

REGIONAL REVIEW

Cancer Epidemiology in South Asia - Past, Present and Future

Malcolm A Moore^{1,2}, Yasantha Ariyaratne³, Farhana Badar⁴, Yasmin Bhurgri⁵, Karabi Datta⁶, Aleyamma Mathew⁷, Paalath Gangadharan⁸, A Nandakumar⁹, Kishore K Pradhananga¹⁰, Md Habibullah Talukder¹², Balkrishna B Yeole¹³, Tomotaka Sobue²

Abstract

Pakistan, India, Sri Lanka, Bangladesh, Nepal and Bhutan, with their total population of more than 1,500 million, make up the subcontinent of South Asia. Despite massive diversity across the region, there are sufficient similarities to warrant a collective approach to chronic disease control, including development of cancer control programs. Cancer is already a major problem and there are general similarities in the prevalence patterns. In males, oral and lung cancer are either number one or two, depending on the registry, with the exceptions of Quetta in the far north, Larkana and Chennai. Moderately high numbers of pharyngeal and/or laryngeal cancer are also consistently observed, with prostate cancer now becoming visible in the more developed cities. Breast and cervical cancer share first and second place except in Muslim Pakistan, where oral cancer generally follows breast. The ovary is often included in the five most prevalent types. Markedly increasing rates for breast cancer and distribution shifts in other cancers suggest that, despite improvement in cervical and oral rates, the overall burden will only become heavier over time, especially with increasing obesity and aging of what are still youthful populations. Coordination of activities within South Asia is a high priority for cancer control in the region.

Asian Pacific J Cancer Prev, 10, Asian Epidemiology Supplement, 49-67

Introduction

The countries of the South Asia, whether Muslim or Hindu, Indo-European or Dravidian, share a great deal in terms of culture as well as geographical proximity. The included population is approximately 1,500 million, or almost a quarter of the total in the world. Naturally the level of economic development is very varied and this is reflected in the infrastructure for cancer control. However, given the increasing importance of neoplastic diseases, as well as the other chronic medical conditions like diabetes and circulatory problems, cooperation across the region to best marshal the available resources is a high priority. A comprehensive understanding is therefore necessary.

There is a general awareness of the scope of the cancer problem faced by South Asia and efforts are increasing to develop and expand cancer control programs incorporating registration and screening or early detection. The present review was conducted taking advantage of all of the Pubmed references covering the area, as well as the CancerMondial website of the International Agency for Research on Cancer (IARC) (www-dep.iarc.fr/) and

separate publications where available.

Cancer Registration in Southern Asia

Cancer registries have been active in the region for many years, Mumbai being listed in Cancer Incidence in Five Continents from Volume II in 1972 (see Table 1),

Table 1. Numbers of South Asian Registries in the Series of Nine Volumes of CIV

Volume	I	II	III	IV	V	VI	VII	VIII	IX
Karachi								1	1
New Delhi								1	1
Ahmedabad						1		1	
Mumbai		1	1	1	1	1	1	1	1
Barshi							1		
Bangalore					1	1	1	1	
Trivandrum							1	1	1
Karunagapally							1	1	1
Chennai					1	1	1	1	1
Nagpur					1			1	1
Poona				1	1			1	1

¹UICC Asian Regional Office for Cancer Control, apocpcontrol@yahoo.com, ²Cancer Information Services and Surveillance Division, Center for Cancer Control and Information Services, National Cancer Center, Tokyo, ³Sri Lankan Cancer Control Program, Colombo, ⁴Shaukat Khanum Memorial Cancer Hospital and Research Center, Lahore, ⁵Karachi Cancer Registry, Aga Khan University, Karachi, ⁶Dept Epidemiology and Biostatistics, Chittaranjan Natl Cancer Institute, Kolkatta ⁷Division of Biostatistics, Regional Cancer Centre, Trivandrum, ⁸Amrita Inst of Medical Sciences & Research Center, Kochin, ⁹National Cancer Registry Program, Indian Council of Medical Research, Bangalore, ¹⁰B.P. Koirala Memorial Cancer Hospital, Chitwan, Nepal, ¹¹Amrita Inst of Medical Sciences & Research Center, Kochin, ¹²Bangladesh National Cancer Registry, National Institute of Cancer Research & Hospital, Dhaka, ¹³Bombay Population-Based Cancer Registry, Indian Cancer Society, Mumbai

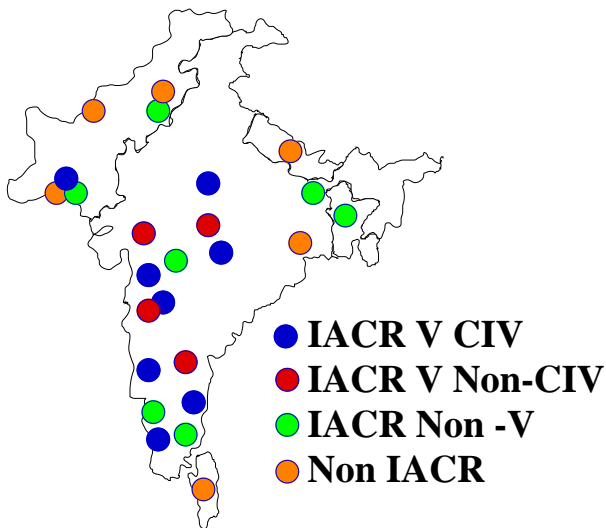


Figure 1. Cancer Registries in South Asia (V, Voting) and there were a total of eight registries included in the last International Agency for Research on Cancer compilation, in 2002. However, all but the South Karachi registry are in India, and therefore recourse has been made in the present report to Globocan 2002 for comparisons across countries. The actual registries now in operation are illustrated in Figure 1. The available population-based

data have been summarized in Tables 2 and 3, for males and females, respectively, and the overall picture in terms of the percentages of the total burden accounted for by the five most prevalent cancers is illustrated in Figure 2. In addition to Globocan and CIV, at least partial data are available for city or region based registries in Quetta (Bhurgri et al., 2002), Larkana (Bhurgri et al., 2006), Hyderabad (Bhurgri et al., 2005) and Karachi (Bhurgri et al., 2000) in Pakistan, Allahabad (Mehrotra et al., 2008), and Kolkata (Sen et al., 2006) in India, and multiple institutes in Nepal (Pradhananga et al., 2009).

Not included in Figure 2 are Dir province, where the leading neoplasms are lymphomas and leukemia, and cancers of the digestive system, skin and breast (Zeb et al., 2006; 2008). In the Punjab, hematological malignancies are the most frequent in males followed by lung and colorectal cancer, while breast cancer is the commonest in females followed by ovarian cancer and gallbladder cancer (Aziz et al., 2003). At the Armed Forces Institute of Pathology, Rawalpindi, the most common malignant tumours in males, in order of decreasing frequency, are prostate, skin, lymph node, leukaemia, urinary bladder, colorectum, bone, lung, stomach and liver, and in females of breast carcinoma followed by skin, leukaemia, ovary, colorectum, lymph node, bone, liver, cervix and gall bladder

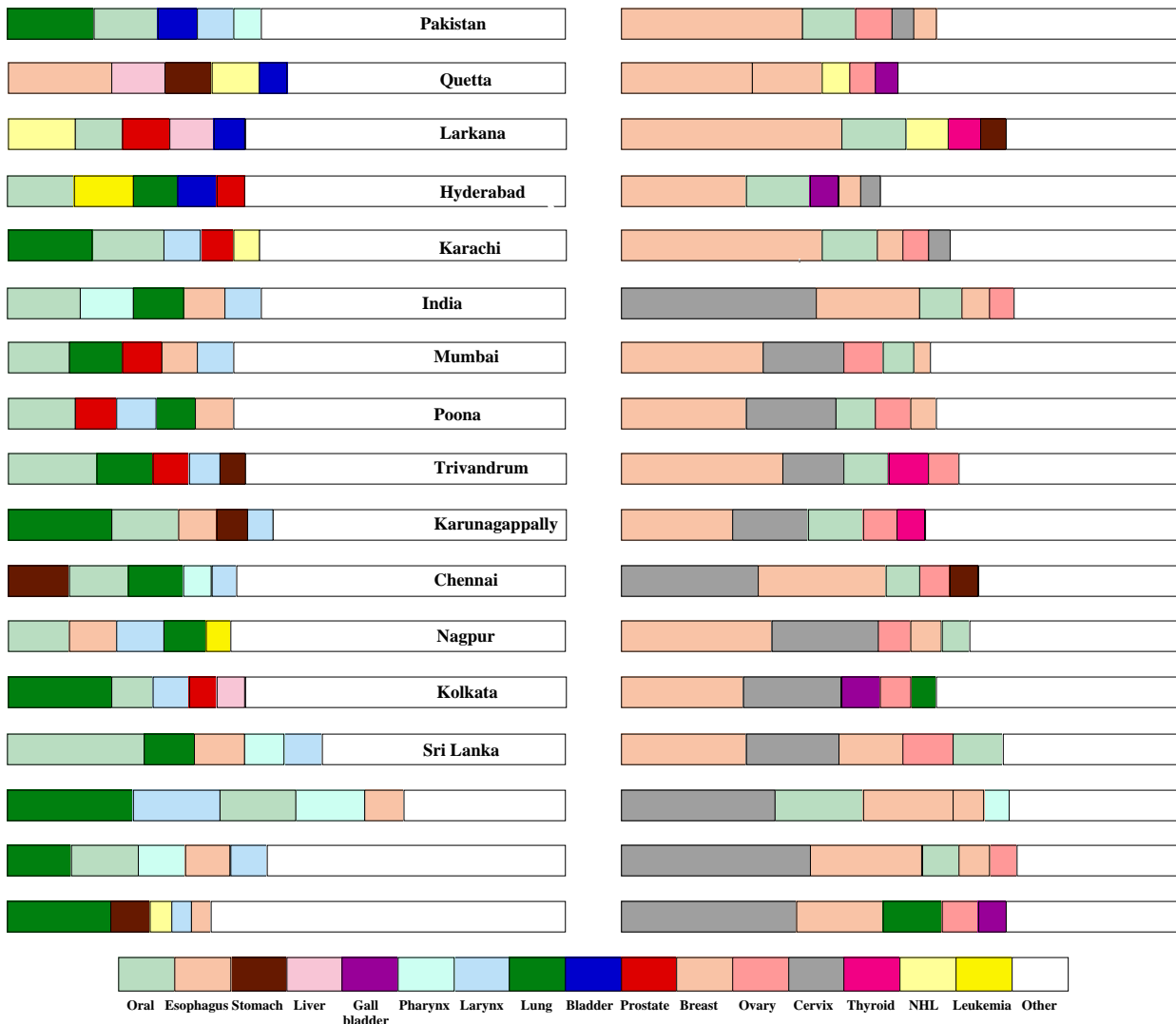


Figure 2. Percentage Data for the Five Most Prevalent Cancers in Countries of South Asia (Globocan 2002)

Table 2. Age-standardized Cancer Incidence Data for South Asian Countries - Males

	Pakistan			India						
	Karachi*	Lakarna [#]	Quetta ^{##}	Chennai*	Mumbai*	Nagpur*	Trivandrum*	K**	Poona*	Kolkata ^{###}
Lip	0.9	12.0	3.8	0.2	0.4	0.5	0.4	0.9	0.6	7.6
Tongue	5.3	-	-	5.1	4.6	5.5	6.0	5.8	3.2	-
Mouth	15.3	-	-	6.0	6.1	5.5	9.2	7.1	6.7	-
Nasopharynx	1.4	-	-	0.8	0.5	0.4	0.6	2.6	2.4	-
Hypopharynx	4.6	6.6	1.0	5.1	4.1	3.1	2.0	0.6	0.4	-
Oesophagus	6.7	2.0	25.5	9.1	6.7	8.7	3.5	8.3	6.1	4.5
Stomach	6.0	2.6	11.4	12.2	4.6	4.1	4.6	6.1	4.3	5.0
Colon	3.6	6.3	8.2	1.9	3.0	2.7	2.2	2.0	2.4	2.7
Rectum	2.9	-	-	3.3	2.6	2.6	3.2	2.1	2.4	2.7
Liver	5.4	10.5	12.3	3.0	4.5	1.6	2.8	3.9	3.4	5.3
Gallbladder	1.3	0.6	2.1	1.0	1.6	0.8	0.6	0.3	0.9	1.6
Pancreas	0.9	0.5	0.6	1.4	2.2	1.3	1.7	2.5	1.9	1.6
Larynx	10.7	6.1	0.9	4.7	6.5	8.5	5.1	5.3	6.2	6.4
Trachea, lung	25.2	6.6	4.0	10.8	9.7	7.5	9.9	21.3	6.2	18.7
Penis	0.0	0.1	0.0	1.7	0.8	1.6	0.8	1.0	1.3	-
Prostate	10.1	11.1	6.9	3.9	6.9	3.0	5.6	4.4	6.4	5.3
Kidney	1.7	1.2	3.6	1.3	2.0	1.1	1.5	0.7	1.7	1.6
Bladder	9.3	9.0	7.0	2.8	3.8	2.8	1.9	4.2	2.8	4.4
Brain	3.3	3.5	2.4	3.0	3.7	3.0	2.9	3.7	3.6	2.0
Thyroid	0.7	1.7	1.8	0.8	0.7	0.4	2.0	1.7	0.7	0.7
Non-Hodgkin	7.6	15.5	2.4	4.4	4.4	4.0	3.5	3.3	3.7	3.7
Leukemia	4.3	2.0	1.0	3.7	3.8	4.5	4.4	2.7	3.6	2.7
Total	167	134	137	107	102	101	97	116	88	102

*Data from Curado et al, 2007; **Karunagapally; [#]Bhurgri et al., 2006 ^{##}Bhurgri et al., 2002; ^{###}Sen et al., 2002

