# Table of Contents

I. INTRODUCTION ..................................................................................................................... 2  
II. METHODS ............................................................................................................................ 3  
III. RESULTS AND DISCUSSION ............................................................................................... 7  

3.1 All Sites ........................................................................................................................... 7  
3.3 Stomach Cancer ................................................................................................................. 10  
3.4 Colon Cancer .................................................................................................................... 13  
3.5 Rectum Cancer ............................................................................................................... 16  
3.6 Lung Cancer ..................................................................................................................... 18  
3.7 Liver Cancer .................................................................................................................... 21  
3.8 Breast Cancer .................................................................................................................. 24  
3.9 Cervical Cancer ............................................................................................................... 26  
3.10 Prostate Cancer ............................................................................................................. 27  
3.11 Thyroid Cancer ............................................................................................................. 29  

Appendix ................................................................................................................................... 32  
References .................................................................................................................................. 34  

Acknowledgements .................................................................................................................... 38  

Philippine Cancer Society Board of Trustees ........................................................................... 38  
Philippine Cancer Society - Manila Cancer Registry ................................................................. 39  
Department of Health - Rizal Cancer Registry ........................................................................ 39
This monograph presents the second part of the fifth volume of the analysis of the incidence of cancer in the populations of Metro Manila and Rizal province, in the Republic of the Philippines. The analysis made use of databases from two population-based cancer registries, namely the Department of Health-Rizal Cancer Registry (DOH-RCR) and the Philippine Cancer Society-Manila Cancer Registry (PCS-MCR). Presented here are cancer incidence trends from 1980 to 2007, which were determined using joinpoint regression and time-space maps.
I. INTRODUCTION

This is the second part of the fifth volume of the Cancer in the Philippines Series, and it presents cancer incidence trends for Metro Manila and Rizal Province from 1980 to 2007, the continuation of incidence trends from 1980 to 2003 in the previous series.

Incidence data tell us if we are successful, or unsuccessful, in cancer prevention, and incidence is best derived from population-based cancer registration. In the WHO 2008-2013 ACTION PLAN for the Global Strategy for the Prevention and Control of Noncommunicable Diseases, one of the indicators is the number of countries with population-based cancer registries. [1] This was reiterated in the WHO GLOBAL ACTION PLAN for the Prevention and Control of Noncommunicable Diseases 2013-2030. [2]

Cancer incidence has been reported for the Metro Manila and Rizal Province populations in the monograph series Cancer in the Philippines [3, 4, 5, 6, 7] and Philippine Cancer Facts and Estimates [8] [9, 10, 11, 12]of the Philippine Cancer Society, as well as the Cancer Incidence in Five Continents of the International Agency for Research on Cancer. [13]

Incidence trends reflect changing exposures to risk factors and, if present, the effects of interventions or programs aimed to remove or minimize such exposures. Trends provide information on the effects of increasing or decreasing exposure to risk factors, help monitor and evaluate prevention control programs when present, or provide evidence to the necessity of initiating appropriate prevention measures.

Another important indicator required in the WHO NCD ACTION PLANs the number of countries with reliable standardized data on the major noncommunicable disease risk factors (based on WHO tools). This is the WHO STEPS Surveillance Manual. [14] The Philippine Food and Nutrition Research Institute (FNRI) of the Department of Science and Technology (DOST) has been religiously using this WHO Method of NCD risk factors surveillance in its National Nutrition and Health Surveys (NNHeS) which are heavily cited in this publication. Started in 1978, the 8th NNHeS was in 2013.
II. METHODS

Data Gathering

Case finding, abstracting, data management and quality control have been described in detail in Cancer in the Philippines Vol. V Part 1. [6]

Data Analysis

Data analysis was done in three phases: 1) computation of age-standardized rates (ASR); 2) determining trends and annual percent change in ASRs using joinpoint regression; 3) illustrating and describing spatio-temporal trends as maps.

