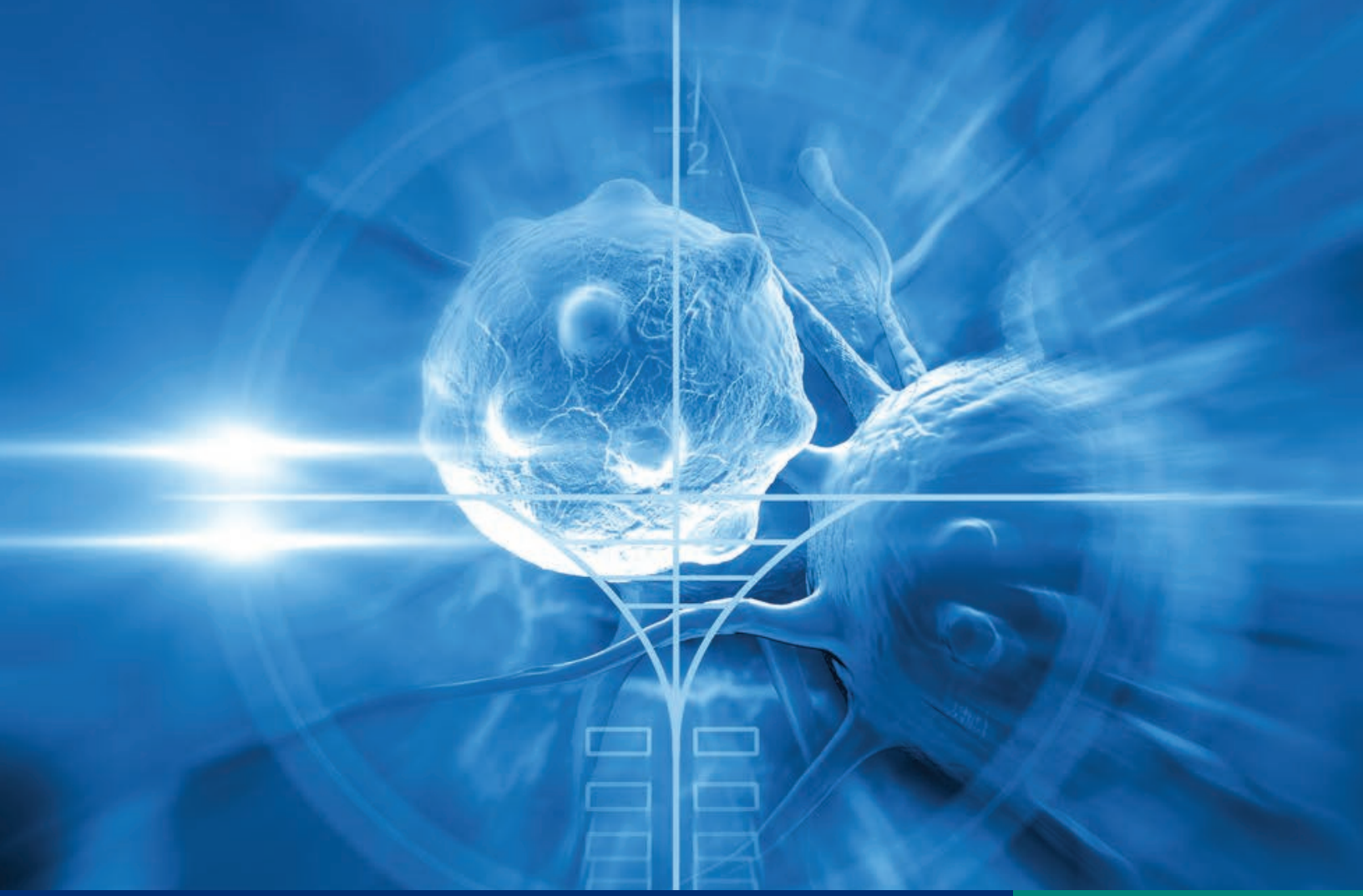

Oncology Institute Tumor Registry

Annual Review 2019

مركز جونز هوبكنز
أرامكو الطبي
Johns Hopkins
Aramco Healthcare

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- **Dr. Adil Al Khatti**, Adult Hematologist/Oncologist
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- **Dr. Ahmed Al Sagheir**, Adult Hematologist/Oncologist
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Introduction

The Oncology Institute is delighted to present the 2019 Johns Hopkins Aramco Healthcare (JHAH) Tumor Registry Annual Review. JHAH is a leading cancer center in the Eastern Province of Saudi Arabia, providing state-of-the-art cancer treatment to all Saudi Aramco/JHAH employees and their dependents.

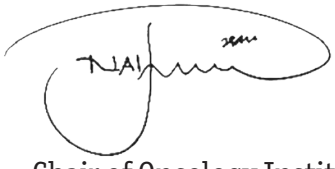
Highly qualified specialists on call ensure that we provide quality medical services - which is our priority. The specialized services at the Oncology Institute at JHAH include, but are not limited to, chemotherapy, immunotherapy, radiotherapy, surgery, autologous stem cell transplantation and palliative care.

Our center is the first to establish a tumor registry in the Kingdom and the rest of the Gulf Cooperation Council countries (GCC). The cancer registry is a vital component of the Oncology center, with a database that is fundamental to report trends in cancer occurrence within our population, for quality control analysis as well as for research.

The hospital administration uses information from the cancer registry for planning, allocation and utilization of health resources. In addition, the JHAH cancer registry works in collaboration with the Saudi Cancer Registry (SCR) which collects and maintains cancer incidence, mortality, and survival data. This data is helpful for cancer prevention and control programs within the Kingdom.

I want to personally acknowledge the work and support of our dedicated physicians, nurses and hospital staff. I also want to express my gratitude to the tumor registry staff for their tremendous effort and commitment, and for producing this annual review.

Dr. Nafisah Al Faris



Chair of Oncology Institute

Oncology Institute
Johns Hopkins Aramco Healthcare

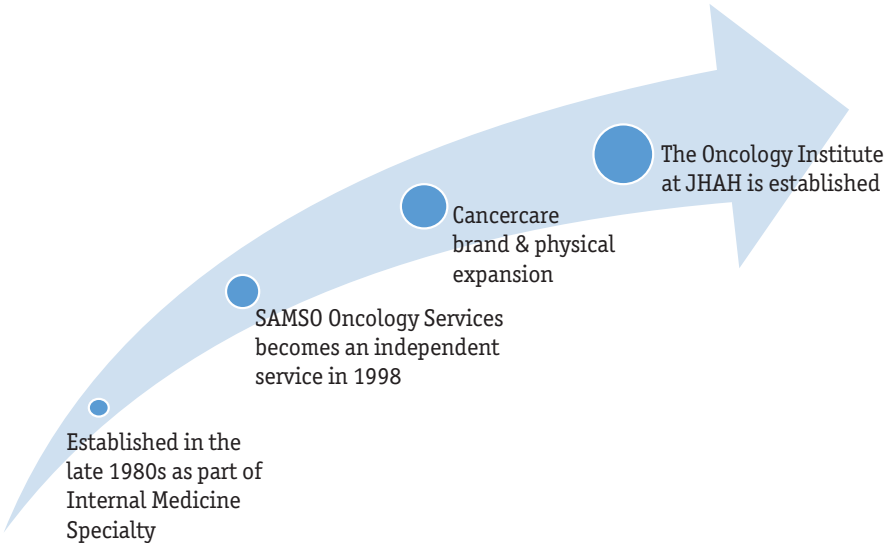
The Oncology Institute is a crucial service line based on three fundamental drivers: quality clinical outcomes, academic excellence, and oncology education. Recently, it became a Ministry of Health Oncology and Hematology Fellowship Program training site.