Table 3. Population-based Cancer Registry Data for Pakistan and India - Females

	Pakistan			India						
	Karachi*	Lakarna [#]	Quetta ^{##}	Chennai*	Mumbai*	Nagpur*	Trivandrum*	K**	Poona*	Kolkata ^{###}
Lip	0.4	12.6	2.5	0.2	0.2	0.2	0.3	0.1	0.4	4.3
Tongue	6.6	-	-	1.6	1.9	1.7	2.6	2.4	2.0	-
Mouth	12.3	-	-	5.2	3.7	3.4	4.1	5.4	5.0	-
Nasopharynx	0.6	-	-	0.3	0.2	0.3	0.3	0.3	1.0	-
Hypopharynx	1.8	-	1.7	1.8	0.9	1.0	0.2	0.0	0.2	-
Oesophagus	8.6	2.2	23.4	5.4	3.4	5.7	0.9	2.0	5.0	3.5
Stomach	3.6	4.8	2.2	6.0	1.8	1.9	1.0	2.6	2.4	3.8
Colon	3.5	3.2	4.3	1.6	1.8	1.8	1.6	2.1	2.3	2.4
Rectum	1.3	-	-	2.2	1.4	1.8	2.2	1.4	2.4	2.0
Liver	3.7	2.0	3.1	0.9	2.2	0.9	1.0	0.8	1.4	3.9
Gallbladder	4.9	3.0	3.6	0.8	2.3	0.8	0.4	0.9	1.2	8.1
Pancreas	0.5	0.1	0.1	0.7	1.6	0.5	1.0	1.2	1.2	1.6
Larynx	1.8	0.8	0.3	0.5	0.8	1.4	0.2	0.1	1.1	0.8
Trachea, lung	3.6	0.4	0.0	2.6	3.1	2.4	1.7	2.3	3.0	4.9
Breast	69.0	20.6	11.8	26.5	26.9	27.4	24.6	16.0	24.4	25.1
Ovary	8.8	4.4	4.3	6.0	7.1	6.4	4.8	4.8	6.8	6.3
Corpus uteri	6.7	2.2	2.4	2.0	2.8	2.3	2.8	1.1	1.9	-
Cervix uteri	7.5	2.2	2.7	28.0	14.5	18.4	9.4	10.6	17.3	19.9
Kidney	0.8	1.0	1.4	0.8	0.9	0.5	0.3	0.4	0.9	0.8
Bladder	2.6	2.8	2.3	1.0	1.0	1.0	0.4	0.2	1.0	0.6
Brain	2.7	2.0	0.4	2.1	2.8	2.6	2.2	1.9	1.9	1.5
Thyroid	2.9	6.4	2.5	1.9	1.5	1.0	5.8	3.9	1.4	1.6
Non-Hodgkin	5.1	8.4	4.7	2.3	2.9	1.9	2.3	2.1	2.4	2.1
Leukemia	3.7	1.8	0.2	2.3	2.7	2.6	2.6	2.6	2.0	1.6
Total	192	110	92	115	105	103	85	80	101	114

*Data from Curado et al, 2007; **Karunagapally; [#]Bhurgri et al., 2006 ^{##}Bhurgri et al., 2002; ^{###}Sen et al., 2002

(Jamal et al., 2006). On an in-patient basis colorectal tumours were found to be most frequent, followed by stomach and esophagus malignancies (Jamal et al., 2005). In Multan, the common tumours in males, in order of decreasing frequency were leukaemia, prostate cancer, urinary bladder cancer, skin cancer and lymphomas. In females they were leukaemia, breast cancer, skin cancer, gallbladder cancer and lymphomas (Atique et al., 2008). At the Himalayan Institute of Medical Sciences (HIMS), Dehradun, situated in Uttaranchal with a low socio-economical status, the top five cancer sites are in males are lung, larynx, lymph system (non-Hodgkins lymphomas), oesophagus and stomach, while in females they are the breast, cervix, gallbladder, ovary and oesophagus (Gaur et al., 2006). In a single institution in Karachi, head and neck cancers in males and breast cancers in females were found to be most common, at rates almost highest in Asia (Hanif et al., 2009). In Nepal, for males the leading cancer sites are reported to be lung, larynx and stomach and for females lung, cervix and breast (Binu et al., 2007), with shifts noted with aging (Pradhananga et al., 2009).

There is information about ethnic and social variation (Zeb et al., 2006). For example, cancers of the buccal cavity, pharynx, larynx, oesophagus and cervix uteri are more frequently seen in non-Parsi than Parsi populations in Mumbai, while breast and endometrial cancers, as well as lymphomas and leukaemias, are more common in the latter (Yeole et al., 2001). Considerable variation is also evident with different religious faiths (Yeole et al., 2006). The registered numbers of overall cancer cases in Bangalore, Chennai, Delhi, Bhopal and Mumbai are rising (Marimuthu, 2008), although an earlier study found no increase in Delhi (Tyagi et al., 2001). Yeole has recently published a series of papers on trends over time. Age-adjusted incidence rates for cancers of the stomach and esophagus are generally decreasing, while colon and rectum and liver cancers are on the rise in most registries (Yeole, 2008a). Bhurgri et al (2006) have focused on the upper aerodigestive tract.

Organ Specific Epidemiology

Skin Cancer

Skin cancers are rare.

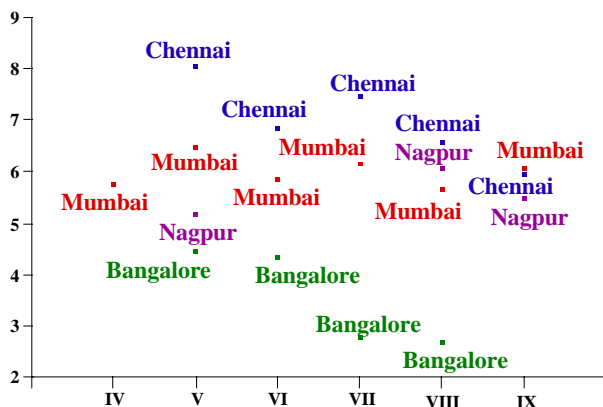


Figure 4. Male Mouth Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

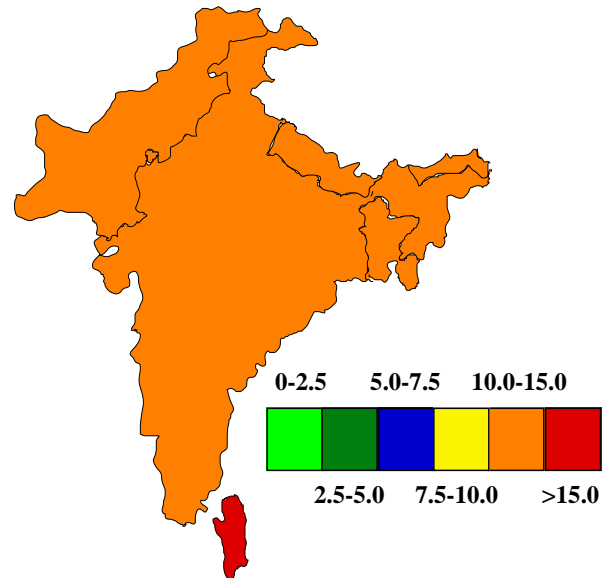


Figure 3. Male Oral Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

Oral Cancer

In half of the registries from the region, oral cavity cancer is number one in males, and in almost all of the remainder is number two in frequency (see Figure 3). High rates have been reported in Nepal (Baskota et al., 2005) and in Indian tea estate labourers in Sri Lanka (Ariyawardana et al., 2007). Similarly, in females it is generally number two or three and often the absolute numbers are equivalent to those in men, which may reflect the pattern of exposure to known risk factors such as betel quid, arecanut, with or without *Aspergillus* contamination, and chewing or other forms of tobacco (Bhurgri et al., 2003b; Patel et al., 2007; Basu et al., 2008). In some situations alcohol might play a role, rather than smoking (Thomas et al., 2003). A history of diabetes mellitus might also predispose (Dikshit et al., 2006) while high socioeconomic status is protective (Hashibe et al., 2003). Gas-affected regions of Bhopal in the year 1992 have subsequently shown an elevated risk (adjusted for tobacco chewing) (Dikshit and Kanhere, 1999).

Generally, in India incidences of both mouth and tongue cancers are decreasing although apparently independently of one another (see Figures 4 and 5). In

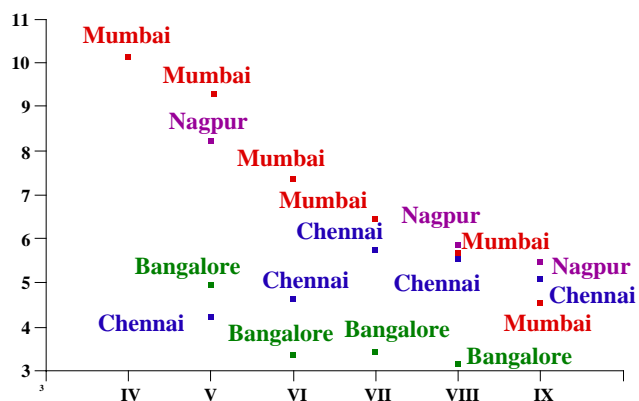


Figure 5. Male Tongue Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

Pakistan, sub-categories of oral cancer also show variation in trend, with lip cancer in men decreasing, and tongue increasing, but the most dramatic is rise in the cheek in both sexes, a strong socio-economic factor with a poorer, low literacy profile being apparent (Bhurgri, 2005). Sub-site specific risk factors need to be elucidated by analytical epidemiological assessment (Yeole, 2007). Decreasing trends in oral cancers in Indian men may be attributed to a decrease in the usage of pan and tobacco (Sunny et al., 2004b), although the tongue is exceptional (Elango et al., 2006). Use of smokeless tobacco (Pan masala, Zarda etc.) is on the increase in North India, especially in Uttar Pradesh, and is responsible for the large majority of these tumours (Mehrotra et al., 2005), the tongue being the most frequently involved site (Mehrotra et al., 2003). People of Mohajir ethnicity generally have a higher prevalence of paan, gutka and tumbaku use while Pathans are more exposed to niswar (Mazahir et al., 2006). One reported male/female ratio was 3.7:1 (de Silva et al., 1995). Many cancers in the young do not have a readily recognizable etiology, especially tongue lesions (Siriwardena et al., 2006; 2007). The fact that deficient CYP2A6 activity due to genetic polymorphism reduces oral cancer risk in betel quid chewers suggest involvement of particular carcinogens (Topcu et al., 2002). Hypermethylation may also contribute to pathogenesis (Takeshima et al., 2008).

As expected, 5-year survival for localized cancers depends on the subsite, with a poorer prognosis for less readily observable locations (Yeole et al., 2000). The low rate points to need for early detection (Yeole et al., 2003).

Regarding screening, it has been suggested that adequate coverage can be obtained in population-based oral screening in developing countries (Warnakulasuriya and Pindborg, 1990; Ramadas et al., 2008), but good patient-provider communication is essential to assure high compliance with referral (Warnakulasuriya et al., 1988; Warnakulasuriya and Nanayakkara, 1991; Sankaranarayanan et al., 2000; Ramadas et al., 2008). Importantly, after surgical excision of non-homogeneous oral leukoplakia in a screening intervention trial, Kerala, almost three quarters of patients remained disease free with no evidence of recurrent/new lesions during follow-up (Pandey et al., 2001). Urinary nicotine, cotinine, and NO₂+NO₃ could be helpful as adjunct parameters for screening programs for oral cancer (Patel et al., 2007).

Awareness of risk factors is a problem (Khawaja et al., 2006; Ariyawardana and Ekanayake, 2008) and knowledge about the causal relationships with tobacco smoking and use of alcohol is lower than for betel chewing (Ariyawardana and Vithanaarachchi, 2005). In the absence of state-sponsored preventive activities, it is necessary to improve the capacity of individual health practitioners and medical centres to participate in oral health promotion and oral pre-cancer screening (Ariyawardana et al., 2007).

Regarding molecular mechanisms underlying oral cancer development, overexpression of p63 in oral precancerous lesions and SCC in betel-quid chewers in Sri Lanka may be a useful marker for oral precancerous lesions (Haniffa et al., 2007). Molecular biomarkers may find use for early detection (Suhr et al., 2007).

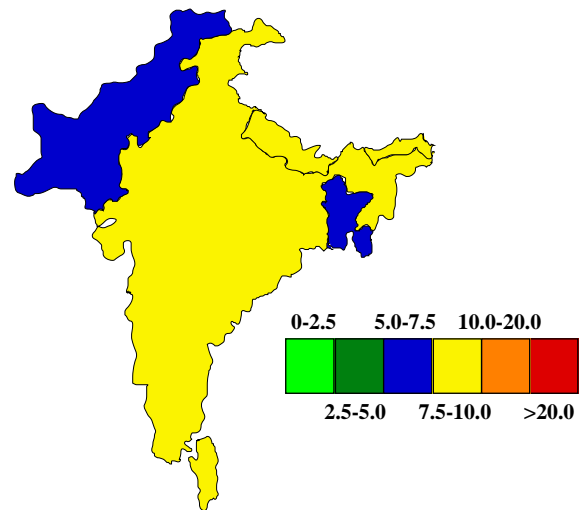


Figure 6. Male Oesophageal Cancer Incidences/100,000 (Ghobaan, 2002; Ferlay et al., 2004)

High rates of nasopharyngeal cancer are found in the northeastern states of India (Nandakumar et al., 2005).

Oesophageal Cancer

Oesophageal cancer is relatively common in India, and in the Baluchistan province of Pakistan, where it is the commonest malignancy in both genders (Bhurgri et al., 2003a). Rates are also high in India, Sri Lanka and Nepal (see Figure 6), but appear to be falling (Figure 7). An excessive likelihood of development of squamous cell carcinoma (SCC) versus adenocarcinoma, and in the upper-third of the esophagus relative to the lower-third of the organ has been reported in Pakistan (Badar et al., 2005).

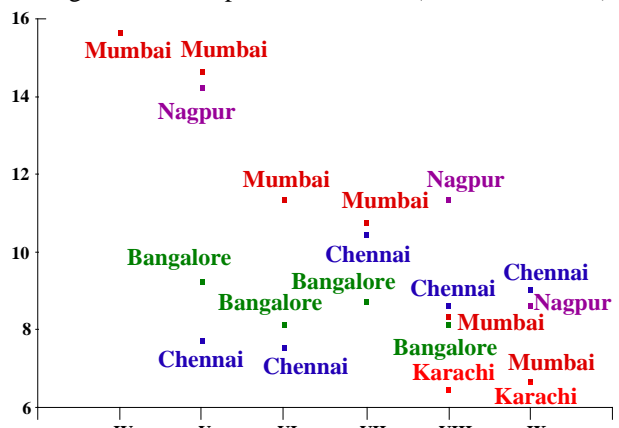


Figure 7. Male Oesophageal Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

Table 4. Oesophageal Cancer Histopathology: SCC-Adenocarcinoma Ratios

	Male			Female		
	SCC	AC	Ratio	SCC	AC	Ratio
Karachi	81.3	15.7	5.2:1	92.2	4.3	21.4:1
New Delhi	50.1	10.9	4.6:1	57.0	5.0	11.4:1
Mumbai	86.6	10.3	8.4:1	90.6	6.8	13.3:1
Nagpur	95.5	1.0	95.5:1	95.5	0.0	-----
Karunagapally	73.2	16.1	4.5:1	88.2	5.9	14.9:1
Trivandrum	71.1	22.4	3.2:1	69.2	19.2	3.6:1
Chennai	87.9	6.6	13.3:1	91.5	5.2	17.6:1

Data from Curado et al, 2007

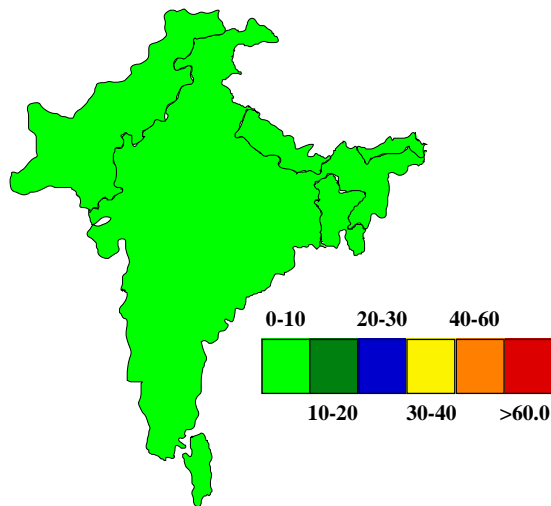


Figure 8. Male Stomach and Colon Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

In India overall, SCCs predominate, although there is some variation and both sexes in Trivandrum have relatively large proportions of ACs (see Table 4).

