

## RESEARCH ARTICLE

# Incidence Trends of Colorectal Cancer in the West of Iran During 2000-2005

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### Abstract

**Background:** Colorectal cancer is a main leading cause of cancer death in western countries. Although many studies have been conducted on incidence trends all over the world in recent years, information regarding changes in incidence of colorectal cancer in Iran is insufficient. The present study of colorectal cancer in the west of Iran during recent years was therefore performed. **Materials and Methods:** The registered data for colorectal cancer cases in National Cancer Registry System were extracted from the Ministry of Health and Medical Education, Center for Disease Control and Management. The codes from 18-21 among cancers were selected for colon and rectum cancers. Incidence rates were standardized directly using WHO population. The significance of incidence rate trends during 2000-2005 was tested through Poisson regression. **Results:** 762 cases of colorectal cancer were observed during 6 years in this region, with a gender ratio of men to women of 1.2. It increased from 65 cases in 2000 to 213 cases in 2005 or from 1.5 per 100,000 per persons per year to 4.8. Significant increasing trends were evident in Kermanshah and Hamadan provinces; however, change did not reach significance in Ilam and Kurdistan provinces. **Conclusions:** Colorectal cancer has an increasing trend in the west of Iran. Although it seems that the increasing rate of colorectal cancer is due to increasing of cancer risk factors, some proportion may be related to the improvement of surveillance systems in Iran.

**Keywords:** Colorectal - cancer - incidence trend - West of Iran

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### Introduction

Colon and rectum cancers become one of the main causes of cancer death in the west (Ponz de Leon et al., 2004). Their increasing prevalence to other countries with western culture led to rapid increasing rate of this cancer at the third world countries (Ponz de Leon et al., 2004). Approximately 9.4 percent of one million annual recent cases of cancer in the world are colorectal cancers (Parkin, 2004). According to world health organization reports, approximately 87,500 new cases of colorectal cancer are diagnosed each year (Janout and Kollarova, 2001). The incidence rate in old people is greater so that more than 95 percent of cases have more than 55 years old (Turkiewicz et al., 2001). However, this rate in younger patients is reported between 0.4-35.6 (O'Connell et al., 2003). Cancer incidence rate increases by aging and regarding the increasing age of world population, it is predicted that 70 percent of malignancies will occur in age group <65 in 2030 (Balducci, 2005).

In the recent decade incidence trends of colorectal cancer have differed between populations so that the incidence rate has decreased in USA (Jackson-Thompson et al., 2006), slightly increasing or constant in Europe (Center et al., 2009) and highly increasing in most of Asian countries (Sung et al., 2005; Kuriki and Tajima, 2006). Also

a study in Iran indicated that the incidence and prevalence rates of colorectal cancer are increasing (Pahlavan and Kanthan, 2006). It has been estimated that 70-80% of colorectal cancer occurs because of environmental factors and life styles such as: food consumption pattern (for example, low consuming vegetables and fruits, high intake red meat and daily drinking of alcohol), smoking and physical activity (Giovannucci, 2002; Norat and Riboli, 2003; Franco et al., 2005; Norat et al., 2005; Norgaard et al., 2005). According to Iranian annual report on the status of cancer in 2004, colorectal cancer as the sixth prevalence cancer with 3,407 new cases formed 7.2% of all cancers (Mousavi and Somi, 2009). The food consumption pattern of Iranian may indicate the increasing incidence rate because in recent decades people use more fat and fast food instead of traditional foods (Mousavi and Somi, 2009).

The increasing trends of colorectal cancer in Iran as well as the close relationship of cancer with geographical regions were the underlying reasons to study the emerging trends of colorectal cancer in the west region of Iran. Furthermore, no study has ever been done on emerging trends of this cancer in this region. The aim of this study is to investigate age standardized incidence rate of colorectal cancer using data recording system during 2000-2005 in the west of Iran. The results of this study can be used

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to identify high-risk groups and help national health programming toward better controlling of the cancer.

### Materials and Methods

The present study was a cross sectional population-based study. The registered data for gastric cancer cases in National Cancer Registry System were extracted from the Ministry of Health and Medical Education, Center for Disease Control and Management. The data were gathered from pathology centers in Iran at the end of each year. Disease Management Center verified the accuracy of data regarding correct coding, identity information defects and demographic and deleting repetitive reports. Meanwhile, cancers were coded based on The International Classification of Diseases for Oncology ICD-O (second edition) (Constance et al., 2000). The C18-C21 codes were given to colon and rectum cancers. The west region includes Kermanshah, Ilam, Kurdistan, and Hamadan provinces. 2006 national population census results were used for standardizing incidence rate. Moreover, WHO standard population was regarded as criteria population and incidence rates were standardized directly. The Stata 11 software was used for statistical analysis and trends changes were tested by Poisson regression. Then, Excel software 2007 was also used to draw diagrams.