Mission
To improve the community's health by providing high-quality, multidisciplinary, comprehensive clinical care for oncology diseases and blood disorders.

Vision
To be a leader in clinical quality, research and education in the Kingdom of Saudi Arabia.

The Oncology Institute is a comprehensive cancer center that provides multidisciplinary cancer care including medical, surgical, radiation oncology services, autologous bone marrow transplant, blood disorders, and palliative care, as well as a tumor registry. It provides inpatient and outpatient services, the latest in chemotherapy and hormone therapy, a wide range of diagnostic and therapeutic procedures, and radiotherapy utilizing the latest technology.

Oncology services began in the 1980s, becoming an independent service in 1998 in Saudi Aramco Medical Services Organization, and has progressed over the years. Now part of JHAH, the service has become the Oncology Institute, recognized locally, regionally, and internationally.



Tumor Registry Unit

The JHAH Tumor Registry uses an information system designed to collect, manage and analyze patient data of those diagnosed with cancer.

The unit began collecting this information in 1987. It is a hospital-based registry that collects data from all medical organizations within the JHAH system, including its network of providers. The registry reports its data to the Saudi Cancer Registry in the Saudi Arabian Ministry of Health. The registry's database currently holds about 14,000 cases.

For quality improvement purposes, the Tumor Registry has been applying internal audits (Peer Reviews) for three years, which helps standardize and reduce variations among the abstractors. External Audits also are done by Oncology/Hematology/Radiation Oncology Physicians and thus would lead to high accuracy in Tumor Registry data.

The registry contains a wide range of information, including the following:

- Patient demographics, age, gender and nationality
- Medical history, physical findings and screening information
- Diagnostic information including relevant dates and diagnostic procedure(s)
- Tumor information including primary site (Topography), cell type (Histology), behavior and extent of disease
- Type of therapies, i.e., surgery, chemotherapy, radiotherapy, hormone and immunotherapy
- Follow-up information including patient status, cancer status, last date of contact and death when appropriate

JHAH Cancer Population

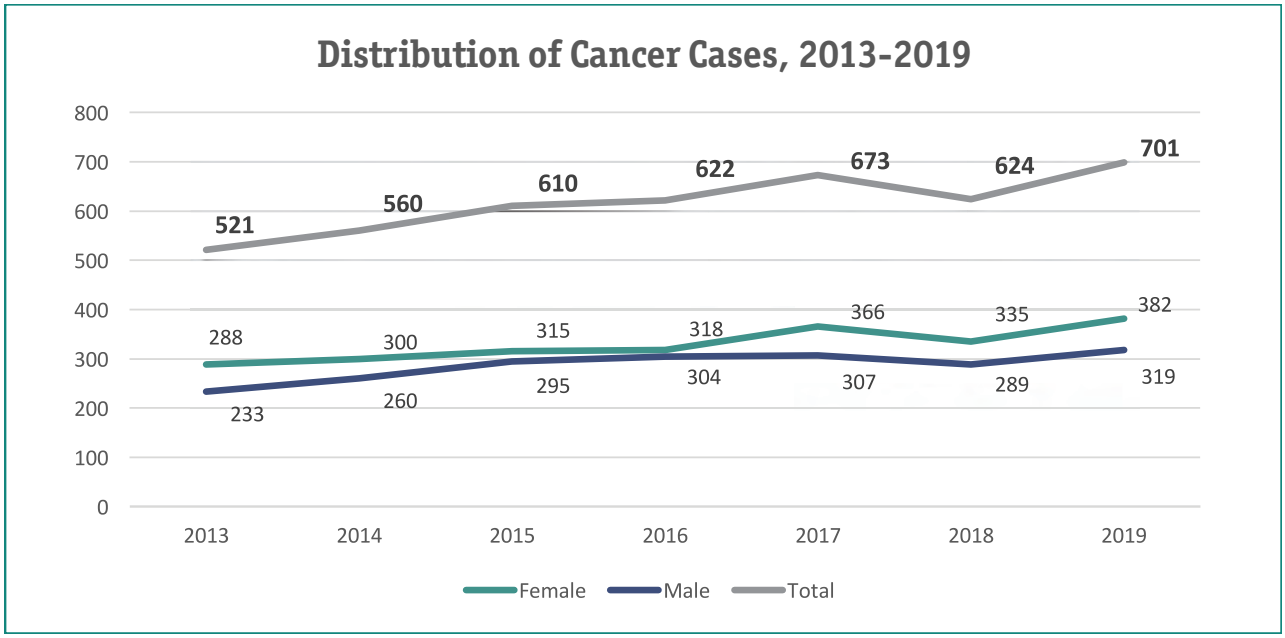
In this year's book, the review will cover the three years between January 1st, 2017 to December 31st, 2019. In this period, our registry recorded a total of 1998 new cancer cases. Between 2017 and 2019, the number of new cancer cases increased from 673 to 701.

We continue to see more cancer cases amongst females, with a ratio of 54% to 46% female-to-male. The majority of our patients continue to be Saudi Nationals, who constitute about 88% of the total cases vs. 12% non-nationals.

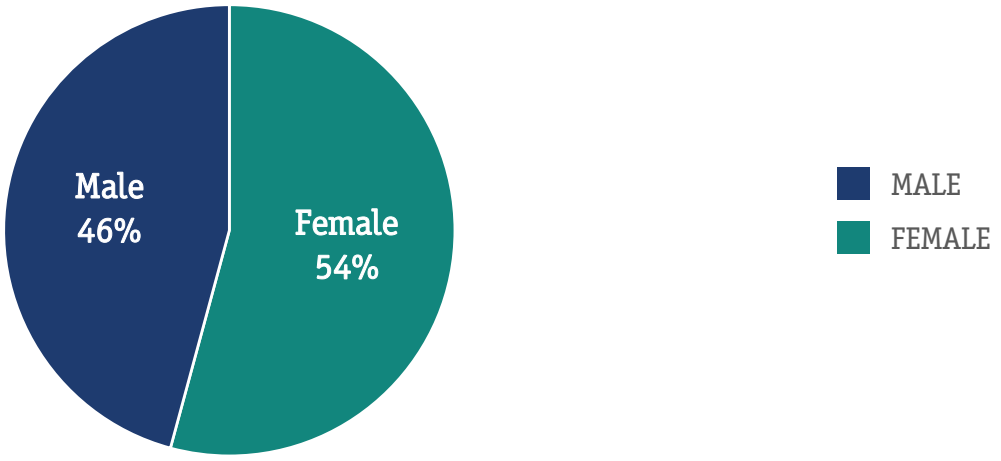
At JHAH, breast cancer, hematologic, and colon cancers continue to account for a majority of cases. All three cancers made up to 45% of total cases in the three years. Breast cancer is by far the number one cancer in women, while in men, hematologic malignancies and colon cancer dominate.