Potential risk factors in Karachi are use of all forms of tobacco, areca nut, infrequent consumption of raw fruits and vegetables and diet deficiencies, with slightly higher incidences for females than males (Bhurgri et al., 2004). The same appears to be the case for Sri Lanka, where pathological changes such as acanthosis, basal cell hyperplasia, intra epithelial neoplasia, chronic oesophagitis koilocytosis and papillomatosis occur in the oral hypopharyngeal and other areas of the oesophageal squamous mucosa, in association with squamous carcinoma of the oesophagus (Ratnatunga and Edussuriya 1997). Generally lesions are locally advanced (Alidina et al., 2004).

Stomach Cancer

Stomach cancer is relatively rare (see Figure 8) except in particular registries like Chennai, and in Mizoram, in the north-eastern state of India, where it is associated with tobacco use (Phukan et al., 2005). It is generally on the decrease (see Figure 9) (Sunny et al., 2004a; Yeole, 2008a), although Pakistan may be an exception in this regard (Bhurgri et al., 2009a). While the stomach cancer incidence is very low, a PCR-based study revealed very high positive

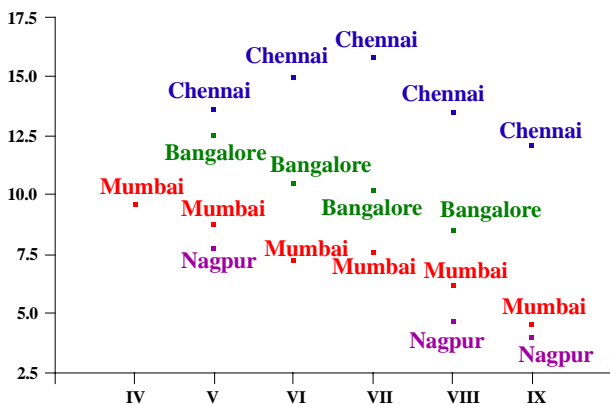


Figure 9. Male Gastric Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

rates for *Helicobacter pylori* infection and cagA (Fernando et al., 2002). Itself not sufficient to cause cancer, *H. pylori* infection may interact with consumption of saum or smoked dried meat or soda (alkali), used as a food additive (Phukan et al., 2006). In one study, tobacco chewing, bidi or cigarette smoking and alcohol drinking did not emerge as major risk factors for stomach cancer, but consumption of dry fish at least once a week 12-fold excess risk, while tea consumption was protective (Rao et al., 2002). Both intestinal and diffuse types of gastric carcinoma showed strong association with *H. pylori*, chronic gastritis being the background lesion, while atrophy and intestinal metaplasia indicate long term infection (Arif and Syed, 2007).

Gastric carcinoma in the region carries a bad prognosis, with a 5-year survival rate of only 13.3% in one series (Khan et al., 2005), most patients presenting with unresectable disease (Mohammad and Makaju, 2006b; Siriwardana and Pathirana, 2007).

Colorectal Cancer

While colorectal cancers are still consistently rare across countries (see Figure 8), they appear to be very slightly on the increase (Yeole, 2008a), the majority being found in the rectosigmoid region (Perera et al., 2008). Rates of rectal cancer were earlier found to be steady (Mohandas and Desai, 1999). Generally numbers in both colon and rectum sites are about equal, but rectal cancers are more frequent in some registries. Young age and delayed presentation are typical (Singh et al., 2002b), with left-sided tumors (Pal, 2006; Anwar et al., 2008). Disease is usually very advanced with 5-year relative survival of less than 40% overall (Ahmad et al., 2005). Age, site of cancer and clinical stage of disease are independent predictors of survival (Yeole et al., 2001).

Liver Cancer

Liver cancer is generally relatively rare, only being included in the first five cancers in Larkana and Kolkata males. Most patients present with large, multifocal tumours, with evidence of prior infection with hepatitis B or C (Yusuf et al., 2007). There is a possibility that the recent documented increase in non-alcoholic steatohepatitis (NASH), with clinical, biochemical and histological features similar to those reported in western countries, might indicate an elevated risk in the future (De Hewavisenthi et al., 2005).

Gallbladder Cancer

In females in the North-east of India and possibly Nepal, gallbladder cancers are relatively frequent (Nandakumar et al., 2005). Risk factors are gallstones, low age at menarche, high parity, young age at first delivery, low fiber and vitamin A intake, high fat intake, fasting, a habit of missing dinner and tobacco chewing (Rizvi and Zuberi, 2003; Dutta et al., 2005; Shukla et al., 2008).

Low zinc levels may promote (Gupta et al., 2005), while vegetables protect (Rai et al., 2006). Most of the studies have shown a good association with Salmonella, especially in the area of high endemicity of typhoid, and bacterial degradation of bile and chronic inflammation may

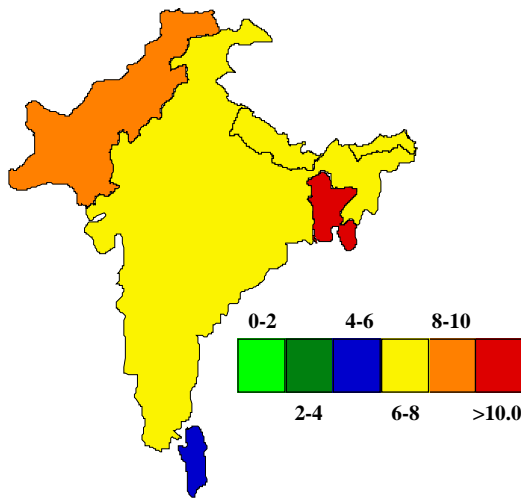


Figure 10. Male Laryngeal Cancer Incidences/100.000 (Globocan, 2002: Ferlay et al., 2004)

also play some role (Kumar et al., 2006). *Helicobacter hepaticus* infection may also be important (Pradhan and Dali, 2004).

Pancreatic Cancer

Pancreatic cancer rates are generally low. Studies are required to confirm the associated risk factors such as *Manihot esculenta* and foods with a high content of chilli (de Silva et al., 2005).

Pharyngeal Cancer

Cancer of the pharynx, other than the nasopharynx, is relatively common in males of Pakistan, some Indian registries, Sri Lanka and Bangladesh. Smoking bidi is even more hazardous than cigarette smoking in the development of lung and oropharyngeal cancer (Dikshit and Kanhere, 2000). Rates rise with age but starting at 25+, a decade and a half after the oral cancer rise (Bhurgri et al., 2006a). Gas-affected regions of Bhopal in the year 1992 in comparison to gas-unaffected regions and the year 1987-1990 combined were estimated. In a case-control study the RRs of 0.9, 1.4 and 1.2 for lung, oropharynx (adjusted for smoking) and oral cavity cancer, respectively, (adjusted for tobacco chewing) were estimated as the effect of the gas accident. (Dikshit and Kanhere, 1999)

Laryngeal Cancer

Laryngeal cancer is moderately frequent in males in all registries and appears particularly common in Bangladesh (see Figure 10). After adjusting for education, years of use of alcohol, smoking, chewing of betel leaf with tobacco in the model, low green leafy vegetables and preference for spicy foods were found to be positively related to risk of laryngeal cancer (Kapil et al., 2005).

Lung Cancer

Overall, cancer of the lung in males is number one or two in the majority of registries, but frequencies are low at the country level (see Figure 11) and may be decreasing (see Figure 12). In females it is very rare but appears to be on the increase (Agarwal et al., 2009). There is major variation in the proportions of different histopathological types (see Table 8), adenocarcinomas predominating in Mumbai and Trivandrum, but SCCs elsewhere (Balamugesh and Balamugesh, 2004). In Pakistan, in contrast, SCCs are the most common in both sexes. In Kashmir, most cancers are smoking related SCCs, with a very poor prognosis (Kan et al., 2006). The risk of developing lung cancer increases with age, with a marginally higher risk in the higher socio-economic categories for men and in the lower socio-economic categories for women. A higher risk was also observed for men who were residing along the coastal belt, and for ethnicities belonging to Southern Pakistan (Sindhi and Mohajir) residing in Karachi South (Bhurgri et al., 2006b). Lung cancer incidence increases with the number of bidi smoked a day, the duration of

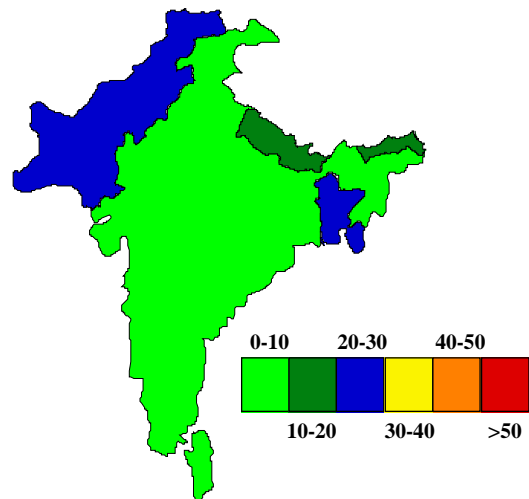


Figure 11. Male Lung Cancer Incidences/100.000 (Globocan, 2002: Ferlay et al., 2004)

and Balamugesh, 2004). In Pakistan, in contrast, SCCs are the most common in both sexes. In Kashmir, most cancers are smoking related SCCs, with a very poor prognosis (Kan et al., 2006). The risk of developing lung cancer increases with age, with a marginally higher risk in the higher socio-economic categories for men and in the lower socio-economic categories for women. A higher risk was also observed for men who were residing along the coastal belt, and for ethnicities belonging to Southern Pakistan (Sindhi and Mohajir) residing in Karachi South (Bhurgri et al., 2006b). Lung cancer incidence increases with the number of bidi smoked a day, the duration of

Table 8. Lung Cancer Histopathology: SCC-Adenocarcinoma Ratios

	Male			Female		
	SCC	AC	Ratio	SCC	AC	Ratio
Karachi	40.2	8.3	4.8:1	38.3	14.9	2.6:1
New Delhi	24.0	9.6	2.5:1	15.0	22.2	0.7:1
Mumbai	29.8	41.4	0.7:1	14.9	56.4	0.3:1
Nagpur	45.1	29.8	1.5:1	36.1	42.1	0.9:1
Karunagapally	22.8	21.9	1.0:1	26.7	46.7	0.6:1
Trivandrum	14.7	28.4	0.5:1	11.9	35.7	0.3:1
Chennai	41.9	26.2	1.6:1	31.3	37.4	0.8:1

Data from Curado et al, 2007

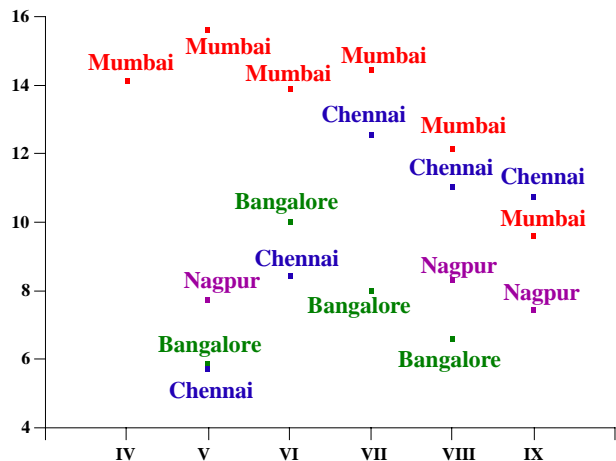


Figure 12. Male Lung Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

exposure and the younger the age of starting, with risk not returning to the level of non-smokers within 10 years after cessation (Jayalekshmy et al, 2008). In addition to smoking, occupational exposure to carcinogens, indoor air pollution and dietary factors have also been implicated (Joshi, 2003; Behera and Balamugesh, 2004).

In Pakistan, significant differences were found in the average age at diagnosis between males (60.1 years) and females (57.5 years) and, in the distributions of non-smokers, current smokers, and ex-smokers, but none for histology (Badar et al., 2006). Overall 5-year observed and relative survival rates for lung cancers were 12.5% and 15.9% respectively (Yeole, 2005). Most cancers are late stage and there may furthermore be delays during the diagnostic evaluation and treatment (Chandra et al., 2009). One complicating factor is the high prevalence of tuberculosis and radiological similarities lead to a large number of lung cancer patients initially receiving the wrong treatment (Singh et al., 2009). Management of lung cancer must include strategies to improve various aspects of QOL and the nutritional status (Mohan et al., 2008).

Kidney Cancer

Renal cell carcinoma rates are generally very low, although a link with obesity might suggest increase in the future (Ildaphonse et al., 2009; Mathew et al., 2009). Alteration in interleukin-4-receptor alpha gene expression may be associated with risk (Mohan et al., 2009)

Urinary Bladder Cancer

Urinary bladder cancers are within the first five most common neoplasms in Pakistan but elsewhere they are rare. There is a clear male predominance, with some linkage to tobacco, and possibly also to employment as a motor vehicle driver or railroad worker (Manju et al., 2009). Patterns of urological malignancies have been described for Sri Lanka (Goonewardena and de Silva, 1999) and Pakistan (Badar et al., 2009). Around 90% of primary bladder tumors are transitional cell, with nearly half the patients having muscle-invasive disease on initial presentation (Goonewardena et al., 2004).