### Results

#### West region of Iran

762 colorectal cancer cases were totally recorded during these 6 years in the west region. 65 cases in

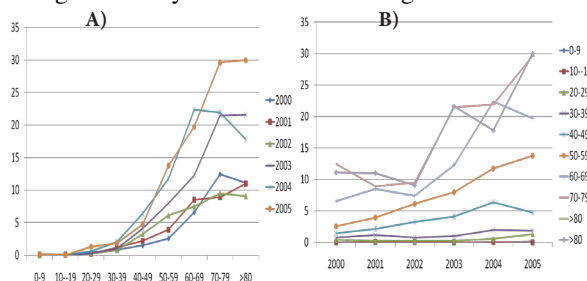


Figure 1. Age Standardized Incidence Rate of Colorectal Cancer during 2000-2005 by Age Groups and Years (A and B)

Table 1. Age Standardized Incidence Rate of Colorectal Cancer in the West of Iran during 2000-2005 (Per 100,000 persons)

		2000	2001	2002	2003	2004	2005	Slope/ PValue
Kermanshah	Male	0.6 (0.1-1.2)	1.2 (0.4-2.1)	3.7 (2.3-5.2)	4.1 (2.5-5.6)	4.5 (2.9-6.0)	7.7 (5.6-9.8)	0.39 (0.006)
	Female	0.8 (0.2-1.4)	2.2 (1.1-3.4)	2.9 (1.6-4.2)	2.8 (1.5-4.1)	4.1 (2.5-5.6)	4.7 (3-6.3.0)	0.25 (0.089)
	Total	0.7 (0.3-1.1)	1.7 (1.0-2.4)	3.3 (2.4-4.3)	3.5 (2.5-4.5)	4.3 (3.2-5.4)	6.2 (4.9-7.6)	0.33 (0.023)
Kordestan	Male	2.4 (1.1-3.7)	1.9 (0.6-3.2)	2.9 (1.4-4.3)	3.7 (2.1-5.3)	3.8 (2.1-5.5)	5.6 (3.5-7.7)	0.19 (0.145)
	Female	2.9 (1.3-4.5)	3.2 (1.7-4.7)	1.0 (0.2-1.8)	3.3 (1.7-4.9)	5.5 (3.3-7.6)	2.5 (1.1-3.9)	0.66 (0.629)
	Total	2.7 (1.6-3.7)	2.5 (1.5-3.5)	1.9 (1.1-2.8)	3.5 (2.4-4.6)	4.6 (3.3-6.0)	4.1 (2.8-5.3)	0.13 (0.323)
Ilam	Male	0.0 (0)	0.5 (0.1-1.3)	2.8 (0.3-5.4)	1.2 (0.1-3.0)	3.3 (0.7-5.9)	2.9 (0.5-5.2)	0.37 (0.067)
	Female	0.0 (0)	1.9 (0.1-4.2)	1.5 (0.1-3.7)	1.7 (0.1-3.6)	0.9 (0.1-2.2)	1.3 (0.1-2.9)	0.90 (0.681)
	Total	0.0 (0)	1.2 (0.1-2.4)	2.2 (0.5-4.0)	1.4 (0.1-2.6)	2.1 (0.6-3.6)	2.1 (0.7-3.5)	0.24 (0.235)
Hamedan	Male	1.4 (0.5-2.2)	1.7 (0.8-2.7)	0.7 (0.1-1.3)	2.8 (1.5-4.1)	5.5 (3.6-7.3)	4.6 (3.1-6.2)	0.32 (0.040)
	Female	2.3 (1.1-3.4)	1.3 (0.4-2.2)	0.5 (0.1-1.1)	2.8 (1.5-4.1)	5.2 (3.4-6.9)	4.6 (3.0-6.2)	0.27 (0.073)
	Total	1.8 (1.1-2.6)	1.5 (0.9-2.2)	0.6 (0.1-1.0)	2.8 (1.9-3.7)	5.3 (4.6-6.0)	4.6 (3.5-5.8)	0.30 (0.054)
West Region	Male	1.3 (0.8-1.7)	1.5 (0.9-2.0)	2.4 (1.8-3.1)	3.3 (2.5-4.1)	4.6 (3.6-5.5)	5.8 (4.7-6.8)	0.31 (0.032)
	Female	1.8 (1.2-2.4)	2.1 (1.5-2.8)	1.5 (0.9-2.0)	2.9 (2.1-3.6)	4.6 (3.6-5.5)	3.8 (3.0-4.7)	0.20 (0.178)
	Total	1.5 (1.1-1.9)	1.8 (1.4-2.2)	2.0 (1.5-2.4)	3.1 (2.6-3.6)	4.6 (3.9-5.2)	4.8 (4.2-5.5)	0.26 (0.077)