We continue to see an increased number of cancer cases in our younger population as 54% of our patients were under 60, and the peak incidence was between the ages of 50-59. This follows the national age distribution of cancer patients.

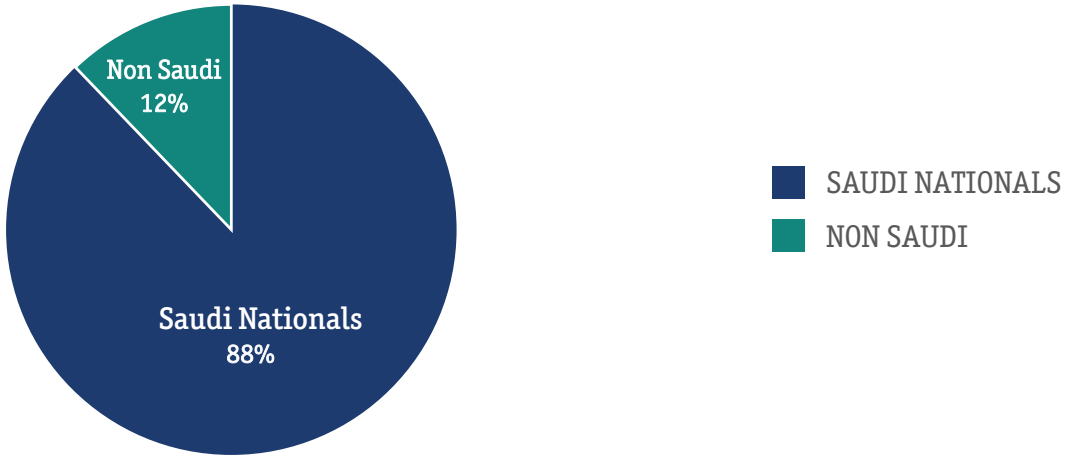
Over these three years, only 42% of all cases presented with localized disease, while more advanced disease (regional and metastatic) accounted for 50% of all cases. Of all the diagnosed cases in this period, 17% passed away from their cancer, 44% are alive and free of disease, while 38% are alive with disease. Our survival data is influenced by the high number of patients presenting late in their illness. The findings in this report should encourage us to stress screening campaigns and early detection in the general population.