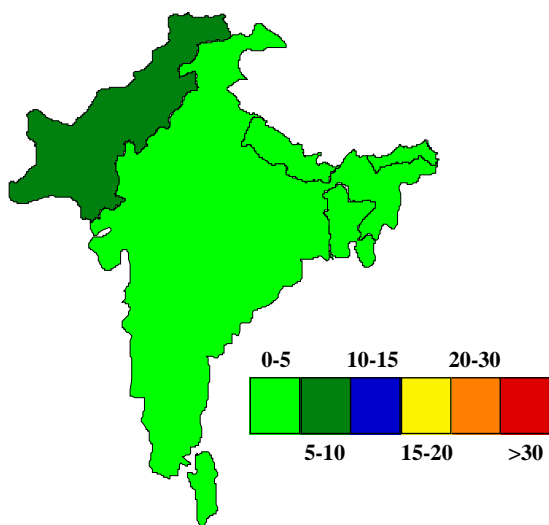


Figure 13. Prostate Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

Prostate Cancer

Prostate cancer is relatively common in some of the Indian registries, but at the country level absolute incidences are very low (see Figure 13). Earlier, stability in age adjusted-incidence rates was considered to reflect no changes in the etiological factors for prostate cancer in Mumbai (Sunny et al., 2004c). However, more recently, increasing trends in the age adjusted incidence rates throughout a 25 year period of observation were noted for most of the registries, especially in Chennai and Bhopal and to the least extent in Mumbai (Yeole, 2008c). Recent publications suggest that a major problem with prostate cancer in Pakistan (Bhurgri et al., 2008; Ahmad et al., 2009). In Sri Lanka also, the real incidence of prostate cancer was earlier questioned (de Silva et al., 1999). A low fat diet rich in fruits and vegetables may reduce the risk of developing prostate cancer (Sunny, 2005)

There has been interest in outcome of elevated prostate specific antigen and transrectal ultrasound guided prostatic biopsy for detection (Samarasinghe et al., 2004). Survival in one Indian series was 49.2% for localised disease, 23.5% for direct extension and regional node involvement and 12.7% for distant metastatic patients (Yeole and Sunny, 2001),

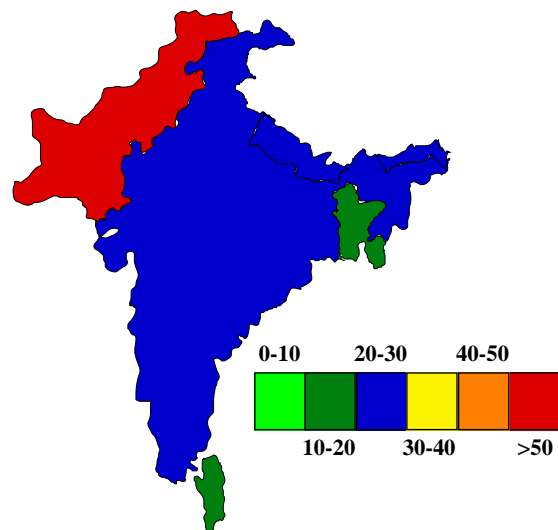


Figure 14. Female Breast Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

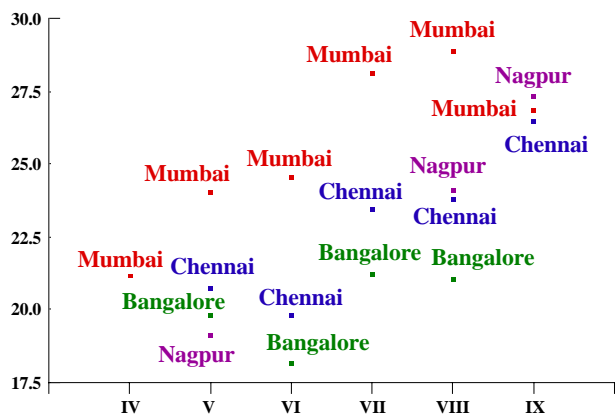


Figure 15. Female Breast Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

Breast Cancer

While still relatively infrequent as compared to the Western world, breast cancer is already a major problem throughout the region (see Figure 14) and there is strong evidence that continued rapid rise can be expected in the future (see Figure 15) (Takiar and Srivastav, 2008; Yeole, 2008b). Intermediate breast cancer trends exhibited by Indian immigrants in the US may help predict future incidence trends amongst Indian (particularly urban) residents (Ghumare and Cunningham, 2007). However, the incidence of breast cancer in Karachi South (KS) for the period 1995-1997 was already the third highest in Asia (Bhurgri et al., 2007).

No history of breast-feeding, lower parity, smoking, postmenopausal status, family history of breast cancer, unmarried status, and use of contraceptive pill are risk factors (Faheem et al., 2007). In Kolkata a positive correlation has been found with a higher standard of living, higher educational status, and higher intake of animal protein, fat and deep fried foods (Datta et al., 2009). Christians in India have the greatest risk of breast risk and Muslims have the lowest, but in all the populations breast cancer was found to be less prevalent at the lower

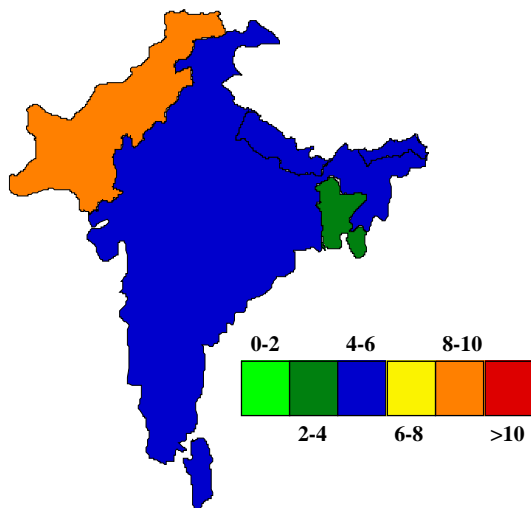


Figure 16. Ovarian Cancer Incidences/100.000
(Globocan, 2002; Ferlay et al., 2004)

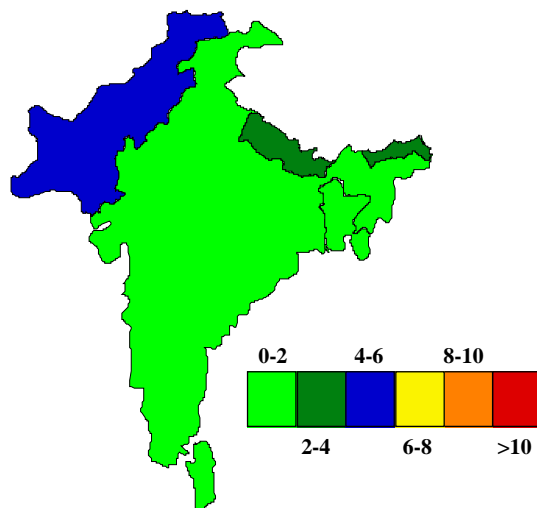


Figure 17. Endometrial Cancer Incidences/100.000
(Globocan, 2002; Ferlay et al., 2004)

education level (Yeole and Kurkure, 2003). Increased anthropometric values, like BMI, are risk factors of postmenopausal BC in India (Mathew et al., 2008). Nepalese breast cancer cases, particularly premenopausal, have unexpectedly been seen at a relatively young age with late menarche, early first full-term pregnancy, long duration of lactation and a large number of children (Singh et al., 2002a). Diet is also important and mean vitamin C, vitamin E and selenium levels were found to be lower in patients as compared to the controls (Singh et al., 2005). Recently, plasma beta-carotene, vitamin E and vitamin C were also significantly associated with decreased risk of breast cancer, whereas increased risk was linked to plasma vitamin A (Shah et al., 2009). In South India, tapioca was found to be protective and chicken consumption a risk factor in one study (Jayalekshmi et al., 2009). The CYP17 TT/CC genotype is associated with decreased risk for breast cancer, especially in post menopausal women (Samson et al., 2009).

Most cases present late and survival is poor (Nandakumar et al., 1995a; Gilani et al., 2003; Sharma et al., 2005; Bhattacharya and Adhikary, 2006; Mohammad and Makaju, 2006a). Elevated risks for late stage reporting were observed for women who were unmarried, widowed/divorced and with lower education (Ali et al., 2008). Strong associations have similarly been noted between low socioeconomic status and advanced disease, delay in diagnosis, limited access to minimal expected treatment and inferior disease free and overall survival (Aziz et al., 2004). Substantial differences were found between groups of patients stratified according to tumor diameter and nodal involvement, but none for ER status (Badar et al., 2005b).

Practice and knowledge of breast self-examination is low, even among Indian teachers (Khokar, 2009a) although short text email messages may be an effective aid in this regard (Khokar, 2009b). With breast self-examination, size of the breasts and lumps had significant relation to performance and a Kappa test showed 68% agreement between findings of examinations done by the experts and respondents (Tara et al., 2008). International cost-effectiveness of clinical breast screening for breast cancer in India compares favorably with that of mammography (Okonkwo et al., 2008). With outreach compliance is good (Dinshaw et al., 2007a). However, most patients receive their first mammograms when they already have clearly palpable disease (Badar et al., 2007b) and an objective grading system is necessary (de Silva et al., 1998) with international collaboration (Perera et al., 2004).

The prevalence of ER, PR and Her/2neu amplification in carcinoma of breast among Sri Lankans is similar to that described internationally (Ratnatunga and Liyanapathirana, 2007).

Ovarian Cancer

Ovarian cancers are relatively frequent, particularly in Pakistan (see Figure 16). Stage at presentation in the majority of ovarian cases is advanced, with Cancer Antigen-125 elevated in 70% of one series (Sarwar et al., 2006).

Corpus uteri

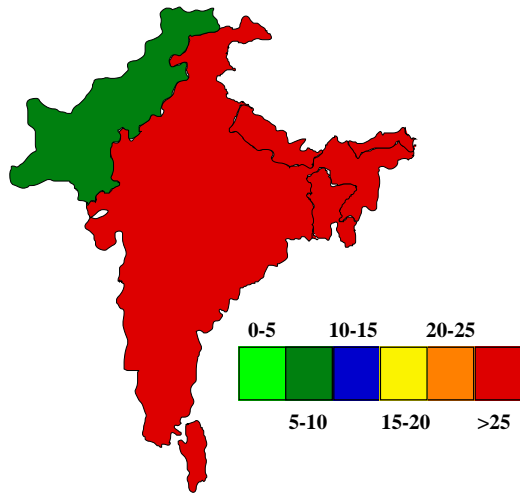


Figure 18. Cervix Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

Cancer corpus uteri is generally rare, for example in Nepal (Mohammad and Makaju, 2006a), with the possible exception of Pakistan (see Figure 17). In Karachi South the population is moderate risk, tumours predominantly occurring in middle-aged individuals with a higher socio-economic status (Bhurgri et al., 2007a). On the average the malignancy is observed a decade earlier then reported in the West.

Cervix uteri

Cervical cancer is very common throughout South Asia except for muslim Pakistan (see Figure 18). However, the trend is for decrease in incidence rates in most registries (see Figure 18) (Murthy et al., 2005; Takiar and Srivastav, 2008; Yeole, 2008b). The major risk factor is clearly the high risk HPV, together with an importance for genital hygiene in the fight against infections that have a role in the development of cervical dysplasia and cancer (Varghese et al., 1999). Risk factors thus mainly pertain to early sexual debut, multiple sexual partners, menstrual hygiene and unprotected sex conducive to the transmission of an etiological agent (Juneja et al., 2003; de Silva et al., 2006). In Darjeeling, low socioeconomic status, having the first coitus before age 17, and low literacy are established factors (Bhattacharyya et al., 2000). A large proportion of cervical cancer patients in Pakistan (67%) present in stages II to IV and only few presented early at

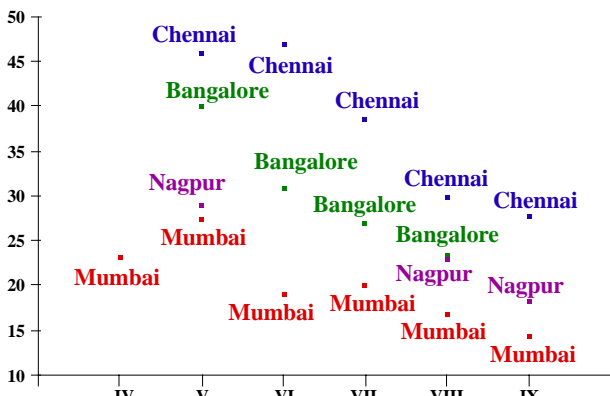


Figure 19. Cervical Cancer Incidences/100,000 over Time(Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

stages 0 or I, emphasizing the need for early detection (Badar et al., 2007; Bhurgri et al., 2007b). Good participation levels for cervical cancer screening can be achieved in rural areas of developing countries by using appropriate strategies to deliver services (Basu et al., 2007). Communication methods and delivery strategies must be aimed at encouraging older, less-educated women (Nene et al., 2007).

On approach considered appropriate for rural India is visual inspection with acetic acid (VAI) or Lugols iodine (VILI) which can be performed reliably by trained paramedical workers or doctors, with no significant difference between the two, and is an effective screening option in low resource settings (Bhatla et al., 2004; Sankaranarayanan et al., 2007). In some situations, VIA may be more sensitive and have a higher accuracy than the Pap smear (Tayyeb et al., 2003), although it requires careful monitoring (Sankaranarayanan et al., 2005) and it has been argued that unaided visual inspection or “downstaging” is not suitable as an independent primary screening modality (Basu et al., 2002). In Nepal, VIA as a screening test for cervical neoplasia did not miss any lesion detected by Pap smear and confirmed by cervical biopsy (Dhaubhadel et al., 2008). A consistently higher sensitivity but equal specificity of VILI compared with VIA has been reported (Arbyn et al., 2008). ‘See and treat’ with cryotherapy by nurses under medical supervision is acceptable, safe and effective for cervical cancer prevention in low-resource settings (Sankaranarayanan et al., 2007). Detection rates obtained by HPV testing were similar to cytology, despite higher investments (Sankaranarayanan et al., 2005). The main utility of hybrid capture-II is in the triage of patients with cytology smear diagnosis of ASC-US, ASC-H or L-SIL, for referral to colposcopic examination. HC-II alone has the best diagnostic accuracy but owing to high cost it is unsuitable for general screening (Legood et al., 2006; Kumar et al., 2007). Affordability has also been stressed for Sri Lanka (Kumarasinghe et al., 1999; Sirisena, 1999).

In the longer term the alternative is vaccination, especially if costs can be brought down drastically (Das et al., 2008; Diaz et al., 2008). A wide spectrum of HPV types is seen in Indian and Sri Lankan women, but the most frequent is HPV-16 in all grades of histology (de Silva et al., 2006). A vaccine against HPV-16 and HPV-18 could prevent two thirds of cases of high-grade cervical neoplasia (Bhatla et al., 2008; Basu et al., 2009). Integration sites may not have prognostic significance (Nambaru et al., 2009) Of 59/60 HPV positive samples in Pakistan, 56 showed the presence of HPV16 and one sample was positive for HPV18 (Khan et al., 2007).

Late stage reporting is also a problem, especially in the absence of bleeding (Kaku et al., 2008).

Brain and Nervous Tissue

There is some variation in incidences across South Asia (see Figure 20). An increasing trend in cancers of nervous system in both sexes has been noted for almost all registries in India (Yeole 2008d).

Thyroid cancer

South Asia is a low to intermediate incidence area for thyroid cancer (see Figure 20). However, there is a relatively high incidence belt in females in southwest coastal districts of India (Nandakumar et al., 2005). A trend towards more differentiated thyroid cancer with lesser degree of spread was observed in recent years, possibly

due to the iodination programme implemented in 1995 (Ratnatunga et al., 2003). Because many patients have multifocal disease, aggressive surgery is generally recommended (Amarasinghe et al., 2007).