2000 increased to 213 cases in 2005. Regarding gender distribution, 55.2% of cancer was related to male and 44.8% was related to female; therefore, the male to female ratio was 1.2. The age standardized incidence rate was significantly increased in the west from 1.5 cases per100000 per persons per year in 2000 to 4.8 cases in 2005. The age standardized incidence rate of colorectal cancer of men increased from 1.2 cases per 100,000 per persons per year in 2000 to 5.7 cases in 2005. Similarly, the rate in women increased from 1.8 cases per 100,000 per persons per year in 2000 to 3.8 cases in 2005. Regarding the comparison of the incidence trend in both genders, it was observed that the trend in male followed a steady increase slope while a relative reduction in cancer incidence in female was recorded in 2002 and 2005. The incidence rate in male was higher than female from 2002 onwards. Investigating age groups, no colorectal cancer case was recorded in the age group above 60 years in 2005. The incidence trend more or less increased in all subgroups; however, the change was minor in lower age groups. Incidence in the age group between 70-79 years reached its maximum.

#### Kermanshah province

This province had the highest risk of colorectal cancer incidence in the west region. The 6-year emerging rate average was 3.27 which were more than all western provinces. The age standardized incidence rate of colorectal cancer increased from 0.7 cases per 100,000 per persons per year in 2000 to 6.2 cases in 2005. It represented a significant increasing trend during study years. The trend was very mild in 2003 so that the

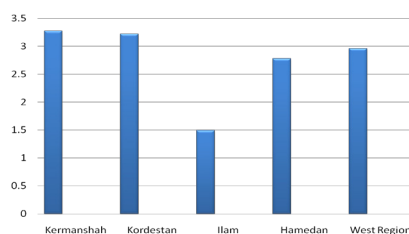


Figure 2. Average of Age Standardized Incidence Rate of Colorectal Cancer in the West of Iran during 2000-2005

incidence rate increased only 0.1 cases in per 100,000 per persons per year in comparison to 2002. The age standardized incidence rate of colorectal cancer of male increased from 0.6 cases per 100,000 per persons per year in 2000 to 7.7 cases in 2005. Similarly, the rate in female increased from 0.8 cases per 100,000 per persons per year in 2000 to 4.6 cases in 2005. However, despite the increase trend in male, a slight decrease in female incidence rate was observed in 2003. The incidence rate in male has increased since 2002.

#### *Kurdistan province*

The 6-year incidence rate average was 3.22 per 100,000 per persons per year in this region. Kurdistan province got the second rank among western provinces. The age standardized incidence rate of colorectal cancer of both genders increased from 2.6 cases in 2000 to 4.0 cases per 100,000 per persons per year in 2005. The rate decreased in 2002 then it increased and again decreased in 2004. The age standardized incidence rate of colorectal cancer of male increased from 2.4 cases per 100,000 per persons per year in 2000 to 5.6 cases in 2005. The trend slightly decreased in 2001 and remarkably increased in 2005. The rate in female decreased from 2.9 cases per 100,000 per persons per year in 2000 to 2.5 cases in 2005. The trend fluctuated during those years. For instance it increased slightly in 2001 and increased rapidly in 2002-4. However, it decreased during 2002 to 2005.