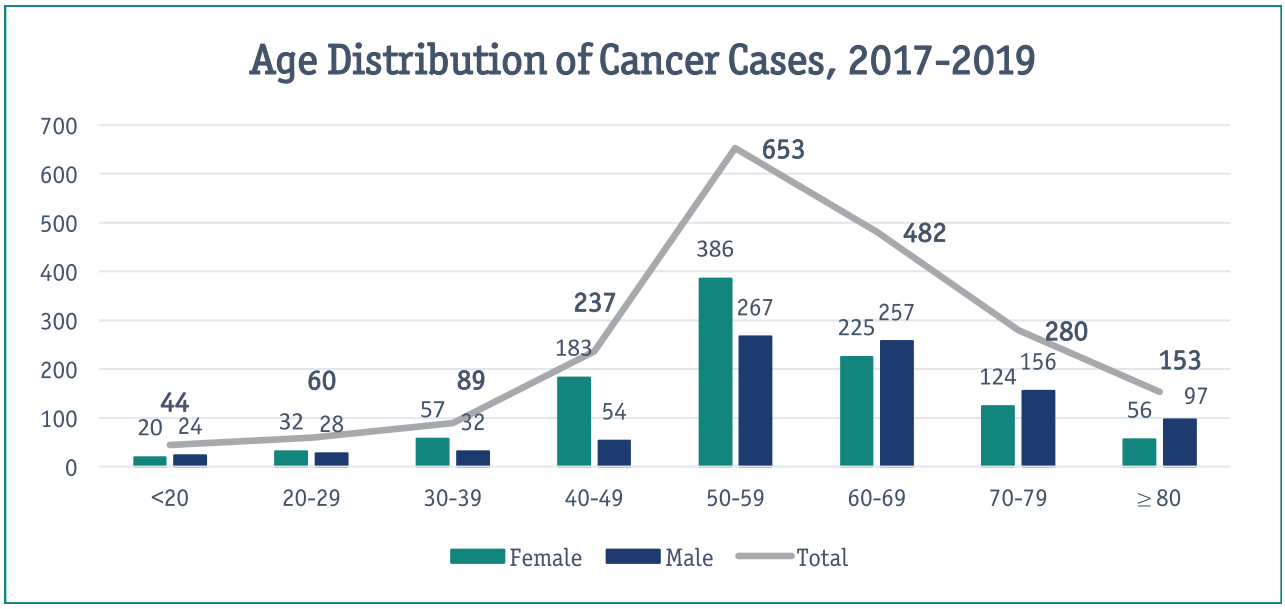


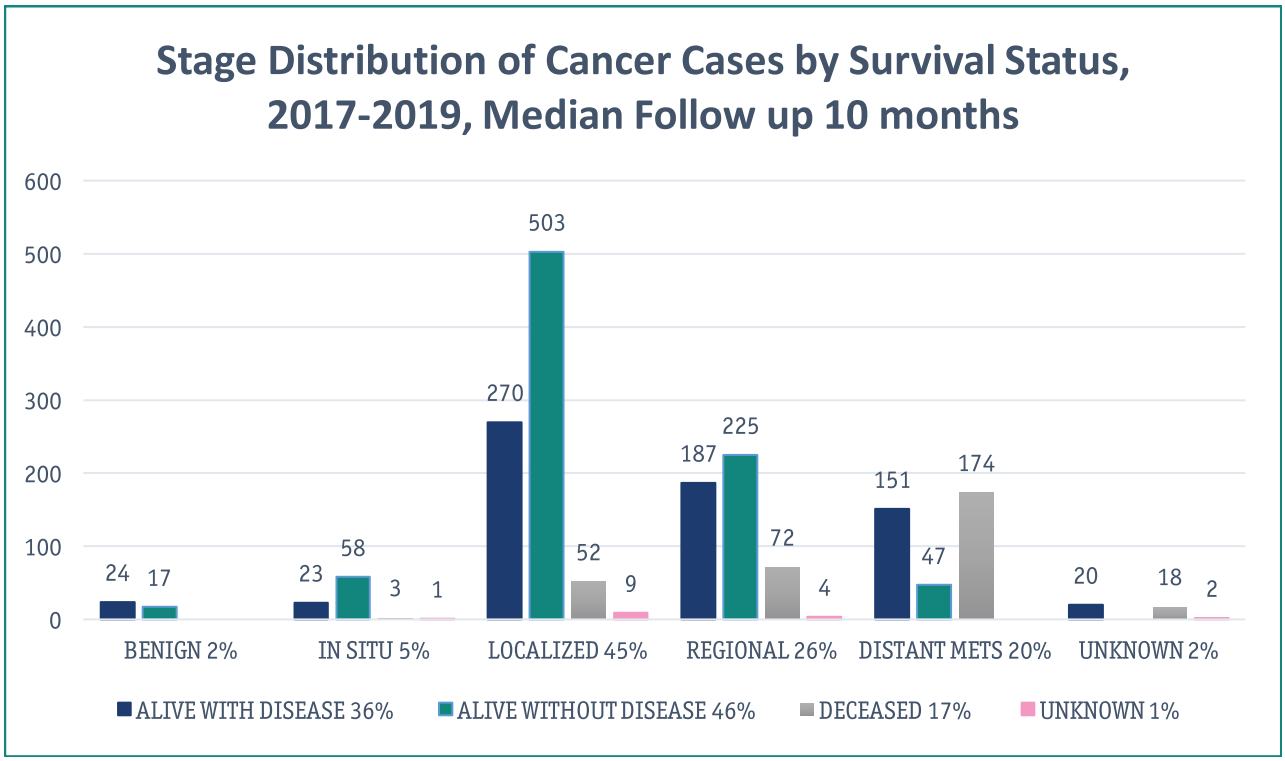
Gender Distribution of Cancer Cases, 2017-2019



Saudi Cancer Cases, 2017-2019







Note: Malignant Hematologic disorders are excluded from this chart as they are always considered systemic.

Cancer Incidence 2017-2019

SITE	2017	2018	2019	SUBTOTAL	TOTAL	%
BREAST	124	129	154		**407**	**20.4%**
HEMATOPOEITIC	86	83	93		**261**	**13.1%**
NON HODGKIN LYMPHOMA				96		
LEUKEMIA				78		
HEMA OTHER				49		
HODGKIN LYMPHOMA				25		
MULTIPLE MYELOMA				14		
COLON & RECTUM	97	75	73		**245**	**12.3%**
COLON				152		
RECTUM				93		
SKIN	52	42	37		**131**	**6.6%**
NON MELANOMA				121		
MELANOMA				10		
PROSTATE	47	37	43		**127**	**6.4%**
URINARY NON PROSTATE	45	42	39		**126**	**6.3%**
KIDNEY				71		
BLADDER				45		
TESTIS				8		
URETER				2		
THYROID	41	40	41		**122**	**6.1%**
LUNG & PLEURA	31	34	36		**101**	**5.1%**
FEMALE GENITAL	26	27	46		**99**	**5.0%**
CNS	28	23	38		**89**	**4.4%**
GI NON COLORECTAL	19	22	14		**55**	**2.8%**
SARCOMA & GIST	16	14	21		**51**	**2.6%**
SARCOMA				39		
GIST				12		
HEAD & NECK	13	17	13		**43**	**2.2%**
LIVER	20	10	12		**42**	**2.1%**
PANCREAS	14	13	15		**42**	**2.1%**
UNKNOWN PRIMARY SITE	5	8	9		**22**	**1.1%**
BILIARY DUCT	4	6	10		**20**	**1.0%**
THYMUS	3	1	2		**6**	**0.3%**
PITUITARY GLAND	1	1	3		**5**	**0.3%**
BONE			1		**1**	**0.1%**
PAROTID GLAND	1				**1**	**0.1%**
PERITONEUM			1		**1**	**0.1%**
Total	**673**	**624**	**701**		**1998**	

Note: There were 85 cases of basal cell carcinoma diagnosed and treated between 2019-2017. This relatively high number is because of the Saudi Aramco community›s multi-national population.

Cancer Incidence by Male 2017-2019

SITE	2017	2018	2019	SUBTOTAL	TOTAL	%
HEMATOPOEITIC	46	47	53		**146**	**15.9%**
NON HODGKIN LYMPHOMA				49		
LEUKEMIA				43		
HEMA OTHER				30		
HODGKIN LYMPHOMA				15		
MULTIPLE MYELOMA				9		
COLON & RECTUM	42	40	45		**127**	**13.9%**
COLON				76		
RECTUM				51		
PROSTATE	47	37	43		**127**	**13.9%**
URINARY NON PROSTATE	35	32	33		**100**	**10.9%**
KIDNEY				46		
BLADDER				44		
TESTIS				8		
URETER				2		
LUNG & PLEURA	24	30	27		**81**	**8.9%**
SKIN	28	30	19		**77**	**8.4%**
NON MELANOMA				72		
MELANOMA				5		
CNS	10	11	21		**42**	**4.6%**
THYROID	16	8	15		**39**	**4.3%**
GI NON COLORECTAL	12	14	7		**33**	**3.6%**
PANCREAS	10	8	11		**29**	**3.2%**
SARCOMA & GIST	9	5	13		**27**	**3.0%**
SARCOMA				20		
GIST				7		
HEAD & NECK	7	13	7		**27**	**3.0%**
LIVER	14	2	8		**24**	**2.6%**
BILIARY DUCT	3	3	6		**12**	**1.3%**
UNKNOWN PRIMARY SITE	1	6	3		**10**	**1.1%**
BREAST		2	3		**5**	**0.5%**
THYMUS	2	1	1		**4**	**0.4%**
PITUITARY GLAND	1		2		**3**	**0.3%**
BONE			1		**1**	**0.1%**
PERITONEUM			1		**1**	**0.1%**
Total	**307**	**289**	**319**		**915**	