Computation of Age-standardized Rates

The computation of incidence rates was based on the number of new cases registered by the DOH-RCR and the PCS-MCR from 1 January 1980 to 31 December 2007. ASRs were computed for each year of study. Data were summarized and grouped into 5-year age groups and the age-standardized rates were computed using the World Standard Population.

Joinpoint Regression

Joinpoint regression analysis[15] was done to determine changes in the trend, using the joinpoint software [16] downloaded from the website of the Surveillance Research program of the USA National Cancer Institute. This method gives a more proper description of the patterns than linear regression and is useful in monitoring changes in cancer incidence.

The joinpoint regression determines a series of lines that are connected by a joinpoint, which indicates a statistically significant change in the trend. Trends were assessed by identifying the best-fitting points where a significant change in the slope occurred. The analysis began with the minimum number of joinpoints, a zero, representing a straight line. The presence of additional joinpoints was assessed and these were retained if they denoted a significant change in the trend.

The estimated annual percentage change (APC) was computed for each of the periods to describe the linear trends. The annual percentage change assumed that the rates changed at a constant percentage of the rate of the preceding year.
The following model was used to compute for the annual percentage change.

\[
\log (R_y) = b_0 + b_1 y \text{ where } \log (R_y) \text{ is the natural log of the rate in year } y
\]

The APC from year \( y \) to year \( y + 1 \) = \([R_{y+1} - R_y] / R_y \) x 100

\[
= \left( e^{b_0+b_1(y+1)} - e^{b_0+b_1(y)} \right) / e^{b_0+b_1(y)} \times 100
\]

\[
= (e^{b_1} - 1) \times 100
\]

**Cancer Maps**

To produce maps on cancer incidence, age-standardized rates, (ASRs, World Standard Population) were calculated for each municipality for 7-year periods 1980-1986, 1986-1992, 1992-1998, 1998-2004 and 2001-2007. For a given municipality, the observations were assigned to geographical central points; other geographical data needed in the map production included geographical data such as coordinates of national borders (using Alber’s equal area projection). Three administrative regions were located in two separate geographical locations. For these regions, the incidence rate was also located to two separate map coordinates with weights to correspond to sizes of populations living in those regions.

The colored incidence maps were produced by the Finnish Cancer Registry [17]. For six major cities with more than 100,000 inhabitants per sex, the rates were presented as coloured circles on the maps. The radius of the circle indicates the size of the population and the colour the ASR. The rates for the remaining municipalities were smoothed to decrease visibility of change variation. For each 2km by 2km grid, a weighted average of the ASRs of the neighbouring municipalities within a 60 km radius was calculated to define the colour of that grid. The rates were directly weighted with the population size of the municipality and inversely weighted in relation to the distance. Each step on the colour scale of the maps corresponded to a 10% increase in the ASR.

**Figure 1A** shows the names of the six major cities presented as coloured circles on the time-space maps.
Figure 1A. Cities and municipalities in the time-space maps, Metro Manila and Rizal Province.

Figure 1B shows the names of all the cities and municipalities. Rizal Province is composed of Angono, Antipolo, Baras, Binangonan, Cainta, Cardona, Jala-jala, Montalban, Morong, Pillila, San Mateo, Tanay, Taytay and Teresa. The rest are in Metro Manila.
Figure 1B. Cities and municipalities in Metro Manila and Rizal Province.
III. RESULTS AND DISCUSSION

Declining cancer incidence trends were observed in some sites, particularly in the infection-related cancers (stomach, liver, and cervix). On the other hand, incidence trends for cancers related to modern lifestyle continued to increase. Such increase might be attributed to the rapid urbanization and the consequent adoption of unhealthy lifestyle factors that included smoking, unhealthy diet, alcohol consumption, and low physical activity. [1][2][18][19]

3.1 All Sites

Incidence for all cancer types combined among men increased greatly from 1980 to 1986 (APC = 3.7; 95% CI= 1.2, 6.2) (Figure 2). The incidence of cancer in males decreased slightly from 1986 to 2007 (APC = -0.1; 95% CI= -0.5, 0.3). Overall cancer in males increased by an average of 0.7% per annum (95% CI= 0.1, 1.3). The trend for this period is similar to the trend observed in the previous edition. [20]

Figure 2. Joinpoint regression plot for all cancer sites, males, Metro Manila and Rizal Province, 1980-2007.