Leukemias and Lymphomas

For both lymphomas and leukaemias, South Asia is a low incidence region, with slightly higher rates in Pakistan than elsewhere. In India, in general there has been a tendency for increase in NHLs but they constitute a wide group of cancers (including entities such as Burkitt's lymphoma and diffuse large B-cell lymphoma), each with a distinct development path, age profile and prognosis (Yeole, 2008f). There are notable differences in the specific subtypes between different geographic regions in India, T-cell NHLs constituting only 12.5% of NHLs at Barshi, but accounting for 31 and 27.5% at Pondicherry and Jaipur, respectively (Naresh et al., 2002). Diffuse large B-cell lymphomas are common in NWFP (Khurshed et al., 2007). In Pakistan, Hodgkin's lymphoma, Burkitt's lymphoma and lymphoblastic lymphoma are higher amongst the children, whereas follicular lymphomas, mantle cell lymphoma and CLL/SLL are more frequently reported in 5th, 6th and 7th decades (Mushtaq et al., 2008). The main bulk are childhood cancers, with malignancies being twice more common in males than females (Jamal et al., 2006).

Regarding risk factors, the significantly higher risk associated with the GSTM1 (null/null) and GSTP1 [(Ile/Val)/ (Val/Val)] genotype suggest an environmental carcinogen role for lymphoblastic leukemia (Suneetha et al., 2008).

In Bangalore, the overall observed 5-year survival for lymphoid and haemopoietic malignancies (both sexes) was 26%, lower in all the individual lymphomas and leukaemias as compared with similar reports from the developed countries (Nandakumar et al., 1995)

Future Perspectives

While infection, betel and tobacco associated cancers continue to be important, the future will see continuing

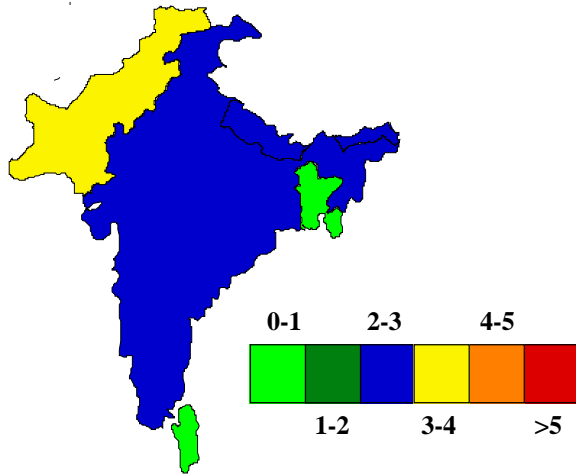


Figure 20. Male Brain and Nervous Tissue Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

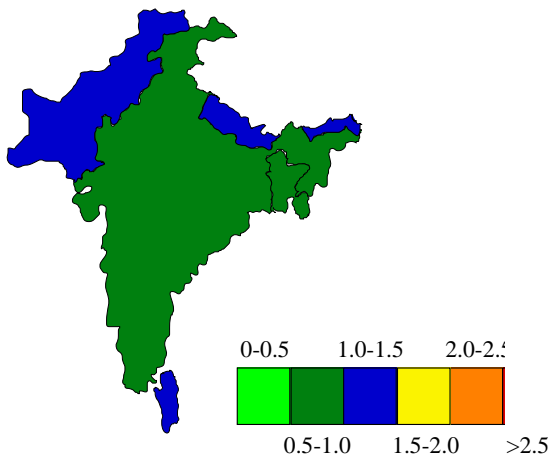


Figure 20. Male Thyroid Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

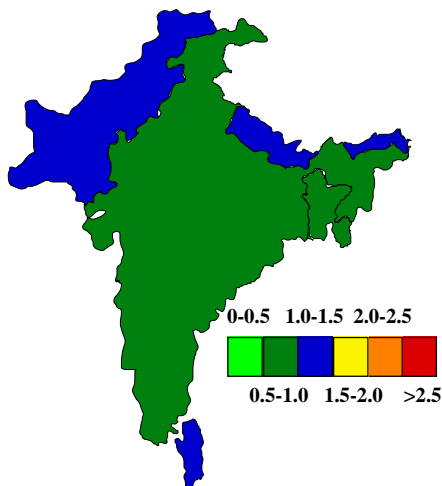


Figure 20. Male Non-Hodgkin Lymphoma Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

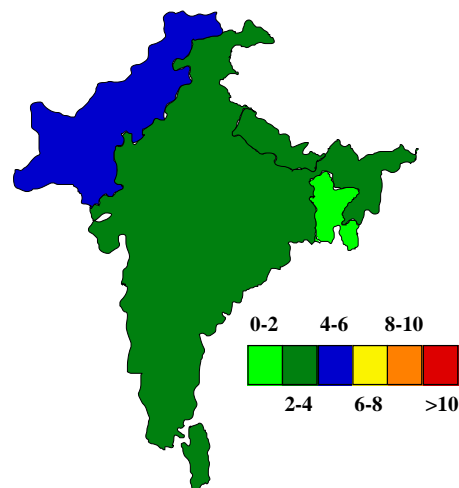


Figure 20. Male Leukemia Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

increase in at least breast cancer as a reflection of change in metabolic disease. Chronic diseases are on the increase and already account for more deaths than all communicable diseases combined. In particular, the metabolic syndrome and diabetes is becoming rapidly more prevalent in Pakistan (Basit and Shera, 2008; Hydrie et al., 2009), India (Siegel et al., 2008), Sri Lanka (Illangasekera et al., 2004; Wijewardene et al., 2005), Bangladesh (Sayeed et al., 2003) and Nepal (Ono et al., 2007). Serious metabolic abnormalities are now evident in obese children (de Silva et al., 2006; Bhardwaj et al., 2008).

In terms of epidemiological research, the risk factors for the major cancers are already well established. What is not known is how to translate the information into effective cancer control policies. Lack of awareness is a key factor underlying late presentation and non-compliance with screening guidelines, where they exist.

Thus the need for early diagnosis for a possible curative treatment needs more stress (Bhatt et al., 2009). In India, and presumably most of the remainder of the subcontinent, the existing treatment facilities for cancer control in-terms of radiotherapy and financial allocation are woefully inadequate to take care of even the present load (Murthy et al., 2008). The only way to fight this scourge under such circumstances is to have pragmatic programmes and policies based on currently available scientific information and sound public health principles. Clearly, tobacco control needs to receive more stress as part of a comprehensive approach (Jandoo and Mehrotra, 2008).

References

- Agarwal N, Yeole BB, Ram U (2009). Lifetime risk and trends in lung cancer incidence in Greater Mumbai. *Asian Pac J Cancer Prev*, **10**, 75-82.
- Ahmad Z, Idrees R, Ahmed R, et al (2005). Colorectal carcinoma, extent and spread in our population. Resection specimens give valuable information. *J Pak Med Assoc*, **55**, 483-5.
- Ahmad Z, Qureshi A, Idrees R, Aftab K (2009). Cancer registration in Pakistan: contemporary state of affairs. *Asian Pac J Cancer Prev*, **10**, 323-4.
- Ahmed F, Mahmud S, Hatcher J, Khan SM (2006). Breast cancer risk factor knowledge among nurses in teaching hospitals of Karachi, Pakistan: a cross-sectional study. *BMC Nurs*, **5**, 6.
- Ahsan H, Chen Y, Kibriya MG, et al (2007). Arsenic metabolism, genetic susceptibility, and risk of premalignant skin lesions in Bangladesh. *Cancer Epidemiol Biomarkers Prev*, **16**, 1270-8.
- Akhtar F (2007). Cancer registration in Pakistan: contemporary state of affairs. *Asian Pac J Cancer Prev*, **8**, 452-6.
- Ali R, Mathew A, Rajan B (2008). Effects of socio-economic and demographic factors in delayed reporting and late-stage presentation among patients with breast cancer in a major cancer hospital in South India. *Asian Pac J Cancer Prev*, **9**, 703-7.
- Ali TS, Baig S (2006). Evaluation of a cancer awareness campaign: experience with a selected population in Karachi. *Asian Pac J Cancer Prev*, **7**, 391-5.
- Amarasinghe IY, Perera NM, Bahinathan N, Marzook HH, Peiris AK (2007). Review of distribution of nodal disease in differentiated thyroid cancers in an oncosurgical center in Sri Lanka. *Ann Surg Oncol*, **14**, 1560-4.
- Ansink AC, Tolhurst R, Haque R, et al (2008). Cervical cancer in Bangladesh: community perceptions of cervical cancer and cervical cancer screening. *Trans R Soc Trop Med Hyg*, **102**, 499-505.
- Anwar N, Badar F, Yusuf MA (2008). Profile of patients with colorectal cancer at a tertiary care cancer hospital in Pakistan. *Ann N Y Acad Sci*, **1138**, 199-203.
- Arbyn M, Sankaranarayanan R, Muwonge R, et al (2008). Pooled analysis of the accuracy of five cervical cancer screening tests assessed in eleven studies in Africa and India. *Int J Cancer*, **123**, 153-60.
- Arif M, Syed S (2007). Association of Helicobacter pylori with carcinoma of stomach. *J Pak Med Assoc*, **57**, 337-41.
- Ariyawardana A, Ekanayake L (2008). Screening for oral cancer/pre-cancer: Knowledge and opinions of dentists employed in the public sector dental services of Sri Lanka. *Asian Pac J Cancer Prev*, **9**, 615-8.
- Ariyawardana A, Sitheequa MA, Ranasinghe AW, et al (2007). Prevalence of oral cancer and pre-cancer and associated risk factors among tea estate workers in the central Sri Lanka. *J Oral Pathol Med*, **36**, 581-7.
- Ariyawardana A, Vithanaarachchi N (2005). Awareness of oral cancer and precancer among patients attending a hospital in Sri Lanka. *Asian Pac J Cancer Prev*, **6**, 58-61.
- Atique M, Leghari MJ, Amin MS, et al (2008). Cancer data analysis in the Pathology Department, Combined Military Hospital, Multan, Pakistan 2002-2007. *Asian Pac J Cancer Prev*, **9**, 679-81.
- Aziz Z, Sana S, Akram M, Saeed A (2004). Socioeconomic status and breast cancer survival in Pakistani women. *J Pak Med Assoc*, **54**, 448-53.
- Badar F, Anwar N, Mahmood S (2005a). Geographical variation in the epidemiology of esophageal cancer in Pakistan. *Asian Pac J Cancer Prev*, **6**, 139-42.
- Badar F, Anwar N, Meerza F, Sultan F (2007a). Cervical carcinoma in a Muslim community. *Asian Pac J Cancer Prev*, **8**, 24-6.
- Badar F, Faruqui ZS, Ashraf A, Uddin N (2007b). Third world issues in breast cancer detection. *J Pak Med Assoc*, **57**, 137-40.
- Badar F, Meerza F, Khokhar RA, et al (2006). Characteristics of lung cancer patients--the Shaukat Khanum Memorial experience. *Asian Pac J Cancer Prev*, **7**, 245-8.
- Badar F, Moid I, Waheed F, et al (2005b). Survival analyses of breast cancer patients--the Shaukat Khanum Memorial experience. *Asian Pac J Cancer Prev*, **6**, 135-8.
- Badar F, Sattar A, Meerza F, Irfan N, Siddiqui N (2009). Carcinoma of the urinary bladder in a tertiary care setting in a developing country. *Asian Pac J Cancer Prev*, **10**, (in press).
- Baig S, Ali TS (2006). Evaluation of efficacy of self breast examination for breast cancer prevention: a cost effective screening tool. *Asian Pac J Cancer Prev*, **7**, 154-6.
- Basit A, Shera AS (2008). Prevalence of metabolic syndrome in Pakistan. *Metab Syndr Relat Disord*, **6**, 171-5.
- Baskota DK, Agrawal R, Prasad R, Sinha BK (2005). Distribution of malignancies in head and neck regions and their management. *J Nepal Med Assoc*, **44**, 68-72.
- Basu P, Sankaranarayanan R, Mandal R, et al (2002). Evaluation of downstaging in the detection of cervical neoplasia in Kolkata, India. *Int J Cancer*, **100**, 92-6.
- Basu P, Sarkar S, Mukherjee S, et al (2006). Women's perceptions and social barriers determine compliance to cervical screening: results from a population based study in India. *Cancer Detect Prev*, **30**, 369-74.
- Basu P, Roychowdhury S, Bafna UD, et al (2009). Human papillomavirus genotype distribution in cervical cancer in India: results from a multi-center study. *Asian Pac J Cancer Prev*, **10**, 27-34.