Cancer Incidence by Female 2017-2019

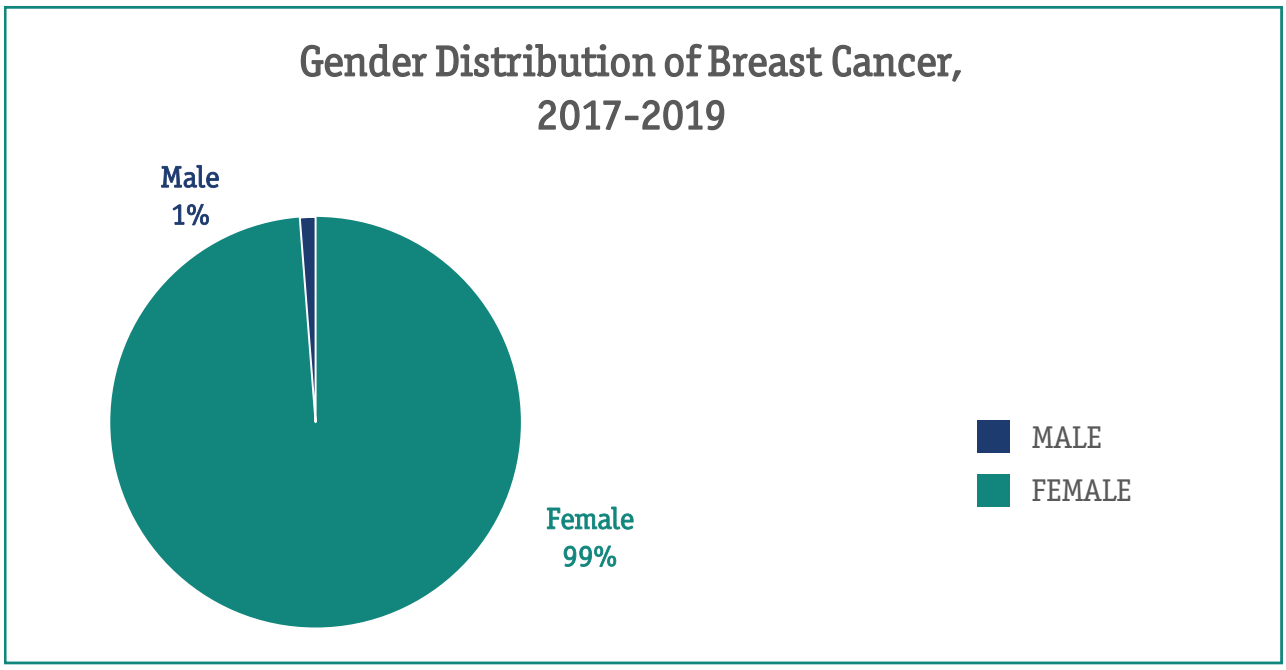
SITE	2017	2018	2019	SUBTOTAL	TOTAL	%
BREAST	124	127	151		**402**	**37.2%**
COLON & RECTUM	55	35	28		**118**	**10.9%**
COLON				76		
RECTUM				42		
HEMATOPOEITIC	40	36	40		**116**	**10.7%**
NON HODGKIN LYMPHOMA				47		
LEUKEMIA				35		
HEMA OTHER				19		
HODGKIN LYMPHOMA				10		
MULTIPLE MYELOMA				5		
FEMALE GENITAL	26	27	46		**99**	**9.1%**
THYROID	25	32	26		**83**	**7.7%**
SKIN	24	12	18		**54**	**5.0%**
NON MELANOMA				49		
MELANOMA				5		
CNS	18	12	17		**47**	**4.3%**
SARCOMA & GIST	7	9	8		**24**	**2.2%**
SARCOMA				19		
GIST				5		
URINARY NON PROSTATE	10	10	6		**26**	**2.4%**
KIDNEY				25		
BLADDER				1		
GI NON COLORECTAL	7	8	7		**22**	**2.0%**
LUNG & PLEURA	7	4	9		**20**	**1.8%**
LIVER	6	8	4		**18**	**1.7%**
HEAD & NECK	6	4	6		**16**	**1.5%**
PANCREAS	4	5	4		**13**	**1.2%**
UNKNOWN PRIMARY SITE	4	2	6		**12**	**1.1%**
BILIARY DUCT	1	3	4		**8**	**0.7%**
PITUITARY GLAND		1	1		**2**	**0.2%**
THYMUS	1		1		**2**	**0.2%**
PAROTID GLAND	1				**1**	**0.1%**
Total	**366**	**335**	**382**		**1083**	

