

## RESEARCH COMMUNICATION

## A Study of Cancer Patterns Among Inpatients of Public Hospitals in Iran

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### Abstract

Cancer is becoming an increasingly important cause of premature mortality in developing countries as their populations expand and their lifestyle becomes westernized. The aim of this study was to determine the frequency distribution of various neoplasms among Iranian inpatients, their demographic status and length of stay involved in hospitals during 2000-2002.

Records of 17447 inpatients who were hospitalized with malignant tumors in Iranian public hospitals during 2000-2002 were studied. The neoplasms had been coded and classified according to International Classification of Diseases, 10th Revision (ICD-10). The frequency distribution of cancer patients was evaluated by age, sex, place of residence and the length of stay at hospital.

There were 9470 male patients (54.3%) and 7977 females (45.7%). The mean  $\pm$  sd age was 51.2 $\pm$ 20.6 with a median of 55 years. The average for females (49.4 $\pm$ 19.2 yrs) was significantly lower than that for males (52.8 $\pm$ 21.7 yrs) ( $p < 0.001$ ). The five most common cancer sites were the digestive organs (27.6%) followed by lymphoid and haematopoietic tissues (21.4%), breast (10.2%), respiratory and intrathoracic organs (8.8%) and skin (6%). These accounted for 74% of all malignancies. Some 31% of women's cancers were found in breast or genital organs compared to only 7.6% for males. The male/female ratio was 1.19 with the highest being 2.85 for respiratory organs and the lowest being 0.04 for breast. Mean age of male patients with cancer of the digestive organs, respiratory and intrathoracic organs and skin was significantly lower than that of females ( $p < 0.001$ ). The median length of stay of patients in hospitals each time they were admitted was 6 days. Of the cancer patients, 77.7% lived in urban areas which include only 64.5% of the population. Rural patients with skin cancer accounted for 32.1%.

In conclusion, the results of this study carry important implications for future health planning strategies and provide a baseline for further studies on the evaluation of malignancies in Iran.

**Key Words:** Cancer - in-patients - hospital based study - length of stay at hospital - Iran

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### Introduction

Cancer is becoming an increasingly important cause of premature mortality in the developing countries as their populations age and expand, tobacco consumption increases and diets are westernized (Parkin et al. 2001). Approximately 60% of global cancers occur in developing countries. The cancer death rate already exceeds that for infectious disease in Iran as well as in many middle income countries, making it a particularly complex health problem which consumes extensive human and financial resources. Many developing countries are beginning to divert more resources to the

increasing problem of non-communicable diseases, predicted to increase to 73% of the global burden of diseases in 2020, from 43% in 1998. Non-communicable diseases, the third largest of which is cancer, account for more than 87% of the disease burden in high income countries. Their prevalence is increasing rapidly in low and middle income communities and have recently been given a higher priority in World Health Organization programs. Nonetheless, available resources, particularly for cancer, within developing countries remain grossly inadequate to deal with the problem (Parkin et al., 2001, Boffetta and Parkin, 1994).

With rapid changes of health indicators in the Iranian

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population as a result of improving living standards, decrease in infant mortality, lowering of morbidity and mortality from infectious diseases, a pattern of epidemiological transition toward non-communicable diseases is being experienced in our community (Yavari et al. 2003). Life expectancy has increased to over 70 years and infant mortality has decreased markedly in recent years. Because of this transition, mortality due to cancers is now the third cause of death after cardiovascular diseases and accidents (Naghavi, 2000). In recent years, there has been an increasing demand for reliable documented cancer data by national health officials and researchers in the field of cancer. In Iran, the epidemiology of cancer is not precisely explainable because of the lack of a well-established population-based registry system. However efforts are being made to explore the magnitude of the problem.

Based on existing data, an increase in the frequency of some types of cancers is already evident; e.g., the relative frequency of breast cancer has doubled in the past thirty years and mortality due to gastric cancer has increased notably. Cancers of stomach, esophagus, larynx and lung, breast and cervix are the most frequent cancers among Iran's population (Mortazavi et al. 1999; Mohagheghi 2000, Nadim et al. 2000). The aim of this study was to determine the frequency distribution of different neoplasms among Iranian in-patients, their demographic status and the length of related stays in hospitals during 2000-2002. The results form a basis for planning, prioritizing and monitoring cancer control activities, and provide important information for developing prudent public health policies. Hospital information can serve as a platform for comparison of our data with other Iranian and regional data, and should prove useful for monitoring health trends, hospital utilization, and the distribution of budgets and funds.

