

Hyderabad (Sindh, Pakistan) Cancer Registry Report of Four Years (2020-2023)

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ABSTRACT

Objective: To collect and analyse cancer data of all malignancies from the Hyderabad Cancer Registry (HCR) for the estimation of cancer incidence (2020-2023) in various age groups and genders to identify common malignancies and any risk factors to facilitate cancer control initiative and prioritisation by the government and private sector.

Study Design: Observational study.

Place and Duration of the Study: Hyderabad Cancer Registry (HCR) Secretariat, Liaquat University of Health Sciences (LUMHS), Jamshoro, in collaboration with Karachi Cancer Registry, Health Research Institute, NICH, JPMC, Karachi, Pakistan, from January 2020 to December 2023.

Methodology: Cancer data of HCR collected from across Sindh province were analysed using SPSS. Parameters included age, gender, first contact date, primary site, and ICD coding. Data were cleaned, merged, and analysed. As per the standard guidelines, patients aged 0-14 years were classified as children, 15-19 years as adolescents, and aged 20 years and above as adults. Age-standardised incidence rates (ASIR) were also determined.

Results: During these four years, i.e., from January 2020 to December 2023, a total of 7,169 malignant cases were received. This included 3,310 (46.2%) males and 3,859 (53.8%) females, respectively. Out of a total of 7,169 cases, 6,967 (97.18%) tumours were seen in adults (≥ 20 years), 104 (1.45%) in adolescents, and 98 (1.37%) in children. In male adults, the oral, prostate, and urinary bladder, while in females, the breast, oral, and ovary constituted the three most common sites. The overall ASIR in males was 188.96 for adults, 2.25 for adolescents, and 2.41 for children. The overall ASIR in females was 236.68 for adults, 2.17 for adolescents, and 1.62 for children.

Conclusion: Both genders combined, breast cancer was the most common malignancy in Sindh. Oral cancer (OC) topped the list in males as the most common cancer, while it was 2nd most common in females after breast. OC, though largely a preventable cancer, has shown an upward trend mostly due to highly prevalent chewing habits, while breast cancer, largely a non-preventable one, not only shows an upward trend but more and more cases are occurring in young and pre-menopausal women. In adolescents and children, the orbital, oral, brain, colorectal, and bone malignancies were predominant.

Key Words: Hyderabad, Sindh, Cancer registry, Oral cancer, Breast cancer.

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INTRODUCTION

Hyderabad is the 2nd largest city in the Sindh Province and the 7th largest city of Pakistan as per the 2023 census.¹ Situated on the east bank of the mighty Indus River, Hyderabad has a rich cultural history and was the capital of the province until 1840 when the British moved the capital to Bombay.

Cancer registries are the backbone of any cancer control programme. Functional cancer registries include the Karachi Cancer Registry,² Punjab Cancer Registry,³ Pakistan Atomic Energy Commission Cancer Registry,⁴ and The Armed Forces Institute of Pathology Cancer Registry.⁵ The Hyderabad Cancer Registry (HCR) was conceived with a major turnaround of diagnostic services, including state-of-the-art histopathological services at the Liaquat University of Health Sciences (LUMHS), Hyderabad, with its outreach services at each remote corner of Sindh. This is the 2nd such miraculous turn-around in Sindh. LUMHS histopathological services offer reliable and comprehensive cancer diagnostic services at a nominal cost, making it the 2nd most reliable cancer diagnostics facility in the public sector in the province of Sindh, following the precedent of Dow University of Health Sciences (DUHS), Karachi. This has provided a unique opportunity to receive reliable cancer data

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from across Sindh. Hence, this is the first report from HCR encompassing cancer data of 4 years from 2020-2023 with the prime objective of what all cancer registries intend to achieve, i.e., cause and risk factors as well as preventive and early detection strategies, reducing the burden of cancer-related morbidity and mortality.