In females (Figure 3), there had been an annual increase of 0.5% in overall cancer in females (95% CI= 0.2, 0.7 from 1980 to 2007). Overall cancer incidence for this period is lower than the 0.8%
observed in females in the previous edition of this publication. [20]

Figure 3. Joinpoint regression plot for all cancer sites, females, Metro Manila and Rizal Province, 1980-2007.

3.2 Oral Cancer

The incidence of oral cavity cancer in males decreased greatly from 1980 to 2007 (APC = -2.9%, 95% CI = -3.5, -2.2) (Figure 4). At the start of the study period, Quezon City had the highest incidence (Figure 5). As time went by, the incidence of oral cavity cancer continued to decrease incidence in Pasay increased and peaked during the period 1992-1998 and remained high compared with the other sites at the end of the study period. The decrease in oral cavity cancer incidence for this period is slower compared with the overall decrease of 3.3 observed between 1980-2002. [20]

Figure 4. Joinpoint regression plot for oral cavity cancer, males, Metro
Similarly, the incidence of oral cavity cancer in females decreased slightly from 1980 to 1992 (APC = -2.0%, 95% CI = -3.7, - 0.2) and decreased more from 1992 to 2007 (APC = -6.1%, 95% CI = -7.3, - 4.9) (Figure 6). The cities of Manila and Quezon consistently had higher incidence than the other sites at the beginning of the study period. A marked reduction was observed in the incidence of oral cancer in the city of Marikina from 1980 to 2007. However, a slight increase was observed in the city of Pasig (Figure 7). From 1980 to 2007 oral cancer incidence decreased at an average of 4.3% per year (95% CI= -5.2, -3.3). Further observation showed a sustained decrease compared with the 4.1% reported in the previous study period. [20]
3.3 Stomach Cancer

The incidence of stomach cancer among males has declined consistently in the past couple of decades (Figure 8). At the start of the study period, markedly higher rates were observed in Metro Manila than in Rizal Province (Figure 9). The rates for the cities of Metro Manila appeared to decline with time. On the other hand, fluctuating but decreasing rates for Rizal Province could be observed. The cities of Manila, Pasay and Pasig registered the highest ASRs throughout the study period. From 1980 to 2007, stomach cancer incidence in males decreased by an average of 2.5% per year (95% CI= -3.0, -2.0). The decline in stomach cancer incidence decreased from 2.7% in the previous period. [20]
Figure 8. Joinpoint regression plot for stomach cancer, males, Metro Manila and Rizal Province, 1980-2007.

Figure 9. Incidence of stomach cancer by time periods, males, Metro Manila and Rizal Province, 1980-2007.
Similarly, Figure 10 showed that the incidence of stomach cancer had also declined in the past couple of decades in females. The incidence of stomach cancer among females in Rizal Province as a whole was consistently lower than the incidence in Metro Manila (Figure 11). From 1980 to 2007, stomach cancer incidence in females decreased by an average of 2.3% per year (95% CI= -2.7, -1.8). The overall trend did not change from the one observed in the previous study period. [20]
These decreasing trends could be due to a decline in *Helicobacter pylori* colonization of the stomach. One reason for this could also be continuing changes in food preservation, from salting or smoking to refrigeration, with almost 90% of households using refrigeration as the main food storage method and this number is increasing further due to improvements in the economy.\[^{21}\] Another reason could be increased antibiotic treatment for other diseases\[^{22}\] that also inadvertently affected *H. pylori* prevalence. The lower price of generic medicines make antibiotic treatment more affordable and hence enable the general population to afford and complete their prescribed antibiotic treatment.