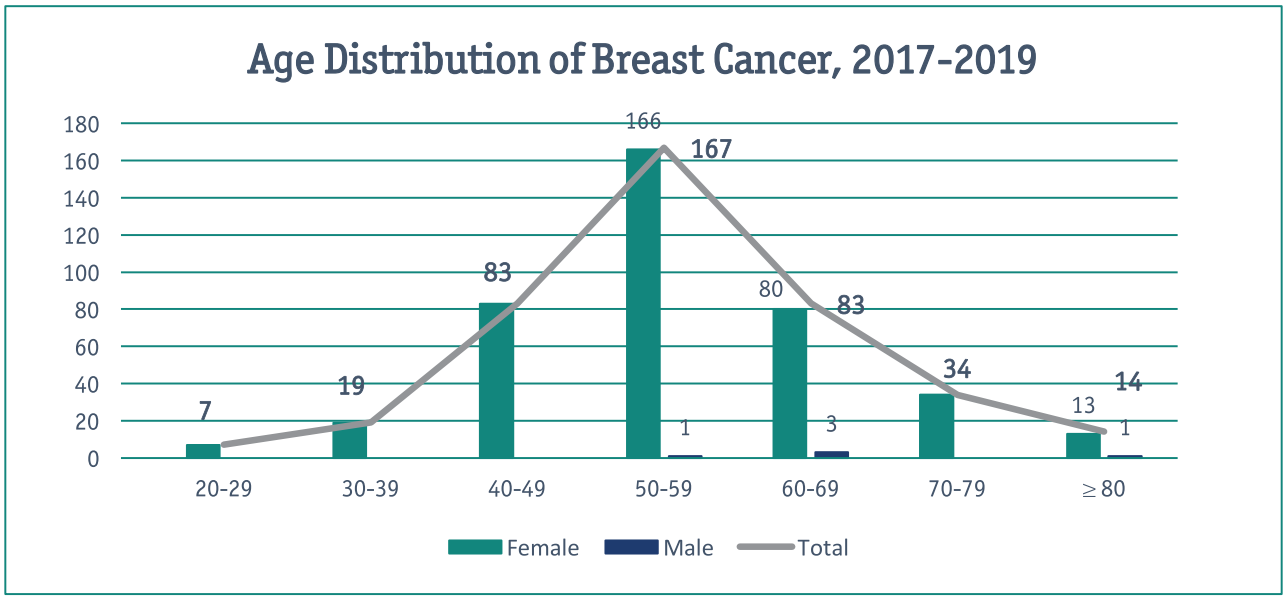
Five Most Common Cancers 2019

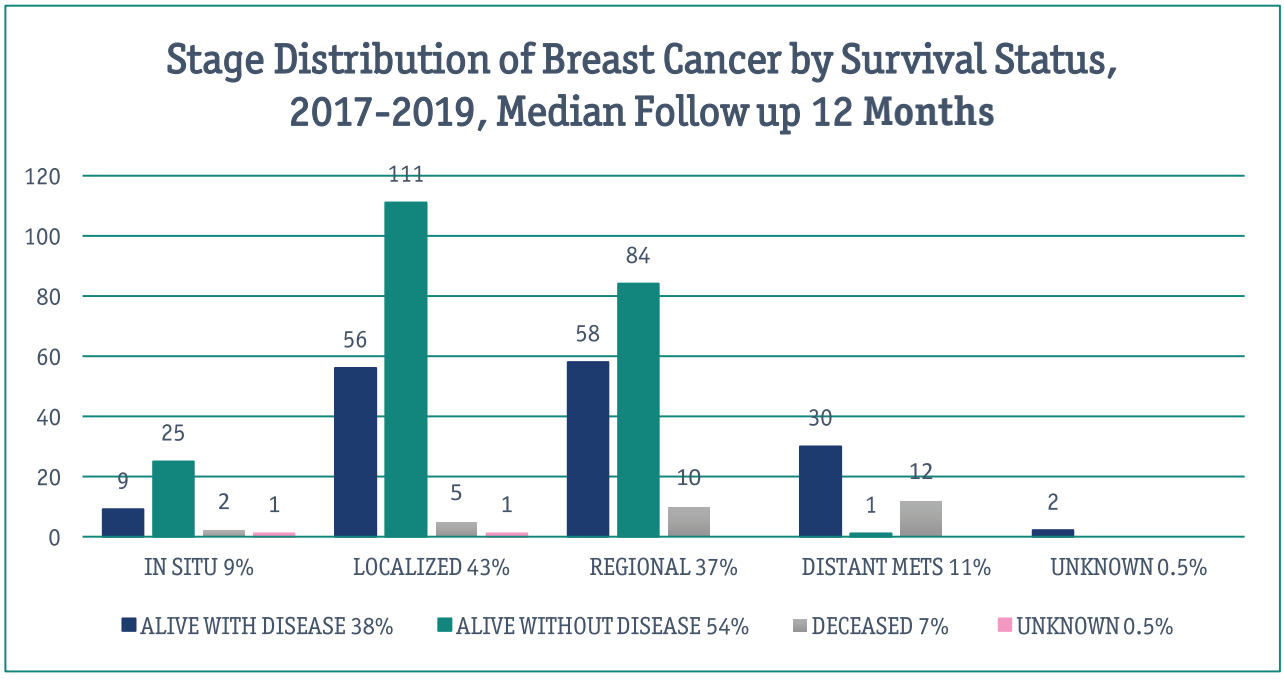
1. Breast Cancer

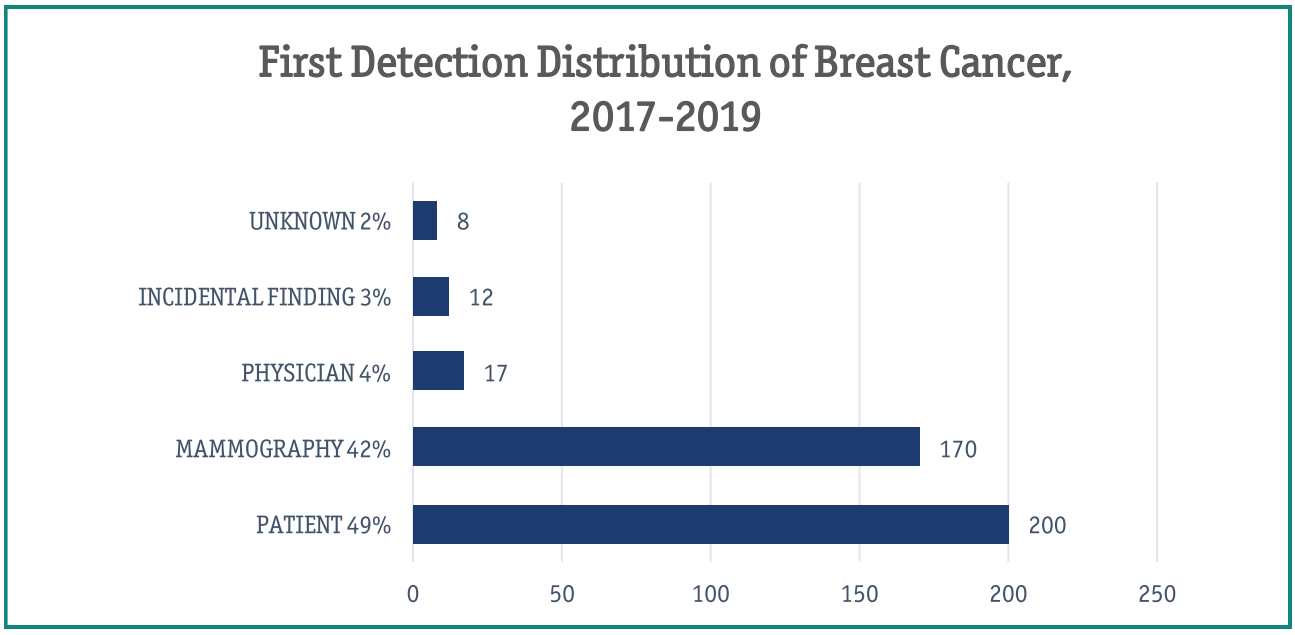
Gender distribution is consistent with historical and international data. The age distribution is also consistent with institutional historical data and national data, with the most affected age group being 50-59. Stage Distribution between 2017 and 2019 continues to show that the majority of the patients are diagnosed with localized disease followed by regional disease, and a minority of patients are diagnosed with de novo stage IV in around 10% of the patients' population who presented with distant metastasis at the time of diagnosis.

A mammogram is the primary method of detecting breast cancer in asymptomatic patients - in about half of the patient population between 2017-2019. Histological subtypes of breast cancer are consistent with national and international data, with the most breast cancer subtypes being invasive ductal carcinoma, followed by lobular carcinoma. Other various rare subtypes registered in less than 10% of the total patient population.




Age Distribution of Breast Cancer, 2017-2019
180
160
140
120
100
80
60
40
20
0
7
19
83
166
167
1
80
83
3
34
13
14
1
20-29
30-39
40-49
50-59
60-69
70-79
≥80
Female
Male
Total


Stage Distribution of Breast Cancer by Survival Status, 2017-2019, Median Follow up 12 Months
120
100
80
60
40
20
0
9
25
2
1
56
111
5
1
58
84
10
30
1
12
2
IN SITU 9%
LOCALIZED 43%
REGIONAL 37%
DISTANT METS 11%
UNKNOWN 0.5%
ALIVE WITH DISEASE 38%
ALIVE WITHOUT DISEASE 54%
DECEASED 7%
UNKNOWN 0.5%



Note: 6% of our breast cancer patients are under 40, and a mammogram does not usually detect these.