METHODOLOGY

A massive outreach programme of LUMHS provided the unique opportunity to gather cancer data across Sindh province, including remote areas. As all cancer biopsies were transported to the central comprehensive diagnostic facility of LUMHS, Jamshoro/Hyderabad, this registry was named as HCR, though in reality about 70% of cases were from Hyderabad division, while about 30% were from the rest of Sindh, largely excluding Karachi, with <1% contribution. HCR data included age, gender, date of first contact, primary site, and ICD coding. Data were cleaned, merged, and analysed using SPSS. Patients aged 0-14 years were classified as children, 15-19 years as adolescents, and 20 years and above as adults. Age-standardised incidence rates (ASIR) were determined for both genders and all age groups.

RESULTS

During the four years (2020-2023), a total of 7,169 malignant cases were received from the HCR. The distributions amongst males and females were 3,310 (46.2%) and 3,859 (53.8%), respectively, with 97.2% tumours in adults (≥20 years), 104 (1.45%) in adolescents, and 98 (1.37%) in children.

Frequency and ASIR of all types of cancer in adult males and females (≥20 years) are shown in Table I and II. Figure 1 shows ASIR by age group and gender and Figure 2 shows ASIR of commonest tumours in children and adolescents, and adults in the HCR, Pakistan, between January 2020 and December 2023, while ASIR of commonest tumours in adult males and females are shown in Figure 3 and 4. Figure 5 shows the LUMHS outreach programme collection centres in Sindh, from where cancer cases were collected and reported.

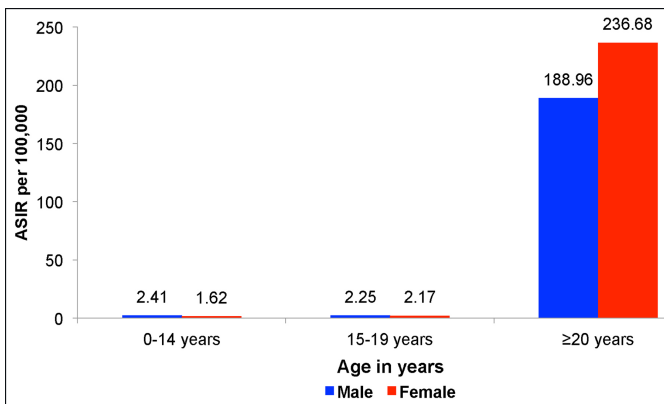


Figure 1: Age-standardised incidence rates (ASIR) by age group and gender in the HCR Pakistan 2020-2023.

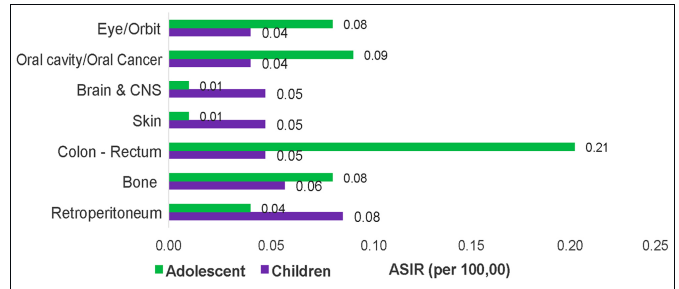


Figure 2: Age-standardised incidence rates (ASIR) of commonest tumours in adolescents and children in the HCR Pakistan 2020-2023.

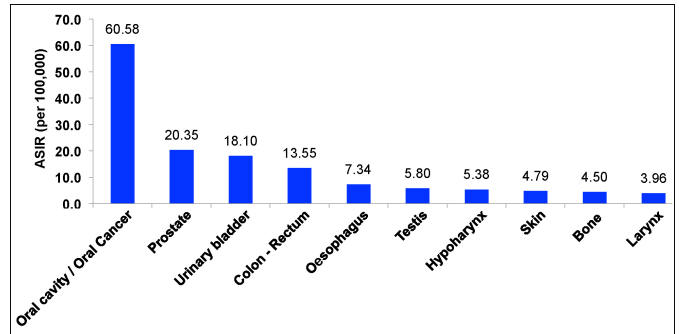


Figure 3: Age-standardised incidence rates (ASIR) of the most common malignant tumours among adult males (≥20 years), in the HCR, Pakistan 2020-2023.