**Materials and Methods**

Of 36,364 patients admitted to public hospitals with neoplasms in Iran during 2000-2002, records of 17,447 patients diagnosed for malignant tumors were studied. Remaining patients (52%) were benign. The data covers about 60% of the public hospitals located in different provinces of Iran. Neoplasms were coded and classified according to International Classification of Diseases, 10th Revision, ICD-10 (WHO, 1992). In this study the cancers were classified into 13 groups. The frequency distribution of cancer patients by age, sex, place of residence (rural/urban) and the length of stay (LOS) at hospitals was drawn for all groups. For age and LOS, mean and standard deviation, median, quartiles and 95% confidence intervals were presented.

**Results**

Of the 17,447 cancer cases, 9,470 (54.3%) were male and 7,977 (45.7%) were female (see Table 1). Mean and standard deviation (sd) of their age was  $51.2 \pm 20.6$  with

median of 55 years. The average age of females ( $49.4 \pm 19.2$ ) was significantly lower than that of males ( $52.8 \pm 21.7$ );  $p < 0.001$ . Due to skewed distribution of age (Figure 1) the medians for female and male patients were 51 and 59 years respectively ( $p < 0.001$ ). As can be seen from the figure, for the 26-55 year age group, the percentage for women was higher than for men whereas this trend changed noticeably afterwards.

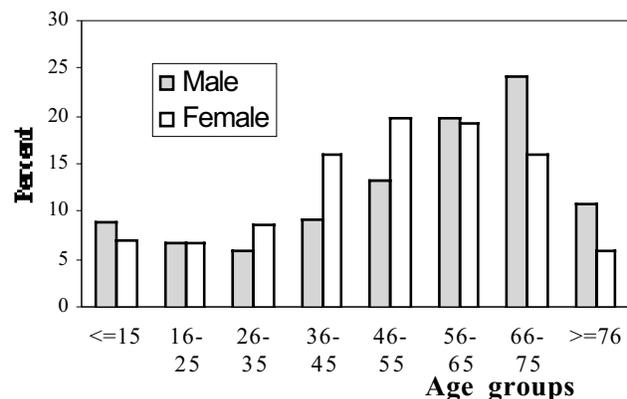
The five most common cancer sites among in-patients were the digestive organs (27.6%) followed by lymphoid and haematopoietic tissues (21.4%), breast (10.2%), respiratory and intrathoracic organs (8.8%) and skin (6%). These accounted for 74% of all malignant cases.

There were 9,470 cancer cases in males, with the five most common cancers being: digestive organs (30.7%) followed by lymphoid and haematopoietic (24.1%), respiratory and intrathoracic (12%), skin (6.9%) and male genital organs (6.1%). As for the female cancer cases, a total of 7,977 were observed with the five most common cancers being: digestive organs (23.9%) followed by breast (21.5%), lymphoid and haematopoietic (18.2%), female genital organs (9.6%), and finally respiratory and intrathoracic organs (5%). It was found that 31% of women's cancers were in the breast or female genital organs compared to only 6.8% in male genital organs and breast. Therefore for both sexes, the most frequent cancer was in the digestive organs. Except for the breast and genital organs, the other cancers ranked alike for both genders.

The male/female ratio for the whole sample was 1.19. This ratio was 2.85 for respiratory, 2.76 for urinary tract, 1.7 for skin, 1.5 for digestive organs and also lip, oral cavity and pharynx. The lowest ratio was approximately 0.04 for breast cancer.

The frequency of inpatients with cancer demonstrated increase with age in both sexes. For those aged 55 and below the male/female ratio was 0.91, while after this age the ratio rose to 1.57.

Overall 54% of digestive, 56.2% of respiratory and 48% of skin cancer patients were between 56-75 years of age. On the other hand, 46.3% of female patients with genital organ cancer were in the 36-55 yr age group and 56% of



**Figure 1. Distribution of Cancer Inpatients by Age Groups and Sex**

male genital organs cancer patients were 66 years or above. On the whole, most female patients (55.4%) were in the age group 36-65 years compared to most male patients (55.4%) with 56+ years.

About one fourth of patients with cancer of the lymphoid and haematopoietic organs were under 15 years. Out of 1,415 children under 15 years of age, malignant neoplasms of lymphoid and haematopoietic were the commonest (62%) followed by eye, brain and other central nervous system (CNS) cancers (9.3%), bone and articular cartilage cancers

(7.6%), mesothelial and soft tissue (4%) and urinary tract cancer (2.8%).