### 3.4 Colon Cancer

Between 1980 and 2007, the incidence of colon cancer had continued to rise in males, with an annual average increase of 1.3% (95% CI= 0.8, 1.8) (Figure 12). This is much lower than the increase of 3% reported in the previous edition.\[^{20}\] The spatial maps showed that the continuous increases observed in the ASRs of colon cancer in Metro Manila also started to happen in Rizal Province (Figure 13). In Metro Manila, throughout the study period, the highest ASRs could be found in the cities of Manila, Pasay and Quezon City, while the lowest incidence was in Caloocan. Towards the end of the study period a decrease had also been observed in the incidence of colon cancer in Marikina. The incidence was consistently higher in the urban areas of Metro Manila with the exception of Caloocan.

![Figure 12. Joinpoint regression plot for colon cancer, males, Metro Manila and Rizal Province, 1980-2007.](image-url)
Increases were also noted in the incidence of colon cancer in females (Figure 14). From 1980 to 2007, the incidence of colon cancer increased at an average of 1.3% per year (95% CI= 0.9, 1.8). The spatial trend for females (Figure 15) was very much similar to the trend seen in men. The increase in incidence of colon was also slower compared with the previous study period. [20]
The observed trends could partly be attributed to the insufficiency [23] and continuing downward trend [24, 25] in the consumption of fruits and vegetables. This was coupled with the constant increase in the intake of protein and energy rich foods. The 7th National Nutrition and Health Survey (NNHeS 2008) of the Food and Nutrition Research Institute (FNRI) reported that overweight/obesity had increased from 24.0% in 2003 to 26.6% in 2008. [25] The 8th National Nutrition and Health Survey (NNHeS 2013), reported obesity (BMI $\geq$30) prevalence to be at 6.8%, higher than the prevalence of 4.9% reported in the previous survey. [27]

Filipino households seemed to not realize the importance of fruits and vegetables in their diet. The low intake of fruits and vegetables could be due to any of the following: (a) fruits are expensive and seasonal, (b) vegetables take long to prepare, (c) fruits and vegetables spoil quickly, and (d) fruits and vegetables contain harmful pesticides. [28]

There is a truth to the perception that fruits are expensive and seasonal because these need to be transported from the adjacent provinces. Small growers may not be able to market their produce due to lack of infrastructure.

There is a need to heighten awareness of the health benefits of fruit and vegetable consumption. In support of this, initiatives are needed for the efficient production and marketing of agricultural products. Fewer losses along the growing and harvesting chain could make fruits and vegetables more affordable to the general population.
3.5 Rectum Cancer

In **males**, the incidence of rectum cancer annually *increased* by 2.4% (95% CI= 1.9, 3.0) for the entire study period (**Figure 16**). This is higher compared with the overall increase reported in the previous study period. [20] The spatial maps showed increasing incidence both in Metro Manila and the adjoining province of Rizal (**Figure 17**).

![Figure 16. Joinpoint regression plot for rectum cancer, males, Metro Manila and Rizal Province, 1980-2007.](image)
The incidence of rectum cancer has also been steadily increasing in females, with an annual average increase of 2.1% (95% CI= 1.5, 2.7) (Figure 18). Similar to males, the increase in incidence of rectum cancer was also higher compared with the previous study period. [20] High incidence of rectum cancer in females was concentrated mainly in Quezon City and the City of Manila but the trend in Rizal province is slowly approaching the same trend. However, urban dominance remained and differences in the incidence rates between Metro Manila and Rizal Province can still be noticed (Figure 19).

Figure 17. Incidence of rectum cancer by time periods, males, Metro Manila and Rizal Province, 1980-2007.

Figure 18. Joinpoint regression plot for rectum cancer, females, Metro Manila and Rizal Province, 1980-2007.
As with colon cancer, the increasing trend could partly be due to the insufficiency\cite{23} and continuing downward trend\cite{24, 26} in the consumption of fruits and vegetables and continuous increase in the intake of protein and energy rich foods.\cite{26} Marketing strategies and the rising disposable income of Filipinos encourage people to eat outside their home. The food items offered at fast food chains are largely meat based and filled with saturated fats. Unlike tobacco, there is no legislation in place to control foods high in saturated fats.