- Basu R, Mandal S, Ghosh A, Poddar TK (2008). Role of tobacco in the development of head and neck squamous cell carcinoma in an Eastern Indian population. *Asian Pac J Cancer Prev*, **9**, 381-6.
- Behera D, Balamugesh T (2004). Lung cancer in India. *Indian J Chest Dis Allied Sci*, **46**, 269-81.
- Bhardwaj S, Misra A, Khurana L, et al (2008). Childhood obesity in Asian Indians: a burgeoning cause of insulin resistance, diabetes and sub-clinical inflammation. *Asia Pac J Clin Nutr*, **17 Suppl 1**, 172-5.
- Bhatla N, Dar L, Rajkumar Patro A, et al (2008). Human papillomavirus-type distribution in women with and without cervical neoplasia in north India. *Int J Gynecol Pathol*, **27**, 426-30.
- Bhatla N, Lal N, Bao YP, Ng T, Qiao YL. (2008). A meta-analysis of human papillomavirus type-distribution in women from South Asia: implications for vaccination. *Vaccine*, **26**, 2811-7.
- Bhatla N, Mukhopadhyay A, Joshi S, et al (2004). Visual inspection for cervical cancer screening: evaluation by doctor versus paramedical worker. *Indian J Cancer*, **41**, 32-6.
- Bhatt CR, Sharan K, Ninan J, et al (2009). Cancer treatment by radiotherapy in Western Nepal: a hospital-based study. *Asian Pac J Cancer Prev*, **5**, 77-82.
- Bhattacharya S, Adhikary S (2006). Evaluation of risk factors, diagnosis and treatment in carcinoma breast--a retrospective study. *Kathmandu Univ Med J*, **4**, 54-60.
- Bhattacharyya SK, Basu S, Banerjee S, Dastidar AG, Bagchi SR (2000). An epidemiological survey of carcinoma cervix in north Bengal zone. *J Indian Med Assoc*, **98**, 60-1, 66.
- Bhurgri H, Gowani SA, Itrat A, et al (2008a). Awareness of cancer risk factors among patients and attendants presenting to a tertiary care hospital in Karachi, Pakistan. *J Pak Med Assoc*, **58**, 584-8.
- Bhurgri Y (2004). Karachi Cancer Registry Data--implications for the National Cancer Control Program of Pakistan. *Asian Pac J Cancer Prev*, **5**, 77-82.
- Bhurgri Y (2005). Cancer of the oral cavity - trends in Karachi South (1995-2002). *Asian Pac J Cancer Prev*, **6**, 22-6.
- Bhurgri Y, Bhurgri A, Hassan SH, et al (2000). Cancer incidence in Karachi, Pakistan: first results from Karachi Cancer Registry. *Int J Cancer*, **85**, 325-9.
- Bhurgri Y, Bhurgri A, Hussainy AS, et al (2003a). Incidence of cancer esophagus in Quetta and Karachi, Pakistan. *Indian J Gastroenterol*, **22**, 170-2.
- Bhurgri Y, Bhurgri A, Hussainy AS, et al (2003b). Cancer of the oral cavity and pharynx in Karachi--identification of potential risk factors. *Asian Pac J Cancer Prev*, **4**, 125-30.
- Bhurgri Y, Bhurgri A, Nishter S, et al (2006). Pakistan--country profile of cancer and cancer control 1995-2004. *J Pak Med Assoc*, **56**, 124-30.
- Bhurgri Y, Bhurgri A, Pervez S, et al (2005). Cancer profile of Hyderabad, Pakistan 1998-2002. *Asian Pac J Cancer Prev*, **6**, 474-80.
- Bhurgri Y, Bhurgri A, Usman A, et al (2006a). Epidemiological review of head and neck cancers in Karachi. *Asian Pac J Cancer Prev*, **7**, 195-200.
- Bhurgri Y, Bhurgri A, Usman A, et al (2006c). Patho-epidemiology of lung cancer in Karachi (1995-2002). *Asian Pac J Cancer Prev*, **7**, 60-4.
- Bhurgri Y, Faridi N, Kazi LA, et al (2004). Cancer esophagus Karachi 1995-2002: epidemiology, risk factors and trends. *J Pak Med Assoc*, **54**, 345-8.
- Bhurgri H, Gowani SA, Itrat A, et al (2008). Awareness of cancer risk factors among patients and attendants presenting to a tertiary care hospital in Karachi, Pakistan. *J Pak Med Assoc*, **58**, 584-8.
- Bhurgri Y, Kayani N, Faridi N, et al (2007). Patho-epidemiology of breast cancer in Karachi '1995-1997'. *Asian Pac J Cancer Prev*, **8**, 215-20.
- Bhurgri Y, Kayani N, Pervez S, et al (2009b). Incidence and trends of prostate cancer in Karachi South, '1995- 2002'. *Asian Pac J Cancer Prev*, **10**, 209-12.
- Bhurgri Y, Nazir K, Shaheen Y, et al (2007a). Patho-epidemiology of cancer corpus uteri in Karachi South '1995-1997'. *Asian Pac J Cancer Prev*, **8**, 489-94.
- Bhurgri Y, Nazir K, Shaheen Y, et al (2007b). Patho-epidemiology of cancer cervix in Karachi South. *Asian Pac J Cancer Prev*, **8**, 357-62.
- Bhurgri Y, Pervez S, Kayani N, et al (2006). Cancer profile of Larkana, Pakistan (2000-2002). *Asian Pac J Cancer Prev*, **7**, 518-21.
- Bhurgri Y, Pervez S, Kayani N, et al (2008b). Time trends in the incidence of cancer cervix in Karachi South, 1995-2002. *Asian Pac J Cancer Prev*, **9**, 533-6.
- Bhurgri Y, Pervez S, Kayani N, et al (2009). Rising incidence of gastric malignancies in Karachi, 1995- 2002. *Asian Pac J Cancer Prev*, **10**, 41-4.
- Bhurgri Y, Pervez S, Usman A, et al (2002). Cancer patterns in Quetta (1998-1999). *J Pak Med Assoc*, **52**, 560-5.
- Binu VS, Chandrashekar TS, Subba SH, et al (2007). Cancer pattern in Western Nepal: a hospital based retrospective study. *Asian Pac J Cancer Prev*, **8**, 183-6.
- Chandra S, Mohan A, Guleria R, Singh V, Yadav P (2009). Delays during the diagnostic evaluation and treatment of lung cancer. *Asian Pac J Cancer Prev*, **10**, (in press).
- Chaudhry S, Khan AA, Mirza KM, et al (2008). Estimating the burden of head and neck cancers in the public health sector of Pakistan. *Asian Pac J Cancer Prev*, **9**, 529-32.
- Chen Y, Graziano JH, Parvez F, et al (2006). Modification of risk of arsenic-induced skin lesions by sunlight exposure, smoking, and occupational exposures in Bangladesh. *Epidemiology*, **17**, 459-67.
- Choudhury K, Hanifi SM, Mahmood SS, Bhuiya A (2007). Sociodemographic characteristics of tobacco consumers in a rural area of Bangladesh. *J Health Popul Nutr*, **25**, 456-64.
- Curado MP, Edwards B, Shin HR, et al (Eds) (2007). Cancer Incidence in Five Continents Vol. IX. IARC Scientific Publications No 160, IARC, Lyon.
- Das BC, Hussain S, Nasare V, Bharadwaj M (2008). Prospects and prejudices of human papillomavirus vaccines in India. *Vaccine*, **26**, 2669-79.
- Datta K, Biswas J (2009). Influence of dietary habits, physical activity and affluence factors on breast cancer in East India - a case-control study. *Asian Pac J Cancer Prev*, **10**, 219-22.
- De Hewavisenthi SJ, Dassanayaka AS, De Silva HJ (2005). Clinical, biochemical and histological characteristics of a Sri Lankan population of non-alcoholic steatohepatitis (NASH) patients. *Ceylon Med J*, **50**, 113-6.
- de Silva GK, Jayamaha JM, Gabriel A (1995). Pattern and prevalence of oral carcinoma in a surgical unit at Cancer Institute Maharagama, 1985 to 1994. *Ceylon Med J*, **40**, 146-7.
- de Silva KS, Wickramasinghe VP, Gooneratne IN (2006). Metabolic consequences of childhood obesity--a preliminary report. *Ceylon Med J*, **51**, 105-9.
- de Silva MV, Fernando MS, Goonewardene SA (1999). Prostatic carcinoma in Sri Lanka--is it more common than cancer registry statistics? *Ceylon Med J*, **44**, 192.
- de Silva M, Selliah S, Thabrew I (2005). Descriptive study of chronic calcific pancreatitis in Sri Lanka. *Ceylon Med J*, **50**, 5-10.
- de Silva MV, Tilakaratna AD, Rodrigo T (1998). A single pathological grading system for breast carcinoma should be

- adopted in Sri Lanka. *Ceylon Med J*, **43**, 232-4.
- de Silva R, Karunaratne K, Mendis LN, Ramesh R, Chow VT (2006). PCR detection and typing of human papilloma virus DNA in squamous carcinoma of the cervix in a cohort of Sri Lankan women. *Ceylon Med J*, **51**, 114-7.
- Dhar M, Lahiri S, Takiar R, Ashok NC, Murthy NS (2008). An indirect study of cancer survival in the context of developing countries. *Asian Pac J Cancer Prev*, **9**, 479-86.
- Dhaubhadel P, Vaidya A, Choudhary P (2008). Early detection of precursors of cervical cancer with cervical cytology and visual inspection of cervix with acetic acid. *JNMA J Nepal Med Assoc*, **47**, 71-6.
- Diaz M, Kim JJ, Albero G, et al (2008). Health and economic impact of HPV 16 and 18 vaccination and cervical cancer screening in India. *Br J Cancer*, **99**, 230-8.
- Dikshit RP, Kanhere S (1999). Cancer patterns of lung, oropharynx and oral cavity cancer in relation to gas exposure at Bhopal. *Cancer Causes Control*, **10**, 627-36.
- Dikshit RP, Kanhere S (2000). Tobacco habits and risk of lung, oropharyngeal and oral cavity cancer: a population-based case-control study in Bhopal, India. *Int J Epidemiol*, **29**, 609-14.
- Dikshit RP, Ramadas K, Hashibe M, et al (2006). Association between diabetes mellitus and pre-malignant oral diseases: a cross sectional study in Kerala, India. *Int J Cancer*, **118**, 453-7.
- Dinshaw K, Mishra G, Shastri S, et al (2007a). Determinants of compliance in a cluster randomised controlled trial on screening of breast and cervix cancer in Mumbai, India. 1. Compliance to screening. *Oncology*, **73**, 145-53.
- Dinshaw K, Mishra G, Shastri S, et al (2007b). Determinants of compliance in a cluster randomised controlled trial on screening of breast and cervix cancer in Mumbai, India. 2. Compliance to referral and treatment. *Oncology*, **73**, 154-61.
- Dutta U, Nagi B, Garg PK, Sinha SK, Singh K, Tandon RK (2005). Patients with gallstones develop gallbladder cancer at an earlier age. *Eur J Cancer Prev*, **14**, 381-5.
- Dutttagupta C, Sengupta S, Roy M, et al (2002). Oncogenic human papillomavirus (HPV) infection and uterine cervical cancer: a screening strategy in the perspective of rural India. *Eur J Cancer Prev*, **11**, 447-56.
- Elango JK, Gangadharan P, Sumithra S, Kuriakose MA (2006). Trends of head and neck cancers in urban and rural India. *Asian Pac J Cancer Prev*, **7**, 108-12.
- Faheem M, Khurram M, Jafri IA, et al (2007). Risk factors for breast cancer in patients treated at NORI Hospital, Islamabad. *J Pak Med Assoc*, **57**, 242-5.
- Ferlay J, Bray F, Pisani P, Parkin DM (2004). GLOBOCAN 2002: Cancer Incidence, Mortality and Prevalence Worldwide. IARC CancerBase No. 5, version 2.0, IARC Press, Lyon.
- Fernando DJ, Siribaddana S, de Silva D (1994). Impaired glucose tolerance and diabetes mellitus in a suburban Sri Lankan community. *Postgrad Med J*, **70**, 347-9.
- Fernando N, Holton J, Vaira D, DeSilva M, Fernando D (2002). Prevalence of *Helicobacter pylori* in Sri Lanka as determined by PCR. *J Clin Microbiol*, **40**, 2675-6.
- Gajalakshmi V, Peto R (2004). Verbal autopsy of 80,000 adult deaths in Tamilnadu, South India. *BMC Public Health*, **4**, 47.
- Gajalakshmi V, Rajaraman S, Shanta V (2000). A survival study of cervical cancer in Chennai, India. *Indian J Cancer*, **37**, 158-64.
- Gajalakshmi CK, Shanta V, Rama R (1998). Registration of cancer mortality data in a developing area: Chennai (Madras, India) experience. *Cancer Causes Control*, **9**, 131-6.
- Gajalakshmi V, Swaminathan R, Shanta V (2001). An independent survey to assess completeness of registration: population based cancer registry, Chennai, India. *Asian Pac J Cancer Prev*, **2**, 179-183.
- Gaur DS, Kishore S, Harsh M, Kusum A, Bansal R (2006). Pattern of cancers amongst patients attending Himalayan Institute of Medical Sciences, Dehradun. *Indian J Pathol Microbiol*, **49**, 193-8.
- Ghumare SS, Cunningham JE (2007). Breast cancer trends in Indian residents and emigrants portend an emerging epidemic for India. *Asian Pac J Cancer Prev*, **8**, 507-12.
- Gilani GM, Kamal S (2004). Risk factors for breast cancer in Pakistani women aged less than 45 years. *Ann Hum Biol*, **31**, 398-407.
- Gilani GM, Kamal S, Akhter AS (2003). A differential study of breast cancer patients in Punjab, Pakistan. *J Pak Med Assoc*, **53**, 478-81.
- Goonewardena SA, de Silva WA (1999). Pattern of urological malignancy in Sri Lanka: experience from a tertiary referral centre. *Ceylon Med J*, **44**, 100-1.
- Gunawardene N (1999). Sri Lanka's double burden kills rich and poor alike. *Health Millions*, **25**, 27.
- Goonewardena SA, de Silva WA, De Silva MV (2004). Bladder cancer in Sri Lanka: experience from a tertiary referral center. *Int J Urol*, **11**, 969-72.
- Gupta SK, Singh SP, Shukla VK (2005). Copper, zinc, and Cu/Zn ratio in carcinoma of the gallbladder. *J Surg Oncol*, **91**, 204-8.
- Haniffa AM, Saitoh M, Abiko Y, et al (2007). Expression pattern of p63 in oral epithelial lesions and submucous fibrosis associated with betel-quid chewing in Sri Lanka. *Med Mol Morphol*, **40**, 203-7.
- Hanif M, Zaidi P, Kamal S, Hameed A (2009). Institution-based cancer incidence in a local population in Pakistan: nine year data analysis. *Asian Pac J Cancer Prev*, **10**, 227-230.
- Hashibe M, Jacob BJ, Thomas G, et al (2002). Socioeconomic status, lifestyle factors and oral premalignant lesions. *Oral Oncol*, **39**, 664-71.
- Hashibe M, Sankaranarayanan R, Thomas G, et al (2002). Body mass index, tobacco chewing, alcohol drinking and the risk of oral submucous fibrosis in Kerala, India. *Cancer Causes Control*, **13**, 55-64.
- Hydrie MZ, Shera AS, Fawwad A, Basit A, Hussain A (2009). Prevalence of metabolic syndrome in urban Pakistan (Karachi): comparison of newly proposed International Diabetes Federation and modified Adult Treatment Panel III criteria. *Metab Syndr Relat Disord*, **7**, 119-24.
- Jamal S, Mamoon N, Mushtaq S, Luqman M (2005). Analysis of gastrointestinal malignancies at the Armed Forces Institute of Pathology (AFIP), Rawalpindi, Pakistan. *Asian Pac J Cancer Prev*, **6**, 497-500.
- Jamal S, Mamoon N, Mushtaq S, Luqman M (2006). Pattern of childhood malignancies: study of 922 cases at Armed Forces Institute of Pathology (AFIP), Rawalpindi, Pakistan. *Asian Pac J Cancer Prev*, **7**, 420-2.
- Jamal S, Moghal S, Mamoon N, et al (2006). The pattern of malignant tumours: tumour registry data analysis, AFIP, Rawalpindi, Pakistan (1992-2001). *J Pak Med Assoc*, **56**, 359-62.
- Jandoo T, Mehrotra R (2008). Tobacco control in India: present scenario and challenges ahead. *Asian Pac J Cancer Prev*, **9**, 805-10.
- Jayalakshmy PA, Akiba S, Nair MK, et al (2008). Bidi smoking and lung cancer incidence among males in Karunagappally cohort in Kerala, India. *Int J Cancer*, **123**, 1390-7.
- Jayalakshmi P, Gangadharan P, Mani KS (2006). Cancer in women in Kerala--a transition from a less-developed state. *Asian Pac J Cancer Prev*, **7**, 186-90.

