4              | 57    | C11    |
| Pyriform sinus                        | 0.1                                | 0.2            | 11    | 0.6                                  | 2.0              | 82    | C12    |
| Hypopharynx                           | 0.0                                | 0.0            | 2     | 0.1                                  | 0.3              | 14    | C13    |
| Other and ill defined sites in lip oral cavity and mouth | 0.0                        | 0.1            | 3     | 0.1                                  | 0.3              | 14    | C14    |
| Esophagus                             | 0.5                                | 1.5            | 73    | 0.8                                  | 2.5              | 102   | C15    |
| Stomach                               | 1.5                                | 4.6            | 215   | 2.4                                  | 7.8              | 312   | C16    |
| Small intestine                       | 0.0                                | 0.1            | 5     | 0.1                                  | 0.3              | 11    | C17    |
| Colon                                 | 0.6                                | 1.7            | 80    | 0.8                                  | 2.6              | 104   | C18    |
| Rectosegmojducnetion                  | 0.0                                | 0.1            | 6     | 0.1                                  | 0.2              | 9     | C19    |
| Rectum                                | 0.8                                | 2.3            | 110   | 0.8                                  | 2.8              | 111   | C20    |
| Anus and anal canal                   | 0.1                                | 0.2            | 10    | 0.1                                  | 0.3              | 13    | C21    |
| Liver                                 | 0.8                                | 2.3            | 110   | 0.9                                  | 3.0              | 121   | C22    |
| Gall bladder                          | 1.1                                | 3.4            | 161   | 0.7                                  | 2.3              | 92    | C23    |
| Other and unspecified biliary tract   | 0.2                                | 0.5            | 23    | 0.2                                  | 0.5              | 21    | C24    |
| Pancreas                              | 0.3                                | 0.9            | 41    | 0.4                                  | 1.2              | 50    | C25    |
| Ill defined digestive organs          | 0.0                                | 0.1            | 4     | 0.1                                  | 0.2              | 9     | C26    |
| Nasal cavity and middle ear           | 0.2                                | 0.5            | 23    | 0.2                                  | 0.6              | 23    | C30    |
| Accessory sinus                       | 0.1                                | 0.2            | 10    | 0.1                                  | 0.4              | 18    | C31    |
| Larynx                                | 0.8                                | 2.5            | 116   | 1.9                                  | 6.2              | 250   | C32    |
| Trachea                               | 0.0                                | 0.0            | 1     | 0.0                                  | 0.0              | 2     | C33    |
| Bronchus and lung                     | 3.5                                | 10.4           | 492   | 5.0                                  | 16.6             | 664   | C34    |
| Thymus                                | 0.0                                | 0.0            | 2     | 0.1                                  | 0.2              | 9     | C37    |
| Heart. mediastinum and pleura         | 0.0                                | 0.1            | 7     | 0.1                                  | 0.3              | 11    | C38    |
| Ill defined respiratory system        | 0.0                                | 0.0            | 2     | 0.0                                  | 0.0              | 2     | C39    |
| Bones joint and articular cartilage   | 0.0                                | 0.0            | 0     | 0.0                                  | 0.0              | 0     | C40    |
| Other and unspecified bones joints and articular cartilage | 0.3                        | 1.0            | 49    | 0.5                                  | 1.6              | 65    | C41    |
| Hematopoietic and Reticuloendothelial systems | 0.0                        | 0.0            | 0     | 0.0                                  | 0.0              | 0     | C42    |
| Skin melanoma                         | 0.2                                | 0.6            | 28    | 0.2                                  | 0.6              | 24    | C43    |
| Skin other                            | 0.2                                | 0.6            | 27    | 0.2                                  | 0.8              | 31    | C44    |
| Peripheral nerves and autonomic nervous system | 0.0                        | 0.0            | 2     | 0.0                                  | 0.0              | 2     | C47    |
This study has illustrated that cervix uteri cancer was the most common cancer in females in both years 2003 and 2013. The crude incidence rate of cervix uteri cancer was (3.8) in 2003 while it was (5.9) in 2013. Studies had also revealed that cervix uteri was the most common cancer for females in Nepal (Poudel et al., 2016; Pun et al., 2015; Pradhananga et al., 2009; Bhatt et al., 2009). It might be because of lack of information regarding the human papillomavirus (HPV), cervical cancer and HPV vaccine (Johnson et al., 2014), concept of Pap smear test (Ranabhat et al., 2014). Owing to not having enough knowledge and the poor purchasing capacity of HPV vaccination (Singh...
In conclusion, the number of cancer cases was higher in 2013 than 2003. Cancer incidence was has increased by age both in males and females in Nepal. The most common cancer in males in 2003 and 2013 was bronchus and lung. Similarly, the most common cancer in females in both years 2003 and 2013 was cervix and uterus.

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