#### *Hamadan province*

The 6-year colorectal cancer incidence rate average was 2.77 per 100,000 per persons per year in Hamadan. Therefore, Hamadan became the third province in comparison to the west region provinces. The general age standardized incidence rate of colorectal cancer increased in this province. Therefore, it increased from 1.8 per 100,000 per persons per year in 2000 to 4.6 in 2005. The trend followed a decreasing process at first so that it decreased to one third of incidence rate in 2002. However, after 2002 the trend increased rapidly at first, and then it decreased in 2004. The age standardized incidence rate of colorectal cancer of male increased from 1.4 cases per 100,000 per persons per year in 2000 to 4.6 cases in 2005. In contrast, the rate in female increased from 2.2 cases per 100,000 per persons per year in 2000 to 4.6 cases in 2005. If the emerging rate between both genders were divided, a similar emerging rate change would be found in both genders.

#### *Ilam province*

Ilam province was the least risky province concerning colorectal cancer incidence among the western provinces so that its 6-year emerging rate average was 1.5 per 100,000 per persons per year. The general trend of colorectal cancers age standardized incidence rate was increasing in west region; however, the changes were not significant. The trend increased from 0 cases in 2000 to 2.1 cases per 100,000 per persons per year in 2005. Although the age standardized incidence rate of colorectal cancer of male increased from 0 cases in 2000 to 2.9 cases per 100,000 per persons per year in 2005, the rate

in female increased from 0 cases in 2000 to 1.3 cases per 100,000 per persons per year in 2005. Irregular changes in the incidence trend were observed in both genders. The analysis of incidence rate in subgroups under 9 years old and above 60 years old revealed no colorectal cancer cases in these groups. Much fluctuation was recorded in age group over 80 years old. It was approximately increasing in other age groups. The incidence rate of lower subgroups was the least while in upper subgroups it was the most. This increase was more prominent after the age 40.

## **Discussion**

This is the first report of standardized Incidence trend of colorectal cancer in the west of Iran Our study showed a rising trend of colorectal cancer in this region in the different categories of age and sex. However, to what extent this increasing trend could be real and due to increasing risk of cancer morbidity in the west of Iran population. Moreover, to what extent the increasing trend over time was due to other factors such as the improvement of recording system of surveillance, promotion of medical knowledge or increasing of people's sensibility to their health and referring to pathology centers. According to the recorded cancer cases report in 2004, the cancer recording program had increasing trend. This center declared in 2004 annual report that in the best condition of cancer case recording based on the pathology report only 80 percent of cases can be recorded. (Mousavi et al., 2007). Therefore, it can be expected that some percentages of incidence trend increase might be due to the improvement of recording system and national report of new cancer cases. However, the real contribution of this part will surely be clarified in future studies. It is obvious that the development of country's medical science or increasing people' sensibility to their health could not have major role in the increase trend in this short time. Although the overall mean of incidenc is most lower than the rate of colorectal cancer in the whole country (Safaei et al., 2012) but the increasing trend of colorectal cancer in this region of the country is consistent with the finding of stomach cancer in different region of the country (Haidari et al., 2012). Many research studies had similar results with the current study all over the world. For instance, the same increasing colorectal cancer incidence trend was found in a 15-year study in Italy (Ponz de Leon et al., 2004). Similar increasing trends have been reported in Asian countries specifically the Pacific Rim countries (Sung et al., 2005) such as Hong Kong (Yee et al., 2010; Xie et al., 2012), Saudi Arabia (Mahmood and Mahmood, 2012), Singapore (Wong and Eu, 2007; De et al., 2008), South Korea (Cheung et al., 2008), Taiwan (Chen et al., 2002), Japan (Kotake et al., 2003; Yiu et al., 2004), and China (Yang et al., 2005). However, the reports indicated the deceasing of cancer incidence trend in USA which is the result of active prevention system and accomplishment of pre-determined programs (Jackson-Thompson et al., 2006).

Various studies emphasized the contribution of many factors in emerging colorectal cancer including environmental factors and life style such as: food consumption pattern, smoking and physical activity