- Jayalekshmi P, Varughese SC, Kalavathi (2006). A nested case-control study of female breast cancer in Karunagappally Cohort in Kerala, India. *Asian Pac J Cancer Prev*, **10**, 241-6.
- Jayasekara H, Rajapaksa LC, Greimel ER (2008). The EORTC QLQ-CX24 cervical cancer-specific quality of life questionnaire: psychometric properties in a South Asian sample of cervical cancer patients. *Psychooncology*, [Epub ahead of print]
- Jayasinghe SA, Atukorala I, Gunethilleke B, et al (2007). Is walking barefoot a risk factor for diabetic foot disease in developing countries? *Rural Remote Health*, **7**, 692.
- Joshi SK (2003) Occupational cancer in Nepal--an update. *Kathmandu Univ Med J*, **1**, 144-51.
- Juneja A, Sehgal A, Mitra AB, Pandey A (2003). A survey on risk factors associated with cervical cancer. *Indian J Cancer*, **40**, 15-22.
- Kaku M, Mathew A, Rajan B (2008). Impact of socio-economic factors in delayed reporting and late-stage presentation among patients with cervix cancer in a major cancer hospital in South India. *Asian Pac J Cancer Prev*, **8**, ??.
- Kapil U, Singh P, Bahadur S, et al (2005). Assessment of risk factors in laryngeal cancer in India: a case-control study. *Asian Pac J Cancer Prev*, **6**, 202-7.
- Khan H, Khawaja MI, Khawaja MR. Dilemma of cancer screening in Pakistan. *Asian Pac J Cancer Prev*, **7**, 340-1.
- Khan MI, Baqai MT, Bukhari M, Hashmi RI. Gastric carcinoma: 5 years survival after gastric surgery. *J Pak Med Assoc*, **55**, 158-60.
- Khan NA, Afroz F, Lone MM, et al (2006). Profile of lung cancer in Kashmir, India: a five-year study. *Indian J Chest Dis Allied Sci*, **48**, 187-90.
- Khan S, Jaffer NN, Khan MN, et al (2007). Human papillomavirus subtype 16 is common in Pakistani women with cervical carcinoma. *Int J Infect Dis*, **11**, 313-7.
- Khawaja MR, Mazahir S, Majeed A, et al (2006). Chewing of betel, areca and tobacco: perceptions and knowledge regarding their role in head and neck cancers in an urban squatter settlement in Pakistan. *Asian Pac J Cancer Prev*, **7**, 95-100.
- Khokhar A (2009a). Level of awareness regarding breast cancer and its screening amongst Indian teachers. *Asian Pac J Cancer Prev*, **10**, 247-50.
- Khokhar A (2009b). Short Text Messages (SMS) as a reminder system for making working women from Delhi breast aware. *Asian Pac J Cancer Prev*, **10**, 319-22.
- Khurshed A, Ahmed R, Bhurgri Y (2007). Primary gastrointestinal malignancies in childhood and adolescence--an Asian perspective. *Asian Pac J Cancer Prev*, **8**, 613-7.
- Kumar AV, Yeole BB (2005). Assessing cancer burden in rural India: an analysis by cause of death statistics. *Asian Pac J Cancer Prev*, **6**, 221-3.
- Kumar K, Iyer VK, Bhatla N, Kriplani A, Verma K (2007). Comparative evaluation of smear cytology & hybrid capture II for the diagnosis of cervical cancer. *Indian J Med Res*, **126**, 39-44.
- Kumar S, Kumar S, Kumar S (2006). Infection as a risk factor for gallbladder cancer. *J Surg Oncol*, **93**, 633-9.
- Kumarasinghe MP (1999). An effective and affordable cervical carcinoma screening programme for Sri Lanka. *Ceylon Med J*, **44**, 156-8.
- Kurkure AP, Yeole BB (2006). Social inequalities in cancer with special reference to South Asian countries. *Asian Pac J Cancer Prev*, **7**, 36-40.
- Lal A, Bhurgri Y, Rizvi N, et al (2008). Factors influencing in-hospital length of stay and mortality in cancer patients suffering from febrile neutropenia. *Asian Pac J Cancer Prev*, **9**, 303-8.
- Legood R, Gray AM, Mahé C, et al (2005). Screening for cervical cancer in India: How much will it cost? A trial based analysis of the cost per case detected. *Int J Cancer*, **117**, 981-7.
- Manju L, George PS, Mathew A (2009). Urinary bladder cancer risk among motor vehicle drivers: a meta-analysis of the evidence, 1977-2008. *Asian Pac J Cancer Prev*, **10**, 287-94.
- Marimuthu P (2008). Projection of cancer incidence in five cities and cancer mortality in India. *Indian J Cancer*, **45**, 4-7.
- Mathew A, Gajalakshmi V, Rajan B, et al (2008). Anthropometric factors and breast cancer risk among urban and rural women in South India: a multicentric case-control study. *Br J Cancer*, **99**, 207-13.
- Mathew A, Pandey M (2002). Attributing death to cancer: cause-specific survival estimation. *J Postgrad Med*, **48**, 322-6.
- Mathew A, Ildaphonse G, George PS, (2009). Obesity and kidney cancer risk in women - a meta-analysis (1992-2008). *Asian Pac J Cancer Prev*, **10**, (in press).
- Mazahir S, Malik R, Maqsood M, et al (2006). Socio-demographic correlates of betel, areca and smokeless tobacco use as a high risk behavior for head and neck cancers in a squatter settlement of Karachi, Pakistan. *Subst Abuse Treat Prev Policy*, **1**, 10.
- Mehrotra R, Pandya S, Singhla M, Srivastava D, Singh M (2008). Spectrum of malignancies in Allahabad, North India: a hospital-based study. *Asian Pac J Cancer Prev*, **9**, 525-8.
- Mehrotra R, Singh M, Gupta RK, Singh M, Kapoor AK (2005). Trends of prevalence and pathological spectrum of head and neck cancers in North India. *Indian J Cancer*, **42**, 89-93.
- Mehrotra R, Singh M, Kumar D, et al (2003). Age specific incidence rate and pathological spectrum of oral cancer in Allahabad. *Indian J Med Sci*, **57**, 400-4.
- Mohammad A, Makaju R (2006b). Retrospective histopathological analysis of various neoplasms of different parts of the gastrointestinal tract seen at the Kathmandu University Teaching Hospital (KUTH), Dhulikhel, Nepal. *Kathmandu Univ Med J*, **4**, 474-8.
- Mohammad A, Makaju R (2006a). Retrospective histopathological analysis of various neoplasms of the female reproductive system (FRS) seen at the Kathmandu University Teaching Hospital, (KUTH) Dhulikhel, Nepal. *Kathmandu Univ Med J*, **4**, 48-53.
- Mohan A, Singh P, Kumar S, et al (2008). Effect of change in symptoms, respiratory status, nutritional profile and quality of life on response to treatment in advanced non small cell lung cancer. *Asian Pac J Cancer Prev*, **9**, ??.
- Mohan S, Mohanasenthil, Paul SFD, Shroff S, Venkatesan V (2009). Interleukin-4-receptor alpha gene polymorphism and the risk of renal cell carcinoma in a South Indian population. *Asian Pac J Cancer Prev*, **10**, 295-8.
- Mohandas KM, Desai DC (1999). Epidemiology of digestive tract cancers in India. V. Large and small bowel. *Indian J Gastroenterol*, **18**, 118-21.
- Mostafa MG, McDonald JC, Cherry NM (2008). Lung cancer and exposure to arsenic in rural Bangladesh. *Occup Environ Med*, **65**, 765-8.
- Muir CS, Waterhouse J, Mack T, Powell J, Whelan SL (Eds) (1987). Cancer Incidence in Five Continents Vol. V. IARC Scientific Publications No 88. IARC, Lyon.
- Murthy NS, Chaudhry K, Saxena S (2005). Trends in cervical cancer incidence--Indian scenario. *Eur J Cancer Prev*, **14**, 513-8.
- Murthy NS, Chaudhry K, Rath GK (2008). Burden of cancer and projections for 2016, Indian scenario: gaps in the availability of radiotherapy treatment facilities. *Asian Pac J Cancer Prev*, **9**, 671-7.
- Mushtaq S, Akhtar N, Jamal S, et al (2008). Malignant

- lymphomas in Pakistan according to the WHO classification of lymphoid neoplasms. *Asian Pac J Cancer Prev*, **9**, 229-32.
- Nair MK, Nambi KS, Amma NS, et al (1999). Population study in the high natural background radiation area in Kerala, India. *Radiat Res*, **152 (Suppl)**, S145-8.
- Nambaru L, Meenakumari B, Swaminathan R, Rajkumar T (2009). Prognostic significance of HPV physical status and integration sites in cervical cancer.
- Nandakumar A, Anantha N, Venugopal TC, et al (1995a). Survival in breast cancer: a population-based study in Bangalore, India. *Int J Cancer*, **60**, 593-6.
- Nandakumar A, Anantha N, Venugopal T, et al (1995b). Descriptive epidemiology of lymphoid and haemopoietic malignancies in Bangalore, India. *Int J Cancer*, **63**, 37-42.
- Nandakumar A, Gupta PC, Gangadharan P, Visweswara RN, Parkin DM (2005). Geographic pathology revisited: development of an atlas of cancer in India. *Int J Cancer*, **116**, 740-54.
- Naresh KN, Agarwal B, Sangal BC, et al (2002). Regional variation in the distribution of subtypes of lymphoid neoplasms in India. *Leuk Lymphoma*, **43**, 1939-43.
- Nene B, Jayant K, Arrossi S, et al (2007). Determinants of womens participation in cervical cancer screening trial, Maharashtra, India. *Bull World Health Organ*, **85**, 264-72.
- Nishtar S, Ahmed A, Bhurgri Y, et al (2004). Prevention and control of cancers: National Action Plan for NCD Prevention, Control and Health Promotion in Pakistan. *J Pak Med Assoc*, **54 (Suppl 3)**, S45-56.
- Okonkwo QL, Draisma G, der Kinderen A, Brown ML, de Koning HJ (2008). Breast cancer screening policies in developing countries: a cost-effectiveness analysis for India. *J Natl Cancer Inst*, **100**, 1290-300.
- Ono K, Limbu YR, Rai SK, et al (2007). The prevalence of type 2 diabetes mellitus and impaired fasting glucose in semi-urban population of Nepal. *Nepal Med Coll J*, **9**, 154-6.
- Pal M (2006). Proportionate increase in incidence of colorectal cancer at an age below 40 years: an observation. *J Cancer Res Ther*, **2**, 97-9.
- Pal SK, Mittal B (2004). Improving cancer care in India: prospects and challenges. *Asian Pac J Cancer Prev*, **5**, 226-8.
- Pandey M, Thomas G, Somanathan T, et al (2001). Evaluation of surgical excision of non-homogeneous oral leukoplakia in a screening intervention trial, Kerala, India. *Oral Oncol*, **37**, 103-9.
- Parkin DM, Muir CS, Whelan SL, et al (Eds) (1992). Cancer Incidence in Five Continents Vol. VI. IARC Scientific Publications No 120. IARC, Lyon.
- Parkin DM, Whelan SL, Ferlay J, Raymond L, Young J (Eds) (1997). Cancer Incidence in Five Continents Vol. VII. IARC Scientific Publications No 143, IARC, Lyon.
- Parkin, DM, Whelan SL, Ferlay J, Teppo L, Thomas DB (Eds) (2002). Cancer Incidence in Five Continents Vol. VIII. IARC Scientific Publications No 155, IARC, Lyon.
- Patel JB, Shukla SN, Patel HR, et al (2007). Utility of urinary biomarkers in oral cancer. *Asian Pac J Cancer Prev*, **8**, 229-35.
- Perera NM, Amarasinghe IY, Wijesundara NN (2004). Establishing a breast clinic in a developing country: effect of a collaborative project. *Eur J Surg Oncol*, **30**, 229-32.
- Perera M, Gunatilleke G, Bird P (2007). Falling into the medical poverty trap in Sri Lanka: what can be done? *Int J Health Serv*, **37**, 379-98.
- Perera T, Wijesuriya RE, Suraweera PH, et al (2008). The prevalence of colorectal cancer and survival in patients from the Gampaha District, North Colombo region. *Ceylon Med J*, **53**, 17-21.
- Phukan RK, Narain K, Zomawia E, Hazarika NC, Mahanta J (2006). Dietary habits and stomach cancer in Mizoram, India. *J Gastroenterol*, **41**, 418-24.
- Phukan RK, Zomawia E, Narain K, Hazarika NC, Mahanta J (2005). Tobacco use and stomach cancer in Mizoram, India. *Cancer Epidemiol Biomarkers Prev*, **14**, 1892-6.
- Pradhan P (2003). Prevention of carcinoma cervix: role of Pap smear screening. *Nepal Med Coll J*, **5**, 82-6.
- Pradhan SB, Dali S (2004). Relation between gallbladder neoplasm and Helicobacter hepaticus infection. *Kathmandu Univ Med J*, **2**, 331-5.
- Pradhananga KK, Baral M, Shrestha BM (2009). Multi-institution hospital-based cancer incidence data for Nepal - an initial report. *Asian Pac J Cancer Prev*, **10**, 259-62.
- Rahman SH, Azam MG, Rahman MA, et al (2008). Non-invasive diagnosis of H pylori infection: evaluation of serological tests with and without current infection marker CIM. *World J Gastroenterol*, **14**, 1231-6.
- Rai A, Mohapatra SC, Shukla HS (2006). Correlates between vegetable consumption and gallbladder cancer. *Eur J Cancer Prev*, **15**, 134-7.
- Rajkumar R, Sankaranarayanan R, Esmi A, et al (2000). Leads to cancer control based on cancer patterns in a rural population in South India. *Cancer Causes Control*, **11**, 433-9.
- Ramadas K, Arrossi S, Thara S, et al (2008). Which socio-demographic factors are associated with participation in oral cancer screening in the developing world? Results from a population-based screening project in India. *Cancer Detect Prev*, **32**, 109-15.
- Ramanakumar AV, Yeole R, Ramarao G (2005). Coping mechanisms among long-term survivors of breast and cervical cancers in Mumbai, India. *Asian Pac J Cancer Prev*, **6**, 189-94.
- Rao DN, Ganesh B, Dinshaw KA, Mohandas KM (2002). A case-control study of stomach cancer in Mumbai, India. *Int J Cancer*, **99**, 727-31.
- Ratnatunga NV, Edussuriya B (1997). Mucosal changes in the upper gastrointestinal tract in Sri Lankan patients with squamous carcinoma of the oesophagus. *Indian J Cancer*, **34**, 143-8.
- Ratnatunga N, Liyanapathirana LV (2007). Hormone receptor expression and Her/2neu amplification in breast carcinoma in a cohort of Sri Lankans. *Ceylon Med J*, **52**, 133-6.
- Ratnatunga PC, Amarasinghe SC, Ratnatunga NV (2003). Changing patterns of thyroid cancer in Sri Lanka. Has the iodination programme helped? *Ceylon Med J*, **48**, 125-8.
- Rizvi TJ, Zuberi SJ (2003). Risk factors for gall bladder cancer in Karachi. *J Ayub Med Coll Abbottabad*, **15**, 16-8.
- Samarasinghe UC, Perera ND, Lokuhetty D (2004). The outcome of elevated prostate specific antigen and transrectal ultrasound guided prostatic biopsy in detecting carcinoma of the prostate: initial experience in Sri Lanka. *Ceylon Med J*, **49**, 67-8.
- Samson M, Rama R, Swaminathan R, et al (2009). CYP17 (T-34C), CYP19 (Trp39Arg), and FGFR2 (C-906T) polymorphisms and the risk of breast cancer in South Indian women. *Asian Pac J Cancer Prev*, **10**, 111-4.
- Sankaranarayanan R, Esmi PO, Rajkumar R, et al (2007a). Effect of visual screening on cervical cancer incidence and mortality in Tamil Nadu, India: a cluster-randomised trial. *Lancet*, **370**, 398-406.
- Sankaranarayanan R, Mathew B, Jacob BJ, et al (2000). Early findings from a community-based, cluster-randomized, controlled oral cancer screening trial in Kerala, India. The Trivandrum Oral Cancer Screening Study Group. *Cancer*,