Distribution of Breast Cancer Cases by Morphology, 2017-2019

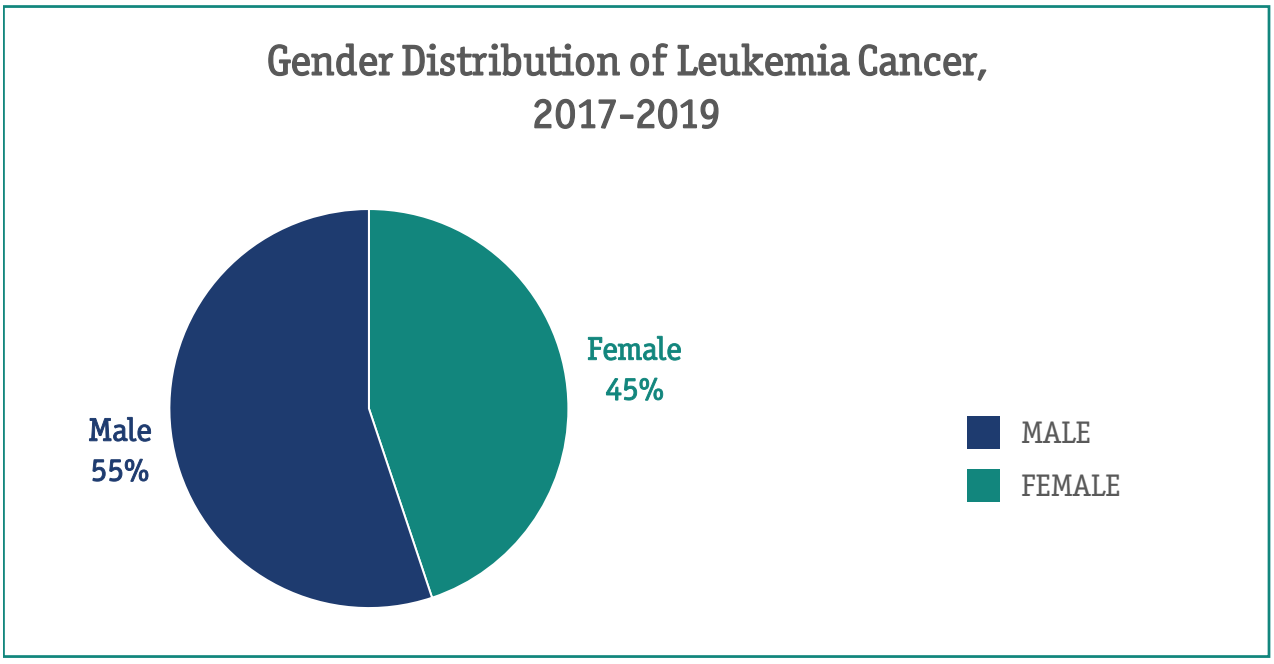
Morphology	2017	2018	2019	Total	%
INVASIVE DUCTAL CARCINOMA	96	102	118	**316**	**78%**
INVASIVE LOBULAR CARCINOMA	12	12	14	**38**	**9.3%**
DUCTAL CARCINOMA IN SITU	8	11	11	**30**	**7.4%**
INFILTRATING DUCT AND LOBULAR CARCINOMA	2	1	5	**8**	**2.0%**
LOBULAR CARCINOMA IN SITU	2		4	**6**	**1.5%**
CARCINOMA NOS	2	1		**3**	**0.7%**
NEOPLASM MALIGNANT		1	1	**2**	**0.5%**
NEUROENDOCRINE CARCINOMA	2			**2**	**0.5%**
DUCTAL CARCINOMA IN SITU AND LOBULAR CARCINOMA IN SITU			1	**1**	**0.2%**
PHYLLODES TUMOR MALIGNANT		1		**1**	**0.2%**
Total	**124**	**129**	**154**	**407**	