which have major role in the emergence of cancer (Giovannucci, 2002; Norat and Riboli, 2003; Franco et al., 2005; Norat et al., 2005; Norgaard et al., 2005). Regarding the effect of changing food consumption pattern on the trend of colorectal cancer, study in Japan showed that this effect will be seen approximately after 20 years (Kuriki and Tajima, 2006). Immigration can be regarded as an environmental factor. The comparison of colorectal cancer emergence trend rate between Iranian immigrants to Canada and Iranian residents revealed that Iranian immigrant's rate was twice higher than Iranian living in Iran (Yavari et al., 2006). With increasing trend of urbanization and changing food consumption patterns, people replaced traditional foods with low-volume foods, fat and low in fiber. Consequently, the colorectal cancer ratio increased (Mousavi and Somi, 2009). Such an increasing trend of colorectal cancer in man and younger age groups was seen in Pakistan (Bhurgri et al., 2011) and Tunisia (Missaoui et al., 2011) which two study have suggested screening as a secondary prevention. Since the dominant populations in the four provinces are from the Kurdish ethnicity, their cultural background is the same. Therefore, their diet is also more or less similar. Growing urbanization and the tendency to consume fast food which is the main risk factor can partly explain the increasing incidence of cancer in this region. Comparing the incidence trend in both genders showed that the trend had a steady increase in male in all years of the study; however, it decreased in some years for female. The incidence rate in male was far more than female though the difference was not so much to attribute to gender. One of the reasons for this difference can be less exposure of female to risk factors such as lifestyle changes compared with male (Parkin, 2004). Further studies are required to prove this difference. According to some studies on healthy lifestyle behaviors, it is observed that female had generally healthier food habits than male (Denton et al., 2004). Consequently, this factor can have significant impact on lowering the incidence rate in female. The analysis of age groups revealed that this increasing trend was more tangible in older age groups. The incidence rate was relatively higher age group between 70-79 years old than other age groups. It is worth mentioning that in all types of cancers the incidence trend increased after the age of 60 (Jackson, 2007), thus the above mentioned results were not unexpected phenomenon. In fact, one of the reasons of increasing cancer risk in older ages may be less mobility (Parkin, 2004). This makes clear the importance of physical activity in reducing the incidence of colorectal cancer.

Increasing the life expectancy in countries as well as overpopulation in old age can justify to some extent the increasing incidence trend. However, since this age group is highly at risk, then to reduce risk factors it is necessary to plan a new health system to cover this age group. Regarding the deficiency of country cancer recording system, the present study can be reliable only along with other studies regarding colorectal incidence trend. The focus of future studies should be related to understanding the recording system and eradicating its shortcomings. To put it in nutshell, to reduce the rate of this cancer further

study should be done. Moreover, it is hoped that increasing the symptoms of emerging cancer paves the way for better planning to prevent and control of colorectal cancer.

In conclusion, the emerging trends of colorectal cancer in all 4 provinces are increasing. This trend is expected to increasingly continue in future years.

## References

- Balducci L (2005). Epidemiology of cancer and aging. *J Oncol Manag*, **14**, 47-50.
- Bhurgri Y, Kha NT, Kayani N (2011). Incidence and current trends of colorectal malignancies in an unscreened, low risk population. *Asian Pac J Cancer Prev*, **12**, 703-8.
- Center MM, Jemal A, Ward E (2009). International trends in colorectal cancer incidence rates. *Cancer Epidemiol Biomarkers Prev*, **18**, 1688-94.
- Chen CJ, You SL, Lin LH, et al (2002). Cancer epidemiology and control in Taiwan: a brief review. *Jpn J Clin Oncol*, **32**, 66-81.
- Cheung DY, Kim TH, Kim CW, et al (2008). The anatomical distribution of colorectal cancer in Korea: evaluation of the incidence of proximal and distal lesions and synchronous adenomas. *Intern Med*, **47**, 1649-54.
- Constance P, Valerie V, Calum M (2000). International Classification of Disease for Oncology, WHO, Geneva.
- De KI, Wong CS, Chia KS, et al (2008). Gender differences in the trend of colorectal cancer incidence in Singapore, 1968-2002. *Int J Colorectal Dis*, **23**, 461-7.
- Denton M, Prus S, Walters V (2004). Gender differences in health: a Canadian study of the psychosocial, structural and behavioral determinants of health. *Soc Sci Med*, **58**, 2585-600.
- Franco A, Sikalidis AK, Solis Herruzo JA (2005). Colorectal cancer: influence of diet and lifestyle factors. *Rev Esp Enferm Dig*, **97**, 432-48.
- Grocott P, Richardson A, Ambaum B, et al (2001). Nursing in colorectal cancer initiative: the audit phase. Part 2. Content validity of the audit tool and implications of the standards set for clinical practice. *Eur J Oncol Nurs*, **5**, 165-73.
- Haidari M, Nikbakht MR, Pasdar Y, et al (2012). Trend analysis of gastric cancer incidence in Iran and its six geographical areas during 2000-2005. *Asian Pac J Cancer Prev*, **13**, 3335-41.
- Jackson-Thompson J, Ahmed F, German RR, et al (2006). Descriptive epidemiology of colorectal cancer in the United States, 1998-2001. *Cancer*, **107**, 1103-11.
- Jackson R (2007). An early selective Medline: Henry Stelwagon's 1916 textbook of dermatology 2. *J Cutan Med Surg*, **11**, 191-4.
- Janout V, Kollarova H (2001). Epidemiology of colorectal cancer. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub*, **145**, 5-10.
- Kotake K, Honjo S, Sugihara K, et al (2003). Changes in colorectal cancer during a 20-year period: an extended report from the multi-institutional registry of large bowel cancer, Japan. *Dis Colon Rectum*, **46**, 32-43.
- Kuriki K, Tajima K (2006). The increasing incidence of colorectal cancer and the preventive strategy in Japan. *Asian Pac J Cancer Prev*, **7**, 495-501.
- Mahmmod HM, Mahmood S (2012). Colorectal cancer in the Kingdom of Saudi Arabia: Need for Screening. *Asian Pac J Cancer Prev*, **13**, 3809-13.
- Missaoui N, Jaidaine L, Abdelkader AB, et al (2011). Colorectal Cancer in Central Tunisia: Increasing Incidence Trends over a 15-Year Period. *Asian Pac J Cancer Prev*, **12**, 1073-6.