- 88, 664-73.
- Sankaranarayanan R, Nene BM, Dinshaw KA, et al (2005). A cluster randomized controlled trial of visual, cytology and human papillomavirus screening for cancer of the cervix in rural India. *Int J Cancer*, **116**, 617-23.
- Sankaranarayanan R, Rajkumar R, Esmey PO, et al (2007b). Effectiveness, safety and acceptability of 'see and treat' with cryotherapy by nurses in a cervical screening study in India. *Br J Cancer*, **96**, 738-43.
- Sarwar CM, Siddiqui N, Khokhar RA, Badar F. Epithelial ovarian cancer at a cancer hospital in a developing country. *Asian Pac J Cancer Prev*, **7**, 595-8.
- Satyanarayana L, Asthana S (2008). Life time risk for development of ten major cancers in India and its trends over the years 1982 to 2000. *Indian J Med Sci*, **62**, 35-44.
- Sayed MA, Mahtab H, Akter Panam P, et al (2003). Diabetes mellitus and impaired fasting glycemia in a rural population of Bangladesh. *Diabetes care*, **26**, 1034-9.
- Sen U, Sankaranarayanan R, Mandal S, et al (2002). Cancer patterns in eastern India: the first report of the Kolkata cancer registry. *Int J Cancer*, **100**, 86-91.
- Shah FD, Patel JB, Shukla SN, Shah PM, Patel PS (2005). Evaluation of plasma non-enzymatic antioxidants in breast cancer etiology. *Asian Pac J Cancer Prev*, **10**, 91-6.
- Shanta V, Gajalakshmi CK, Swaminathan R, Ravichandran K, Vasanthi L (2002). Cancer registration in Madras Metropolitan Tumour Registry, India. *Eur J Cancer*, **30A**, 974-8.
- Sharma A, Bandari R, Gilbert D, Sharma AK (2005). Benign and malignant breast disease presenting to Bhaktapur Cancer Hospital. *Kathmandu Univ Med J*, **3**, 384-7.
- Shukla VK, Chauhan VS, Mishra RN, Basu S (2008). Lifestyle, reproductive factors and risk of gallbladder cancer. *Singapore Med J*, **49**, 912-5.
- Siddiquee BH, Alauddin M, Choudhury AA, Akhtar N (2006). Head and neck squamous cell carcinoma (HNSCC) 5 year study at BSMMU. *Bangladesh Med Res Counc Bull*, **32**, 43-8.
- Siegel K, Narayan KM, Kinra S (2008). Finding a policy solution to India's diabetes epidemic. *Health Aff*, **27**, 1077-90.
- Singh P, Kapil U, Shukla NK, Deo S, Dwivedi SN (2005). Association between breast cancer and vitamin C, vitamin E and selenium levels: results of a case-control study in India. *Asian Pac J Cancer Prev*, **6**, 177-80.
- Singh VK, Chandra S, Kumar S, et al (2009). Common medical error: lung cancer misdiagnosed as sputum negative tuberculosis. *Asian Pac J Cancer Prev*, **10**, (in press).
- Singh Y, Sayami P, Sayami G, et al (2002a). Nepalese breast cancer in relation to reproductive factors: comparison between Nepalese and Japanese cases. *Anticancer Res*, **22**, 319-23.
- Singh Y, Vaidya P, Hemandas AK, Singh KP, Khakurel M (2002b). Colorectal carcinoma in Nepalese young adults: presentation and outcome. *Gan To Kagaku Ryoho*, **29 Suppl 1**, 223-9.
- Sirisena J (1999). Cervical screening program for Sri Lanka--can we afford it? *Ceylon Med J*, **44**, 41-5.
- Siriwardena BS, Tilakaratne A, Amaratunga EA, Tilakaratne WM (2006). Demographic, aetiological and survival differences of oral squamous cell carcinoma in the young and the old in Sri Lanka. *Oral Oncol*, **42**, 831-6.
- Siriwardena BS, Tilakaratne A, Amaratunga EA, et al (2007). Analysis of histopathological and immunohistochemical differences of oral squamous cell carcinoma in young and old patients in Sri Lanka. *J Oral Pathol Med*, **36**, 357-62.
- Siriwardana HD, Pathirana A (2007). Adenocarcinoma of the stomach in a tertiary care hospital in Sri Lanka. *Ceylon Med J*, **52**, 53-5.
- Swaminathan R, Rama R, Shanta V (2008a). Lack of active follow-up of cancer patients in Chennai, India: implications for population-based survival estimates. *Bull World Health Organ*, **86**, 509-15.
- Swaminathan R, Rama R, Shanta V (2008b). Childhood cancers in Chennai, India, 1990-2001: incidence and survival. *Int J Cancer*, **122**, 2607-11.
- Suneetha KJ, Nancy KN, Rajalekshmy KR, Sagar TG, Rajkumar T (2008). Role of GSTM1 (present/null) and GSTP1 (Ile105Val) polymorphisms in susceptibility to acute lymphoblastic leukemia among the South Indian population. *Asian Pac J Cancer Prev*, **9**, 733-6.
- Sunny L (2005). A low fat diet rich in fruits and vegetables may reduce the risk of developing prostate cancer. *Asian Pac J Cancer Prev*, **6**, 490-6.
- Sunny L, Yeole BB, Hakama M, et al (2004a). Decreasing trend in the incidence of stomach cancer in Mumbai, India, during 1988 to 1999. *Asian Pac J Cancer Prev*, **5**, 169-74.
- Sunny L, Yeole BB, Hakama M, et al (2004b). Oral cancers in Mumbai, India: a fifteen years perspective with respect to incidence trend and cumulative risk. *Asian Pac J Cancer Prev*, **5**, 294-300.
- Sunny L, Yeole BB, Kurkure AP, et al (2004c). Cumulative risk and trends in prostate cancer incidence in Mumbai, India. *Asian Pac J Cancer Prev*, **5**, 401-5.
- Suhr ML, Dysvik B, Bruland O, et al (2007). Gene expression profile of oral squamous cell carcinomas from Sri Lankan betel quid users. *Oncol Rep*, **18**, 1061-75.
- Takehima M, Saitoh M, Kusano K, et al (2008). High frequency of hypermethylation of p14, p15 and p16 in oral pre-cancerous lesions associated with betel-quid chewing in Sri Lanka. *J Oral Pathol Med* [Epub ahead of print]
- Takiar R, Srivastava A (2008). Time trend in breast and cervix cancer of women in India - (1990-2003). *Asian Pac J Cancer Prev*, **9**, 777-80.
- Talukder MH, Jabeen S, Shaheen S, Islam MJ, Haque M (2007). Pattern of cancer in young adults at National Institute of Cancer Research and Hospital (NICRH), Bangladesh. *Mymensingh Med J*, **16**, S28-33.
- Talukder SI, Ali MS, Rahman S, et al (2004). Histopathological types of malignant lesions of esophagus and stomach. *Mymensingh Med J*, **13**, 138-42.
- Talukder SI, Haque MA, Alam MO, et al (2007). Histopathology based cancer pattern in Mymensingh region of Bangladesh. *Mymensingh Med J*, **16**, 165-9.
- Tara S, Agrawal CS, Agrawal A (2008). Validating breast self examination as screening modalities for breast cancer in eastern region of Nepal: a population based study. *Kathmandu Univ Med J*, **6**, 89-93.
- Topcu Z, Chiba I, Fujieda M, et al (2002). CYP2A6 gene deletion reduces oral cancer risk in betel quid chewers in Sri Lanka. *Carcinogenesis*, **23**, 595-8.
- Tayyeb R, Khawaja NP, Malik N (2003). Comparison of visual inspection of cervix and Pap smear for cervical cancer screening. *J Coll Physicians Surg Pak*, **13**, 201-3.
- Thomas G, Hashibe M, Jacob BJ, et al (2003). Risk factors for multiple oral premalignant lesions. *Int J Cancer*, **107**, 285-91.
- Tyagi BB, Verma K, Singh RP (2001). Is incidence of cancer on the decline in Delhi, capital of India? *Indian J Cancer*, **38**, 8-16.
- Varghese C, Amma NS, Chitrathara K, et al (1999). Risk factors for cervical dysplasia in Kerala, India. *Bull World Health Organ*, **77**, 281-3.
- Warnakulasuriya S, Ekanayake A, Stjernsward J, Pindborg JJ, Sivayoham S (1988). Compliance following referral in the

- early detection of oral cancer and precancer in Sri Lanka. *Community Dent Oral Epidemiol*, **16**, 326-9.
- Warnakulasuriya KA, Nanayakkara BG (1991). Reproducibility of an oral cancer and precancer detection program using a primary health care model in Sri Lanka. *Cancer Detect Prev*, **15**, 331-4.
- Warnakulasuriya S, Pindborg JJ (1990). Reliability of oral precancer screening by primary health care workers in Sri Lanka. *Community Dent Health*, **7**, 73-9.
- Waterhouse J, Muir C, Shanmugaratnam K, Powell J (Eds) (1982). *Cancer Incidence in Five Continents Vol. IV*. IARC Scientific Publications No 42. IARC, Lyon.
- Yeole BB (2001). An assessment in improvement in reliability and completeness of Mumbai Cancer Registry data 1965-1997. *Asian Pac J Cancer Prev*, **2**, 225-32.
- Yeole BB (2002). Cancer in women in Mumbai, India. *Asian Pac J Cancer Prev*, **3**, 137-42.
- Yeole BB (2005). Respiratory cancer population-based survival in Mumbai, India. *Asian Pac J Cancer Prev*, **6**, 449-54.
- Yeole BB (2006). Role of the cancer registries in determining cancer mortality in Asia? *Asian Pac J Cancer Prev*, **7**, 489-91.
- Yeole BB (2007). Trends in the incidence of head and neck cancers in India. *Asian Pacific J Cancer Prev*, **8**, 607-12.
- Yeole BB (2008a). Trends in cancer incidence in esophagus, stomach, colon, rectum and liver in males in India. *Asian Pacific J Cancer Prev*, **9**, 97-100.
- Yeole BB (2008b). Trends in cancer incidence in female breast, cervix uteri, corpus uteri, and ovary in India. *Asian Pacific J Cancer Prev*, **9**, (119-122).
- Yeole BB (2008c). Trends in prostate cancer incidence in India. *Asian Pacific J Cancer Prev*, **9**, 141-4.
- Yeole BB (2008d). Trends in the brain cancer incidence in India. *Asian Pacific J Cancer Prev*, **9**, 267-70.
- Yeole BB (2008e). Geriatric cancers in India: an epidemiological and demographic overview. *Asian Pacific J Cancer Prev*, **9**, 271-4.
- Yeole BB (2008f). Trends in the incidence of Non-Hodgkin's lymphoma in India. *Asian Pac J Cancer Prev*, **9**, 433-6.
- Yeole BB, Advani S (2002). Retinoblastoma: An epidemiological appraisal with Reference to a population in Mumbai, India. *Asian Pac J Cancer Prev*, **3**, 17-21.
- Yeole BB, Jussawalla DJ (1988). An assessment of reliability and completeness of Mumbai Cancer Registry data. *Ind J Cancer*, **25**, 177-90.
- Yeole BB, Jussawalla DJ (1992). Cancer incidence and trends in Bombay, India. *Eur J Cancer*, **28A**, 1926-8.
- Yeole BB, Jayant K and Jussawalla DJ (1989). Declining trend in cervical cancer incidence in Bombay, India (1964-1985). *J Surg Oncol*, **42**, 267-71.
- Yeole BB, Kumar AV (2004). Population-based survival from cancers having a poor prognosis in Mumbai (Bombay), India. *Asian Pac J Cancer Prev*. Apr-Jun;5(2):175-82.
- Yeole BB, Kumar AV, Kurkure A, Sunny L (2004). Population-based survival from cancers of breast, cervix and ovary in women in Mumbai, India. *Asian Pac J Cancer Prev*, **5**, 308-15.
- Yeole BB, Kurkure AP (2003). An epidemiological assessment of increasing incidence and trends in breast cancer in Mumbai and other sites in India, during the last two decades. *Asian Pac J Cancer Prev*, **4**, 51-6.
- Yeole BB, Kurkure A, Advani S, Lizzy S (2001). An assessment of cancer incidence patterns in Parsi and non Parsi populations, Greater Mumbai. *Asian Pac J Cancer Prev*, **2**, 293-8.
- Yeole BB, Kurkure AP, Koyande SS (2006). Geographic variation in cancer incidence and its patterns in urban Maharashtra, 2001. *Asian Pac J Cancer Prev*, **7**, 385-90.
- Yeole BB, Ramanakumar AV, Sankaranarayanan R (2003). Survival from oral cancer in Mumbai (Bombay), India. *Cancer Causes Control*, **14**, 945-52.
- Yeole BB, Sankaranarayanan R, Sunny M Sc L, Swaminathan R, Parkin DM (2000). Survival from head and neck cancer in Mumbai (Bombay), India. *Cancer*, **89**, 437-44.
- Yeole BB, Sunny L (2001). Population based survival from prostate cancer in Mumbai (Bombay), India. *Indian J Cancer*, **38**, 126-32.
- Yeole BB, Sunny L, Swaminathan R, Sankaranarayanan R, Parkin DM (2001). Population-based survival from colorectal cancer in Mumbai, (Bombay) India. *Eur J Cancer*, **37**, 1402-8.
- Yusuf MA, Badar F, Meerza F, et al (2007). Survival from hepatocellular carcinoma at a cancer hospital in Pakistan. *Asian Pac J Cancer Prev*, **8**, 272-4.
- Zeb A, Rasool A, Nasreen S (2006). Occupation and cancer incidence in District Dir (NWFP), Pakistan, 2000-2004. *Asian Pac J Cancer Prev*, **7**, 483-4.
- Zeb A, Rasool A, Nasreen S (2008). Cancer incidence in the districts of Dir (North West Frontier Province), Pakistan: a preliminary study. *J Chin Med Assoc*, **71**, 62-5.