### 3.6 Lung Cancer

Lung cancer incidence among \textbf{males} had increased by 3.4\% (95\% CI= 1.2, 5.6) from 1980 to 1990 but had been decreasing since 1990 by an average rate of -1.8\% per year (95\% CI= -2.7, 0.8) (\textbf{Figure 20}). The spatial maps show that lung cancer ASRs in males appeared to have peaked within the periods 1986-1992 and declined afterwards. The differences in the incidence between the cities of Metro Manila and Rizal Province were decreasing (\textbf{Figure 21}). From 1980 to 2007, the incidence of lung cancer in males slightly \textit{increased} by an average of \textbf{0.1\%} per year (95\% CI= -0.9, 1.0). The increase in lung cancer incidence is markedly lower than the 0.5 per year increase reported in the previous study period. \cite{20}

Among females the incidence of lung cancer increased by an average of 0.3% per year (95% CI= -0.3, 0.8). (Figure 22). Slow increases in the ASRs were observed until the period 1988-1994, after which a decline was noted (Figure 23). The highest incidence was observed in Quezon City for the entire study period. As time went by, the differences in incidence between Rizal Province and the semi-urban cities of Manila decreased. The average increase of lung cancer in females is slower compared with the previous study period. [20]

![Figure 22. Joinpoint regression plot for lung cancer, females, Metro Manila and Rizal province, 1980-2007.](image)

![Figure 23. Incidence of lung cancer by time periods, females, Metro Manila and Rizal Province, 1980-2007.](image)
These trends were consistent with reported tobacco consumption, which had been decreasing for males. [24, 29] A similar decrease was seen among females [25, 30]. The first Philippine Global Adult Tobacco Survey [31] showed that although more than 90% were aware that smoking causes serious illness, 28.3% were current tobacco smokers, and 48.8% were exposed to cigarette smoke in their homes. Similar to cancer of the oral cavity, more observation is needed to see if the decrease can be sustained. The 2013 NNHeS showed a decrease to 25.4% in the proportion of adult smokers. The implementation of more comprehensive tobacco control policies would be effective in further reducing tobacco use and its effects. These include restricted tobacco company marketing activities, youth sales restrictions, smoking prohibitions in public places and on public transportation, and efforts to implement graphic warning labels. [27] Another inadvertent effect of Metro Manila’s rapid urbanization is the massive traffic that is experienced on a daily basis. Exhaust from the numerous vehicles in the streets of Metro Manila contribute to the growing air pollution and its associated health problems [32]. Not to mention the stress that commuters experience to and from work. If this massive traffic continues, it may negate all of the benefits that may be gained from the efforts in tobacco control.

3.7 Liver Cancer

In males, an annual decrease of 0.5 (95% CI= -0.9, -0.2) in the period 1980-2007 were observed (Figure 24). While the incidence of liver cancer in Rizal Province was essentially stable, a fluctuation was noted in Metro Manila (Figure 25). Liver cancer incidence decrease in males for this period is lower compared with the 1.2% decrease in the previous study period. [20]

![Figure 24. Joinpoint regression plot for liver cancer, males, Metro Manila and Rizal province, 1980-2007.](image-url)
In females, an average annual decrease of 0.5% (95% CI= -1.0, -0.1) was seen (Figure 26). Similar to males, the decrease in liver cancer incidence for this period is also slower than the 0.8% reported previously. [20] The ASRs of liver cancer in females in Rizal Province declined over time and this decline appeared to be happening in the cities of Metro Manila as well (Figure 27).
While reduction in liver cancer incidence was seen, the decrease was small. The prevalence of Hepatitis B had started to decrease since the 1980s, [33, 34, 35] and this could continually contribute to the slow decline in liver cancer incidence. The decrease in incidence by 2002 may be partly attributed to increasing vaccination that started in the 1980s in both private and public sectors. Viral infections that cause chronic active hepatitis, such as Hepatitis B and Hepatitis C viruses, are likely to be responsible for most cases of primary liver cancer in the Philippines. **Hepatitis B virus (HBV)** infection is still the most prevalent. Infants and young children who get the infection and become carriers are at highest risk of liver cancer. HBV vaccines have been available in the country since 1984. The Department of Health had included HBV vaccination as part of the Expanded Program of Immunization (EPI) in 1992 but funding had been inconsistent. Most of those who have their children vaccinated against HBV are private individuals who can afford to pay for the vaccine. Moreover, alcohol consumption remained high and continued to increase. [36, 37] More study is needed to explain the trends observed and to see if the decrease can be sustained.