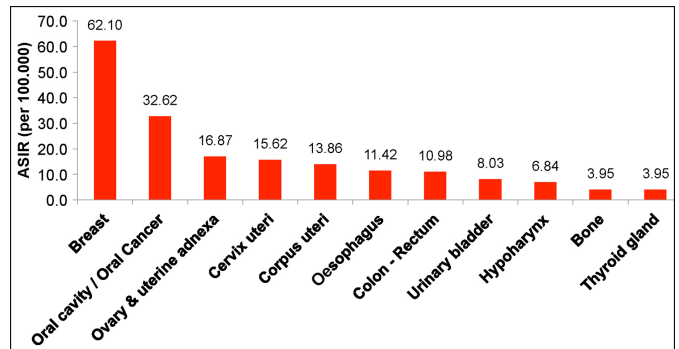


Figure 4: Age-standardised incidence rates (ASIR) of most common malignant tumours among adult females (≥20 years) in the HCR Pakistan 2020-2023.

DISCUSSION

According to the Pakistan Bureau of Statistics (2023), the total population of Pakistan, as recorded in the 7th national census, stands at 241.4 million. The population of Sindh, the 2nd most populous province of Pakistan, stood at 55,696,147 with an annualised growth of 2.57%.¹ Among the six divisions and 30 districts of Sindh, the highest growth rate has been seen in the Karachi division and its seven districts. In addition to the Karachi Division, the remaining five divisions of Sindh include Hyderabad, Mirpurkhas, Sukkur, Larkana, and Nawabshah. As per the 2023 census, all 7 districts of Karachi showed an increase in the population, with a total estimated population of over 20 million. The rest of the Sindh showed a decline in population compared to the 2017 census. This is largely due to mass migration to Karachi, the largest city and commercial hub of Pakistan.

Table I: Age-standardised incidence rates (ASIR) among males by age group in the HCR Pakistan 2020-2023.

Site (Males) Tumour primary site grouping	0-14 years		15-19 years		≥20 years		ICD-10
	Count	ASIR	Count	ASIR	Count	ASIR	
Oral cavity / oral cancer	2	0.08	4	0.16	1024	60.58	C00-C06
Salivary gland	1	0.04	2	0.08	35	2.07	C07-C08
Tonsil	0	0.00	0	0.00	21	1.24	C09
Oropharynx	0	0.00	0	0.00	28	1.66	C10
Nasopharynx	0	0.00	1	0.04	5	0.30	C11
Hypopharynx	2	0.08	0	0.00	91	5.38	C12-C14
Oesophagus	0	0.00	0	0.00	124	7.34	C15
Stomach	0	0.00	0	0.00	45	2.66	C16
Small intestine	0	0.00	0	0.00	22	1.30	C17
Colon - rectum	3	0.12	14	0.57	229	13.55	C18-C21
Liver	0	0.00	0	0.00	2	0.12	C22
Gallbladder	0	0.00	0	0.00	20	1.18	C23-C24
Spleen	0	0.00	0	0.00	2	0.12	C26
Nose, sinuses, etc.	1	0.04	0	0.00	51	3.02	C30-C31
Larynx	0	0.00	1	0.04	67	3.96	C32
Trachea, bronchus, and lung	0	0.00	2	0.08	13	0.77	C33-C34
Thymus, heart, mediastinum, and pleura	0	0.00	0	0.00	4	0.24	C37-C38
Bone	6	0.24	8	0.33	76	4.50	C40-C41
Skin	3	0.12	0	0.00	81	4.79	C43-C44
Retroperitoneum	7	0.28	3	0.12	56	3.31	C48
Connective and soft tissue	0	0.00	1	0.04	20	1.18	C47,C49
Breast	0	0.00	0	0.00	23	1.36	C50
Penis	0	0.00	0	0.00	5	0.30	C60
Prostate	1	0.04	3	0.12	344	20.35	C61
Testis	2	0.08	4	0.16	98	5.80	C62
Kidney and other urinary organ	0	0.00	0	0.00	32	1.89	C64-C66
Urinary bladder	0	0.00	0	0.00	306	18.10	C67
Eye / orbit	2	0.08	1	0.04	36	2.13	C69
Brain and CNS	3	0.12	0	0.00	30	1.77	C70-72
Thyroid gland	0	0.00	0	0.00	10	0.59	C73
Non-Hodgkin lymphoma	0	0.00	0	0.00	1	0.06	C82-C85
Others and unspecified	28	1.10	11	0.45	293	17.33	-
All sites	61	2.41	55	2.25	3194	188.96	-
All sites n (%)	61 (1.84)		55 (1.66)		3194 (96.50)		-

ASIR, Age-standardised incidence rates; HCR, Hyderabad cancer registry.