Table 1 shows that in-patients with cancer of the bone and articular cartilage were the youngest with a mean age of  $32.1 \pm 20.7$ . Half of these patients were 24 years or younger. The mean age of female patients was even less than that of males ( $p < 0.001$ ). The average age of male patients with cancer of the digestive organs, respiratory and intrathoracic organs and skin was significantly lower than those of females ( $p < 0.001$ ). Among patients with cancer of the lip, oral cavity

**Table 1. Mean, Median, Standard Deviation (sd) and Quartiles of Cancer Inpatients' Age (years); Iran 2000-2002**

Total subjects:	Number	Mean $\pm$ sd	P25*	Median	P75*	95% CI*
Lip, oral cavity and pharynx	457	48.3 $\pm$ 20.4	33	50	64	(46.4, 50.2)
Digestive organs	4811	59.4 $\pm$ 15.3	50	62	70	(59.0, 59.8)
Respiratory & intrathoracic organs	1539	60.4 $\pm$ 15.3	52	64	71	(59.7, 61.2)
Bone and articular cartilage	438	32.1 $\pm$ 20.7	16	24	47	(30.1, 34.0)
Skin	1041	57.6 $\pm$ 17.6	48	61	70	(56.6, 58.7)
Mesothelial and soft tissue	516	44.1 $\pm$ 21.6	26	45	62	(42.2, 46.0)
Breast	1784	49.0 $\pm$ 12.7	40	48	57	(48.4, 49.6)
Female genital organs	763	49.8 $\pm$ 15.5	40	49	61	(48.7, 50.9)
Male genital organs	582	60.7 $\pm$ 20.6	54	68	75	(59.0, 62.4)
Urinary tract	741	59.0 $\pm$ 18.8	50	63	72	(57.7, 60.4)
Eye, brain & other parts of CNS	677	40.2 $\pm$ 22.5	21	41	60	(38.5, 41.9)
Thyroid and other endocrine glands	366	46.3 $\pm$ 19.1	32	45	62	(44.3, 48.2)
Malignant neoplasms of lymphoid, haematopoietic & related	3732	39.5 $\pm$ 24.1	16	40	62	(38.7, 40.3)
Total	17447	51.2 $\pm$ 20.6	38	55	68	(50.9, 51.5)
<b>MALE:</b>						
Lip, oral cavity and pharynx	274	50.0 $\pm$ 20.9	35	53	66	(47.5, 52.5)
Digestive organs	2904	60.3 $\pm$ 15.1	51	64	71	(59.8, 60.9)
Respiratory & intrathoracic organs	1139	61.8 $\pm$ 14.4	55	65	72	(61.0, 62.7)
Bone and articular cartilage	253	32.4 $\pm$ 20.4	16	25	48	(29.8, 34.9)
Skin	655	58.9 $\pm$ 17.3	50	63	71	(57.6, 60.2)
Mesothelial and soft tissue	272	43.0 $\pm$ 23.2	21	44	63	(40.2, 45.7)
Breast	65	51.3 $\pm$ 18.4	39	51	65	(46.7, 55.9)
Male genital organs	582	60.7 $\pm$ 20.6	54	68	75	(59.0, 62.4)
Urinary tract	544	59.2 $\pm$ 18.1	50	63	72	(57.6, 60.7)
Eye, brain & other parts of CNS	361	40.8 $\pm$ 22.4	22	41	60	(38.5, 43.1)
Thyroid and other endocrine glands	142	47.2 $\pm$ 19.9	33	49	64	(43.9, 50.5)
Malignant neoplasms of lymphoid, haematopoietic & related	2279	39.4 $\pm$ 24.4	16	40	62	(38.42, 40.4)
Total	9470	52.8 $\pm$ 21.7	39	59	70	(52.3, 53.2)
<b>FEMALE:</b>						
Lip, oral cavity and pharynx	183	45.7 $\pm$ 19.3**	32	47**	60	(42.8, 48.5)
Digestive organs	1907	58.0 $\pm$ 15.4***	49	60***	70	(57.3, 58.7)
Respiratory & intrathoracic organs	400	56.5 $\pm$ 16.9***	46	60***	69	(54.8, 58.1)
Bone and articular cartilage	185	31.7 $\pm$ 21.3	15	23	46	(28.6, 34.8)
Skin	386	55.5 $\pm$ 17.9***	45	58***	69	(53.7, 57.3)
Mesothelial and soft tissue	244	45.4 $\pm$ 19.6	31	46	59	(42.9, 47.8)
Breast	1719	48.9 $\pm$ 12.5	40	48	57	(48.3, 49.5)
Female genital organs	763	49.8 $\pm$ 15.5	40	49	61	(48.7, 50.9)
Urinary tract	197	58.7 $\pm$ 20.5	50	63	72	(55.8, 61.6)
Eye, brain & other parts of CNS	316	39.4 $\pm$ 22.6	20	41	59	(36.9, 41.9)
Thyroid and other endocrine glands	224	45.7 $\pm$ 18.6	31	44	62	(43.3, 48.2)
Malignant neoplasms of lymphoid, haematopoietic & related	1453	39.6 $\pm$ 23.6	17	40	61	(38.4, 40.8)
Total	7977	49.4 $\pm$ 19.2	38	51	64	(48.9, 49.8)