Aflatoxin may be contributory to the observed incidence of liver cancer in the country. Aflatoxin is a metabolite produced by a fungus, Aspergillus flavus and sometimes A. parasiticus. The hot and humid climate of the country is conducive to fungal growth and aflatoxin production. This toxin has a dose-response curve and remains toxic even after being subjected to heat. Plant foods like cassava and corn are susceptible to aflatoxin with cassava appearing to be the most dangerous. The crops however, are staple
food in some areas of the Philippines and in some areas, these serve as rice substitutes. Thus, the daily diet composition alone of Filipinos possibly exposes them to aflatoxin. Males appear to be more susceptible to the effects of aflatoxin than females. [38, 39]

3.8 Breast Cancer

Breast cancer incidence was high in the Metro Manila and Rizal areas, and continued to rise with an annual average increase of 1.2% (95% CI= 0.9, 1.5) (Figure 28). The rate of breast cancer incidence per year increased compared with the 0.9% reported in the previous study period. Urban dominance was noticed but continuing increases in the incidence was observed for the entire study site. Towards the end of the study period, the differences in the incidence between the urban and semi-urban areas of Metro Manila and Rizal Province had been continuously decreasing (Figure 29).

![Figure 28. Joinpoint regression plot for female breast cancer, Metro Manila and Rizal province, 1980-2007.](image-url)
Increase in breast cancer incidence could be highly due to various lifestyle factors such as diet, physical inactivity and alcohol drinking. Consumption of energy and protein rich foods was high, [29] and was reflected by the high and increasing proportion of the population who were overweight and obese. [25, 24] Furthermore, 57.0% of women were reported to be physically inactive. [40] The proportion of physically inactive women decreased to 52.5% in the 2013 NNHeS. Alcohol consumption among women was reported to be moderate but was increasing. The 2013 NNHeS shows that the proportion of current drinking in women increased almost three-fold from 9.8% in 2008 to 28.6% in 2013.

The prevalence of oral contraceptive use and hormone replacement therapy can likewise have an effect on breast cancer incidence. However, there are no estimates available for this population, and more research is needed to determine the actual roles of these factors into breast cancer risk in the Philippines.

A study done in the Philippines found that the risk of Filipino women who had never been pregnant was 5 times that of women with ≥5 pregnancies, while those whose age at first birth was ≥30 years had 3.3 times higher risk than women whose age at first birth was <20 years [41]. The significantly highest rates were seen only in the seven cities of Metro Manila where large-scale housing developments had occurred starting in the 1950’s. [5] This had resulted in large scale internal migration of middle and high income families from all over the country, families who could have been already more susceptible to lifestyle changes, including reproductive behavior. As economic development has consistently been associated with a fall in birth rates, it is expected that breast cancer incidence will continue to rise given the economic development the country experiences.
3.9 Cervical Cancer

The incidence of cervical cancer was rising until 1984, with an annual increase of 5.4% (95% CI= -0.9, 12.0). Since then, it had decreased by a rate of 1.5% per year (95% CI= -1.9, -1.0) (Figure 30). Declining incidence was observed in all of the cities and municipalities. However, fluctuations were noticed in the city of Pasay (Figure 31). From 1980 to 2007, the incidence of cancer of the cervix decreased by an average of 0.5% per year (95% CI=-1.4, 0.4). The average increase in cervix cancer incidence went higher compared with the 0.3% reported in the previous study period.