Table II: Age-standardised incidence rates (ASIR) among females by age group in the HCR Pakistan 2020-2023.

Site (Females) Tumour primary site grouping	0-14 years		15-19 years		≥20 years		ICD-10
	Count	ASIR	Count	ASIR	Count	ASIR	
Oral cavity / oral cancer	2	0.09	5	0.22	520	32.62	C00-C06
Salivary gland	2	0.09	2	0.09	17	1.07	C07-C08
Tonsil	0	0.00	0	0.00	13	0.82	C09
Oropharynx	1	0.04	0	0.00	26	1.63	C10
Nasopharynx	1	0.04	0	0.00	3	0.19	C11
Hypo pharynx	0	0.00	0	0.00	109	6.84	C12 - C14
Oesophagus	0	0.00	2	0.09	182	11.42	C15
Stomach	0	0.00	0	0.00	27	1.69	C16
Small intestine	0	0.00	1	0.04	15	0.94	C17
Colon - rectum	2	0.09	7	0.31	175	10.98	C18-C21
Liver	0	0.00	0	0.00	2	0.13	C22
Gallbladder	1	0.04	0	0.00	51	3.20	C23-C24
Pancreas	0	0.00	0	0.00	1	0.06	C25
Spleen	0	0.00	0	0.00	2	0.13	C26
Nose, sinuses, etc.	0	0.00	0	0.00	49	3.07	C30-C31
Larynx	0	0.00	1	0.04	31	1.94	C32
Trachea, bronchus and lung	0	0.00	1	0.04	5	0.31	C33-C34
Thymus, heart, mediastinum, and pleura	0	0.00	0	0.00	0	0.00	C37-C38
Bone	2	0.09	1	0.04	63	3.95	C40-C41
Skin	2	0.09	1	0.04	61	3.83	C43-C44
Connective and soft tissue	2	0.09	3	0.13	43	2.70	C47-C49
Retroperitoneum	1	0.04	3	0.13	27	1.69	C48
Breast	0	0.00	3	0.13	990	62.10	C50
Vulva and vagina	0	0.00	0	0.00	41	2.57	C51-C52
Cervix uteri	0	0.00	0	0.00	249	15.62	C53
Corpus uteri	0	0.00	1	0.04	221	13.86	C54
Uterus	0	0.00	0	0.00	38	2.38	C55
Ovary	2	0.09	7	0.31	269	16.87	C56-C57
Kidney	0	0.00	0	0.00	21	1.32	C64-C66
Urinary bladder	0	0.00	0	0.00	128	8.03	C67
Eye / Orbit	3	0.13	1	0.04	37	2.32	C69
Brain and CNS	2	0.09	0	0.00	42	2.63	C70-C72
Thyroid gland	0	0.00	1	0.04	63	3.95	C73
Others and unspecified	14	0.61	9	0.40	252	15.81	-
All sites	37	1.62	49	2.17	3773	236.68	-
All sites n (%)	37 (0.96)		49 (1.27)		3773 (97.77)		-

ASIR, Age-standardised incidence rates; HCR, Hyderabad cancer registry.