- Mousavi SM, Donlo M, Haj SM et al (2007). Iranian Annual National Cancer Registration Report 2005-2006. Ministry of Health and Medical Education, Office of Deputy Minister for Health, Center for Disease Control Cancer Office.
- Mousavi SM, Somi MH (2009). Gastric cancer in Iran 1966-2006. *Asian Pac J Cancer Prev*, **10**, 407-12.
- Norat T, Bingham S, Ferrari P, et al (2005). Meat, fish, and colorectal cancer risk: the European prospective Investigation into cancer and nutrition. *J Natl Cancer Inst*, **97**, 906-16.
- Norat T, Riboli E (2003). Dairy products and colorectal cancer: a review of possible mechanisms and epidemiological evidence. *Eur J Clin Nutr*, **57**, 1-17.
- Norgaard M, Iversen LH, Sorensen HT (2005). Colorectal cancer. Incidence and risk factors. *Ugeskr Laeger*, **167**, 4157-9.
- O'Connell JB, Maggard MA, Liu JH, et al (2003). Rates of colon and rectal cancers are increasing in young adults. *Am Surg*, **69**, 866-72.
- Pahlavan PS, Kanthan R (2006). The epidemiology and clinical findings of colorectal cancer in Iran. *J Gastrointest Liver Dis*, **15**, 15-9.
- Parkin DM (2004). International variation. *Oncogene*, **23**, 6329-40.
- Ponz de Leon M, Marino M, Benatti P, et al (2004). Trend of incidence, subsite distribution and staging of colorectal neoplasms in the 15-year experience of a specialized cancer registry. *Annals of Oncol*, **15**, 940-6.
- Sung JJ, Lau JY, Goh KL, et al (2005). Increasing incidence of colorectal cancer in Asia: implications for screening. *Lancet Oncol*, **6**, 871-6.
- Turkiewicz D, Miller B, Schache D, et al (2001). Young patients with colorectal cancer: how do they fare? *ANZ J Surg*, **71**, 707-10.
- Wong MT, Eu KW (2007). Rise of colorectal cancer in Singapore: an epidemiological review. *ANZ J Surg*, **77**, 446-9.
- Xie W CH, Chan MH, Mak K Ch, et al (2012). Trends in the Incidence of 15 Common Cancers in Hong Kong, 1983-2008. *Asian Pac J Cancer Prev*, **13**, 3911-6.
- Yang L, Parkin DM, Ferlay J, et al (2005). Estimates of cancer incidence in China for 2000 and projections for 2005. *Cancer Epidemiol Biomarkers Prev*, **14**, 243-50.
- Yavari P, Hislop TG, Bajdik C, et al (2006). Comparison of cancer incidence in Iran and Iranian immigrants to British Columbia, Canada. *Asian Pac J Cancer Prev*, **7**, 86-90.
- Yee YK, Gu Q, Hung I, et al (2010). Trend of colorectal cancer in Hong Kong: 1983-2006. *J Gastroenterol Hepatol*, **25**, 923-7.
- Yiu HY, Whittemore AS, Shibata A (2004). Increasing colorectal cancer incidence rates in Japan. *Int J Cancer*, **109**, 777-81.