Although a decrease in cervical cancer incidence was evident, reasons for that are not clear. Pap smear screening was available in the country, but effective coverage was low (around 10%, lower than the average effective coverage of 18.5% in developing countries) [42] and might have only slightly influenced cervical cancer incidence. The increased use of condoms, mainly attributed to the massive anti-HIV campaigns in the 1990s, might be a contributory factor, but male condom use among partners of currently married women remained low. [43, 44] as well as condom use among females in the general population. [43, 44] This low condom use rate is an effect of the Catholic church’s staunch opposition to the use of artificial contraceptives. The vaccine for HPV infection was only recently introduced, and could not have an effect on the trends presented here. However, as the cost of HPV vaccination continues to go down, more women are enticed to avail of this service even if the cost is paid out of pocket. The effect of this increasing vaccination coverage will be felt in the years to come.

3.10 Prostate Cancer

Between 1980 and 2007, the incidence of prostate cancer was increasing by a rate of 2.1 per year (95% CI=1.6, 2.6) (Figure 32). This is slightly lower compared with the 2.5% increase per year reported in the previous study period. The spatial maps show that continuous increases could be noted in the incidence of prostate cancer for all study sites, with the highest incidence registered at Quezon City for the entire duration of the study period. An increase in incidence was observed in both Metro Manila and Rizal Province. The difference in the incidence between the semi-urban areas of Metro Manila and Rizal Province diminished with time though urban dominance is still noticeable (Figure 33).
Figure 32. Joinpoint regression plot for prostate cancer, Metro Manila and Rizal province, 1980-2007.

Figure 33. Incidence of prostate cancer by time periods, Metro Manila and Rizal Province, 1980-2007.
Current evidence on the etiology of prostate cancer is very limited, and the roles of various risk factors, such as tobacco smoking, alcohol drinking, diet and hormones, are still under debate. While increasing evidence point to the absence of an association of smoking and alcohol drinking with prostate cancer risk, more definitive results remain elusive. Incidence of diagnosed prostate cancer cases in the developed countries has been very strongly related to frequency of PSA tests done among asymptomatic men or on autopsies rates. There had been no PSA population screening in the Philippines. To date, there is also no data on prostate cancer autopsy rates.

### 3.11 Thyroid Cancer

The incidence of thyroid cancer in males has been almost stable, with an annual average increase of 1.1% (95% CI= 0.3, 2.0) (Figure 34). The jump in the incidence in 2003 caused the average annual increase to double from 0.4% to 1.1%. High incidence of thyroid cancer in males was concentrated in Metro Manila but is now being observed in Rizal Province. The difference in the incidence rates between Metro Manila and Rizal Province diminished with time (Figure 35).

![Figure 34. Joinpoint regression plot for thyroid cancer, males, Metro Manila and Rizal province, 1980-2007.](image-url)
In females, fluctuating incidence was observed. The incidence of thyroid cancer had increased by 12.4% (95% CI= 1.8, 24.1) from 1980 to 1983, decreased by 0.2% (95% CI= -2.0, 1.6) from 1983 to 1993 and increased again by 2.9% (95% CI= 1.9, 3.9) from 1993 to 2007 (Figure 36). The incidence rate now is still almost three-fold as compared with the rate among males, similar to what was observed in the previous study period. Highest incidence rates of thyroid cancer among women were observed in Metro Manila with Rizal Province slowly becoming a high incidence zone (Figure 37). From 1980 to 2007, the incidence of thyroid cancer had increased by an average of 2.7% per year (95% CI=-1.4, 4.1), almost double the 1.6% reported in the previous study period.
While a small increase in the incidence of thyroid cancer was seen for both sexes, its etiology in the Philippine population needs further investigation. Ionizing radiation, which is the main established risk factor for the disease is uncommon in the country. The prevalence of familial benign thyroid disease, which is another known risk factor, is unknown, but is unlikely to be high. A recent study showed that 63.4% of cases with nodular goiter in PGH had iodine deficiency and a higher proportion of malignant thyroid nodules was found among those with iodine deficiency (55.8%) than those who were iodine sufficient (40.0%) [45]. Differences in diagnostic activity may also explain temporal and spatial variation. There are no new initiatives being implemented to address the risk factors of thyroid cancer. Caution should be taken when diagnosing thyroid cancer as the increase in the incidence of thyroid cancer in other countries could be due to overdiagnosis, and not a true increase of clinically significant thyroid cancer. The overuse of ultrasonographic screening may reveal small papillary thyroid cancers but majority of the lumps identified at screening will not produce any symptoms at all. [46]
References


[28] UN Food and Agriculture Organization, «Compendium of food and agriculture indicators,» p. UN Food and Agriculture Organization, 2006.