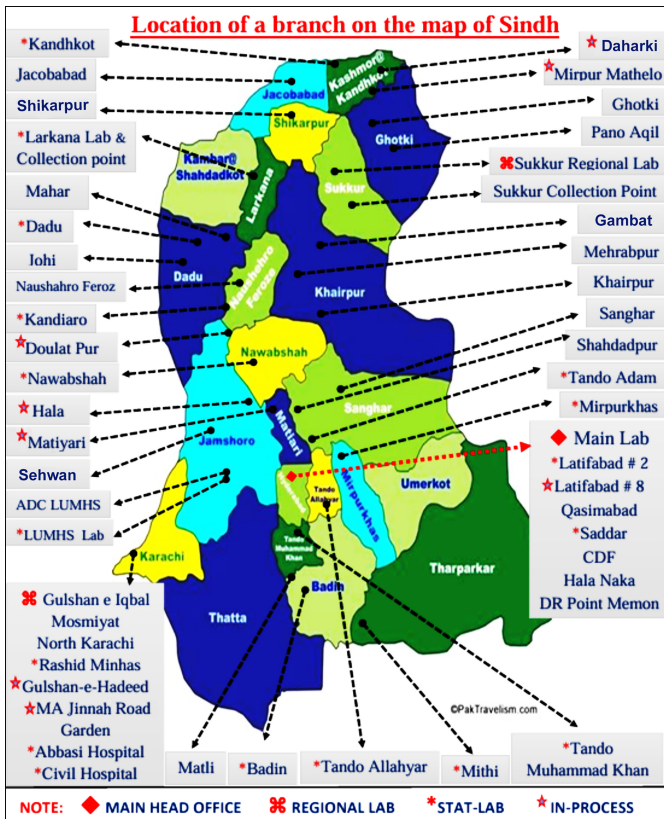


Figure 5: LUMHS outreach programme in Sindh, from where cancer cases were collected and reported.

Overall, in Sindh province, urban population exceeds the rural population, i.e., 54% vs. 46%. Hence, HCR data represent a significant rural population as the Karachi division predominantly represents the urban population.¹ Hyderabad is the second largest city of Sindh province and one of the oldest cities of the sub-continent. It is located just east of the River Indus and is a major commercial and industrial hub. Once a provincial capital, it is at a distance of approximately 150 km from Karachi, and this distance is continuously decreasing as Karachi is physically extending towards Hyderabad on both sides of M-9 connecting Karachi to Hyderabad. This data is the 1st consolidated cancer data which covers all districts of Sindh with ASIR based on the 2023 census (Figure 5).¹ Hyderabad is inhabited by all ethnicities of the country, and the predominant ethnicities include Sindhi and Mohajirs (post-partition immigrants from India and their next generations), and to a lesser extent, Punjabis and Pathans among others. About 9% of the Hyderabad district population is comprised of Hindus.¹ HCR cases included cases from Hyderabad, Larkana, Mirpurkhas, Tando Adam, Tando Allahyar, Sukkur, Kandiaro, Badin, Mithi, Naushero-feroze, Malti, Ghotki, Dadu, T M Khan, Sanghar, Kandhkot, Mehrabpur, Karachi, Gambat, Pano Aaqil, Nawabshah, and Shikarpur in the order of frequency (Figure 5). This broad coverage of HCR is a major strength of this data. The gender gap, such as in the rest of Pakistan, roughly stands at 108, i.e., 108 males for 100 females.

Statistics of HCR show close resemblance to the cancer incidence reported for its largest city Karachi, i.e., breast cancer is the most common cancer in females and oral cancer in males.^{2,6,7} One exception is liver cancer, which is not seen in the top 10 cancers in both genders. Similar to Karachi and the rest of the country, the prevalence of Hepatitis B and C is no less in Hyderabad and the remaining four divisions of Sindh.⁸ A plausible explanation is the referral and diagnostic work-up at more specialised centres in Sindh, such as a major liver transplant centre at Gambat in Khairpur district largely outsources its pre- and post-transplant liver biopsies to tertiary care hospitals in Karachi. Another explanation is the major and largest tertiary care facility at Sindh Institute of Urology and Transplantation (SIUT), Karachi, which drains a large number of liver and kidney patients from across Sindh, including remote parts of interior Sindh. Another observation is the absence of lung cancer in the top 10 cancers in males. This likely reflects a significant transition from cigarette smoking to tobacco chewing.