\*P25=25<sup>th</sup> percentile; P75=75<sup>th</sup> percentile; CI=Confidence Interval.

\*\* $p < 0.03$ ,

\*\*\* $p < 0.001$  compared to Males.

**Table 2. Distribution of Cancer Inpatients by Cancer Groups, Sex and Place of Residence**

Cancer group	Total		Gender		Place of residency	
	Number	%	Male (%) n=9470	Female (%) n=7977	Urban (%) n=13556	Rural (%) n=3891
Lip, oral cavity and pharynx	457	2.6	60.0	40.0	73.4	26.6
Digestive organs	4811	27.6	60.4	39.6	76.6	23.4
Respiratory & intrathoracic organs	1539	8.8	74.0	26.0	75.5	24.5
Bone and articular cartilage	438	2.5	57.8	42.2	78.2	21.8
Skin	1041	6.0	62.9	37.1	67.9	32.1
Mesothelial and soft tissue	516	3.0	52.7	47.3	81.1	18.9
Breast	1784	10.2	3.6	96.4	89.4	10.6
Female genital organs	763	4.4	-	100.0	72.4	27.6
Male genital organs	582	3.3	100.0	-	83.7	16.3
Urinary tract	741	4.2	73.4	26.6	82.0	18.0
Eye, brain & other parts of CNS	677	3.9	53.3	46.7	78.4	21.6
Thyroid and other endocrine glands	366	2.1	38.8	61.2	81.8	18.2
Malignant neoplasms of lymphoid, haematopoietic & related	3732	21.4	61.1	38.9	76.9	23.1
<b>Total</b>	<b>17447</b>	<b>100.0</b>	<b>54.3</b>	<b>45.7</b>	<b>77.7</b>	<b>22.3</b>

and pharynx, similar results was observed ( $p < 0.03$ ). No significant difference between the mean age of two sexes was seen in other cancer groups.

Men with cancer of the respiratory and intrathoracic organs had the highest mean age ( $61.8 \pm 14.4$ ), while among women, patients with cancer of the digestive organs with a mean age of  $58.0 \pm 15.4$  were the oldest.

Table 2 shows that more than three fourths of cancer patients lived in urban areas whereas according to the statistical year-book of the Statistical Center of Iran, only 64.5% of the population were living in urban areas at the time of this study. This in fact seems to be an underestimate for at least two reasons. First, most of the urban population refer to private hospitals which are mainly located in the Capital-Tehran and other large cities and second, the expenses for private hospitals are hardly affordable by

people living in the rural areas. However, 32.1% of skin, 27.6% of female genital organs and 26.6% of lip, oral cavity and pharynx cancer patients stated that they lived in the rural areas. The percentage for breast cancer is 10.6% only, which might be due to cultural factors.

The median length of stay of patients diagnosed with different categories of neoplasm in public hospitals for care and treatment each time they were admitted was 6 days. This figure was 6 days or above for digestive, respiratory, lymphoid and haematopoietic, and eye and brain cancer patients (Table 3).

**Discussion**

The results showed that cancers of the digestive, lymphoid and haematopoietic, breast, respiratory &

**Table 3. Mean, Median, Standard Deviation(sd) and 95% Confidence Interval of Length of Stay\* at Hospital by Cancer Group**