Contributors

Victoria M. Medina is recently finished her Master of Public Health degree and is completing Master of Science in Epidemiology from the College of Public Health, University of the Philippines Manila. Vicky’s thesis is on the burden of disease of breast cancer and has co-authored several publications with the registry.

Adriano V. Laudico is a surgical oncologist and Professor Emeritus of Surgery at the University of the Philippines Manila. He was the former head of the Department of Health- Rizal Cancer Registry, and currently heads the Philippine Cancer Society-Manila Cancer Registry. He was a Past President of the Philippine College of Surgeons, and the Founding President of the Surgical Oncology Society of the Philippines. Yago was also a Short Term Consultant on Cancer of the World Health Organization Western Pacific Region to several counties in Southeast Asia and the Pacific.

Maria Rica Mirasol-Lumague is a general surgeon, and is the current head of the Department of Health – Rizal Cancer Society. Rica is the Chief Training Officer of Rizal Medical Center, where she also supervises the Tumor Clinic. She underwent training on Cancer Registration Methods and Cancer Epidemiology at the International Agency for Research on Cancer in Lyon, France.

Cynthia A. Mapua holds a Master of Science in Epidemiology from the College of Public Health, University of the Philippines Manila, and is at present working for a Doctor of Public Health in Epidemiology at the same institution. Her association with the Philippine Cancer Society – Manila Cancer Registry began with her Masteral thesis which was on population-based survival of breast cancer. Cyndi had undergone training on cancer registration methods and cancer epidemiology at the International Agency for Research on Cancer in Lyon, France. Cyndi is currently a Scientist/Epidemiologist at the Center for Biostatistics and Molecular Epidemiology, Research and Biotechnology Division, St. Luke’s Medical Center.

Toni Patama holds a degree of Master of Science (Environmental Sciences) from the University of Kuopio and specializes on geographical information systems and spatial epidemiology. Toni is currently an Assistant Researcher at the Finnish Cancer Registry.

Eero Pukkala obtained his M.A. from the University of Helsinki, and his Ph.D. from the University of Tampere. He is currently Director of Statistics and an epidemiologist at the Finnish Cancer Registry, Institute for Statistical and Epidemiological Cancer Research, Helsinki. Eero is also Professor of Public Health and Epidemiology at Tampere School of Public Health, University of Tampere, chairman of the national Epidemiological Society and leader of several national and international research programs.
Acknowledgements

Philippine Cancer Society Board of Trustees

Chairman  Roberto Paterno, PhD  
Vice Chairman  Antonio Ma. Guerrero  
President  Corazon Ngelangel, MD  
Vice President  Atty. Enrique Perez  
Treasurer  Jose Sandejas, PhD  
Asst. Treasurer  Virgilio Pena

Emily Almonte Abrera  
Angela U. Crisostomo, MD  
Gloria Cristal Luna, MD  
Sec. Albert F. del Rosario  
Francisco C. Eizmendi Jr.  
Jaime Z. Galvez-Tan, MD  
Cecilia Lladines Llave, MD  
Conrado Llanes Lorenzo, MD  
Alberto B. Roxas, MD
Philippine Cancer Society - Manila Cancer Registry

Ellen Nora S. Mesina
Siony P. Alcos
Erlinda Abris
Marisol
Mirasol Dency
Orengo
Lydia Navarro
Josephine Isla

Department of Health - Rizal Cancer Registry

Wilma M. Grafilo
Elena DC. Marquez