In the past, only one publication touched upon the cancer profile of Hyderabad, covering data from 1998-2002.⁹ This data were, however, of limited value as it only included the Hyderabad residents who travelled to Karachi South for cancer diagnosis and treatment, along with those who used the Aga Khan Clinical Laboratories' histopathological diagnostic services by submitting their biopsies in Hyderabad collection points. Current data from HCR show significant variation from what was reported over two decades ago. The only major similarity remains the fact that even 25 years ago, oral cancer was the most common cancer in males and 2nd most common cancer in females of Hyderabad, while breast cancer was the leading cancer in females. A similar study was published from the 4th largest city of Sindh, Larkana, which covered the data from 2000-2002 in the same fashion as from Hyderabad and are of limited value.¹⁰

Another source of cancer data across Pakistan is the database of Pakistan Atomic Energy Commission (PAEC) hospitals' cancer registration data. PAEC runs 20 major cancer hospitals across Pakistan, including two in Karachi and three in the rest of the province, which include NIMRA in Jamshoro, Hyderabad, LINAR in Larkana, and NORIN in Nawabshah. Their monographs were published covering cancer registration data of 2016-17 and 2018-19.⁸ In addition, PAEC data were also the part of the 1st national cancer registry data of Pakistan.^{11,12}

Early onset of breast^{13,14} and colorectal cancer^{15,16} is another new dimension to these common cancers in Pakistan, and Sindh is no exception. Consanguineous, mostly first cousins and early marriages, well before the age of 18, are very common in rural areas of Pakistan, including Sindh.^{17,18} This is rather the norm than the exception and is happening in the

predominantly Muslim population of the subcontinent for generations. This, on one hand, deprives them of even early education with life-long poor financial prospects and on the other hand, a high probability of multiparity and pregnancy-related complications as well as higher frequency of genetic disorders such as Thalassemia.¹⁹ Cancer is also strongly linked to genetic regulation, in particular DNA repair genes such as *BRCA1*, *BRCA2*, and mismatch repair genes (MMR) have a strong correlation with breast and colorectal cancers, respectively. Screening for these genetic mutations is hardly available to cancer patients in Pakistan, hence, it is anyone's guess what role these are playing in early onset cancers, as the genetic pool does not get a chance to escape, and so-called bad genes spiral from generation to generation.²⁰

Conclusions drawn from this database, though not unexpected, shall still be interpreted with care as only a subset of cancer cases that originate in the Sindh population are included in this database. Nonetheless, this is the first attempt to determine the cancer incidence in Hyderabad and other divisions of Sindh province and should serve as a guideline for estimation of the cancer burden and risk assessment statistics of Sindh province, in particular, and Pakistan in general, towards the cancer control programme, a dire need of the time. Another palpable observation is the fact that in spite of the fact that about 35% population of Pakistan falls between the ages of 0-14 years and only about 4% over 65 years, the number of malignancies recorded in children and adolescents appears to be significantly underdiagnosed or underreported. This caveat is observed in all major functional cancer registries of Pakistan, including the Karachi cancer registry.

CONCLUSION

An optimal facility for tissue diagnosis of cancer is the foremost requirement to get an authentic diagnosis in the first place. This, along with a little support from IT and motivation from Pathologists, Oncologists, and Public Health experts, is the best guarantee to successfully initiate and sustain a cancer registry. HCR is a vivid example of this. This cancer registration data confirms a similar occurrence and risk factors as Karachi, which hopefully may help the Sindh government and private sector to consider prioritisation of its limited resources towards the cancer control programme. In addition, this prompts cancer researchers and geneticists to explore the huge gap in our understanding of the complex interaction between genetics and lifestyle.

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ETHICAL APPROVAL AND PATIENTS' CONSENT:

Ethical approval and individual patient consent for cancer

registries were taken by the respective hospitals sharing data and was almost always exempted by the respective Ethical Committees as the identity of the individual patients were never revealed at any stage.

COMPETING INTEREST:

The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:

SP: Write-up of the manuscript.

MRK: Reporting a significant number of cancer biopsies and maintaining cancer registry data with all its prerequisites.

IDU: Financial support.

NM: Significant contribution in cancer reporting and entries of cancer data.

EA: Maintaining and compiling cancer registration data, cleaning, and merging it with ICD coding, and analysing the data.

HQ: Supervision, guidance, and critically reviewing of the manuscript.

All authors approved the final version of the manuscript to be published.

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