Group	Number	Mean ± sd	Median	95% CI**
Lip, oral cavity and pharynx	457	6.3 ± 6.8	4	( 5.7 , 6.9 )
Digestive organs	4811	9.4 ± 7.1	8	( 9.2 , 9.6 )
Respiratory & intrathoracic organs	1539	9.5 ± 8.3	7	( 9.1 , 9.9 )
Bone and articular cartilage	438	7.9 ± 7.1	5	( 7.2 , 8.5 )
Skin	1041	5.4 ± 7.0	3	( 5.0 , 5.9 )
Mesothelial and soft tissue	516	6.8 ± 7.6	5	( 6.1 , 7.5 )
Breast	1784	4.4 ± 4.2	3	( 4.2 , 4.6 )
Female genital organs	763	5.7 ± 5.5	4	( 5.3 , 6.1 )
Male genital organs	582	5.4 ± 5.0	4	( 4.9 , 5.8 )
Urinary tract	741	7.4 ± 7.1	5	( 6.9 , 7.9 )
Eye, brain & other parts of CNS	677	9.4 ± 8.8	7	( 8.7 , 10.1 )
Thyroid and other endocrine glands	366	7.2 ± 5.9	5	( 6.6 , 7.8 )
Malignant neoplasms of lymphoid, haematopoietic & related	3732	8.2 ± 7.7	6	( 7.9 , 8.4 )
<b>Total</b>	<b>17447</b>	<b>7.8 ± 7.3</b>	<b>6</b>	<b>( 7.7 , 7.9 )</b>

\* Mean length of stay at each episode

\*\* 95% Confidence Interval

intrathoracic organs account for more than two thirds of all inpatients with cancer. Digestive organs cancers are the most common malignancies both in males and females among inpatients in Iran, with a male to female ratio of 1.5. Other studies in Iran demonstrated that it was the second most common cancer in males and the third in females. The rate in different parts of the world varies significantly for example a high prevalence in France versus a low prevalence in Rumania (Mortazavi et al. 1999). The difference may be attributed to both environmental and genetic factors. In addition, inpatients with cancer in digestive organs had the longest stay at hospital which reflects the importance of care for this group of cancers and related costs.

Lymphoid & haematopoietic cancers are commonly seen in children 0-14 years of age with a male to female ratio of 1.5. This is comparable to other studies in Iran (Mortazavi et al. 1999; Mohagheghi 2002; Salabian 1990). The relative frequency is higher compared to the Western countries (Parkin, 2001). This may be explained by the etiologic roles of the environment such as chemical, radiation and pollutant hazards, infections, and also due to the young population of country with 39.5% of under 14 yrs. With half of the population being under the age of 20 years, a large number of neoplasms were observed in the 0-14 years age group (Statistical Center of Iran 2002).

According to the present study, breast cancer was the second most common cancer among female inpatients accounting for more than one fifth of all cancers. It is now a major problem and has a changing age pattern, i.e., 28% in young pre-menopausal (36-45 yrs) and 31% in women of 46-55 yr age group. The frequency rate in countries of the region such as Turkey, Pakistan, Iraq and Egypt is 19-23% and the rate in the West is about 25-28% (Parkin et al. 2001). This cancer is amenable to prevention by early detection. A concentrated program is needed (screening, regular breast examination and mammography) for early diagnosis and treatment which is a key measure in reducing mortality. Our results emphasize the importance of the issue of age and diagnosis of breast cancer.

Cancer in respiratory organs was here found to be relatively low in comparison to other countries (Parkin et al. 2001). However, relative to a previous report in Iran (Mortazavi et al. 1999), an increase in frequency of these cancers was observed. The male/female ratio of 2.85 of these cancers and smoking patterns in the Iranian adult population, which is 22% in men and 2.1% in women (Azizi et al. 2002), strengthens the idea of an association between smoking and cancers of the respiratory organs. In addition, the association cancers have with environmental pollution makes them preventable although this is very complicated. Skin cancer is relatively common in Iran, ranked fifth among in-patients. It is more prevalent in males showing a 1.7 sex ratio with mean age of 58 yrs. In-patients with skin cancer, however, had the shortest stay in hospitals. The rate is below 1% in the region and in Asian countries as compared to the very high rate (30%) in Australia and very low rate (0.2%) in Japan (Parkin et al. 2001). In our study, about one third of

patients with skin cancer were living in rural areas working mainly in agriculture and husbandry and, therefore, suffered from high exposures to sunshine.

The study shows that cancers are more frequent in urban residents compared to rural residents which is more likely related to lifestyle patterns such as smoking, overweight, diet, inactivity and environmental factors such as pollutants.

In conclusion, the results of the present study emphasize the importance of addressing the concerns caused by different types of cancers in Iran as a developing country. They also present an important epidemiological understanding of inpatients' cancers. The data are important for future health planning and provide a baseline for further studies on the evaluation of malignancies in Iran. As a first step towards reducing morbidity and mortality associated with cancers in Iran, preventive measures must be taken to reduce the incidence of cancers. In addition, this information would help health sector policy makers in future planning of health programs, provision of facilities and training staff, according to the needs and necessities of our country and the region.

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