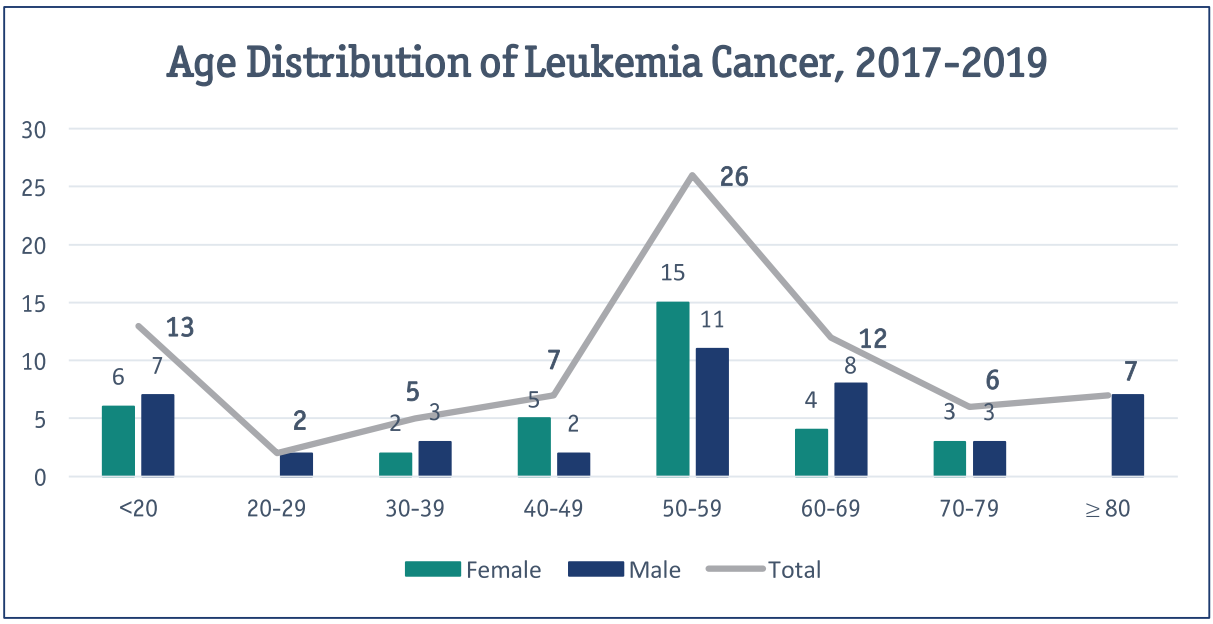
2. Hematologic Malignancies

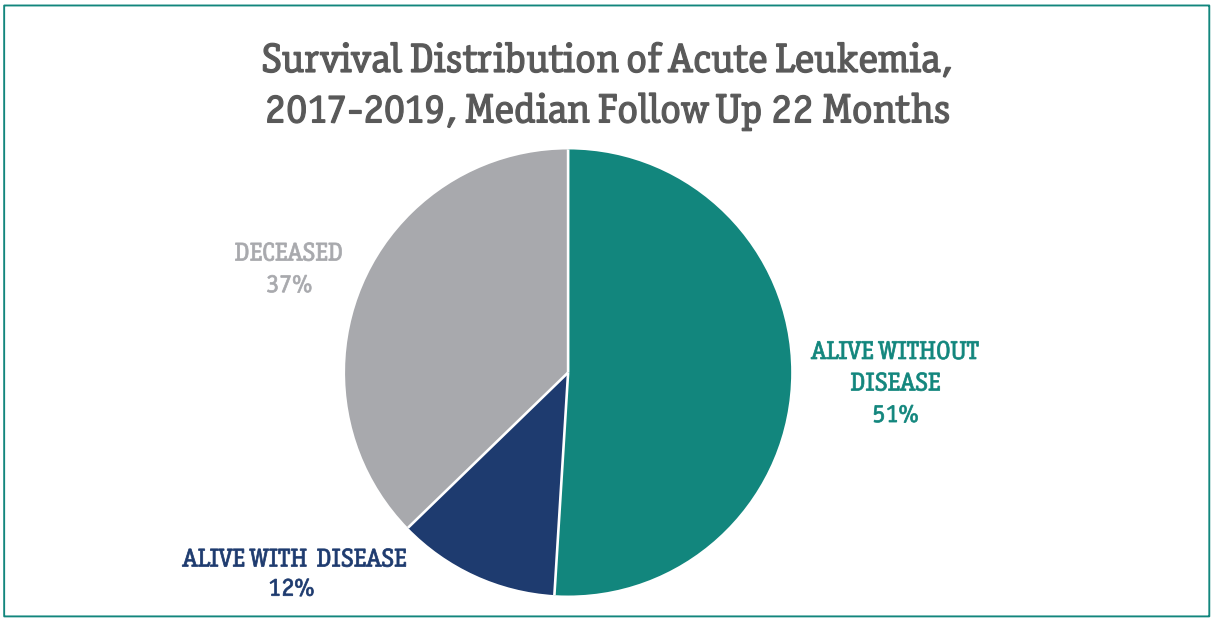
Leukemia

From 2017 to 2019, there were a total of 78 adult and pediatric leukemia cases. More males (55%) were diagnosed with leukemia compared to females (45%). As expected, patients with leukemia peak age are 40-70 years old. Almost two-thirds of the cases were acute leukemia, and one-third were chronic leukemia. The JHAH oncology unit looked after 51 new acute leukemia cases, 38 were adult acute leukemia with the majority of myeloid leukemia (71%), and only 8 cases (21%) were acute lymphoblastic leukemia. The majority of the chronic leukemias were chronic lymphocytic leukemia. Hairy cell leukemia is a rare subtype; hence it is not surprising not to diagnose any cases in 2019.

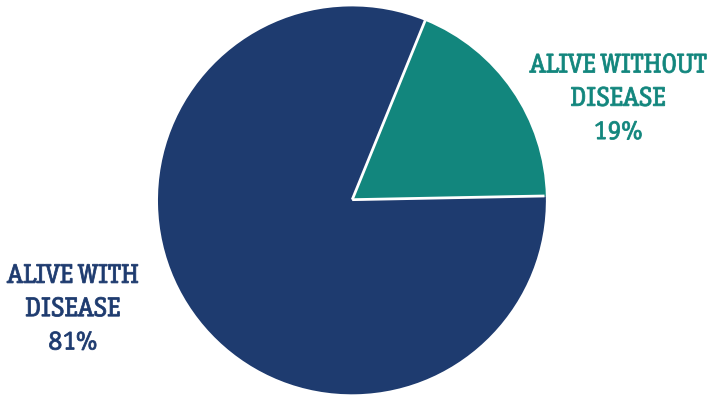
The therapy outcome for acute leukemia is hard to sum in one group, and the numbers are too small to draw solid conclusions.




Age Distribution of Leukemia Cancer, 2017-2019
30
25
20
15
10
5
0
6
7
13
2
2
3
5
5
2
7
15
11
26
4
8
12
3
3
6
7
<20
20-29
30-39
40-49
50-59
60-69
70-79
≥80
Female
Male
Total

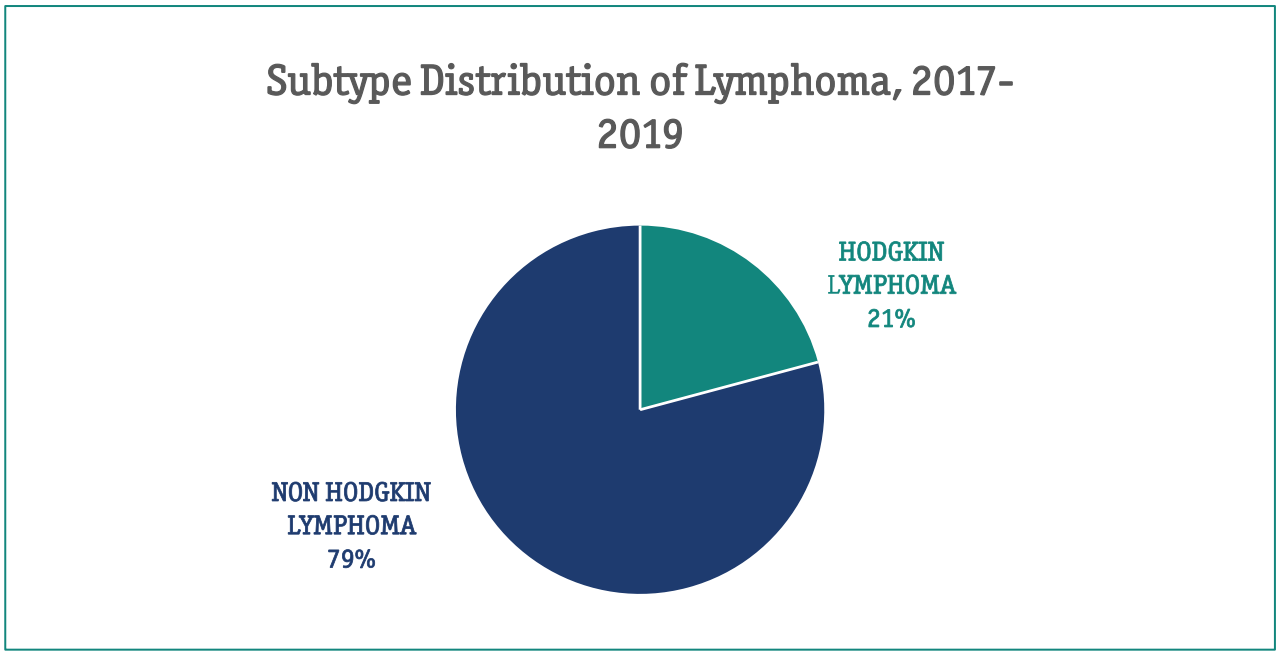

Survival Distribution of Acute Leukemia, 2017-2019, Median Follow Up 22 Months
DECEASED
37%
ALIVE WITHOUT DISEASE
51%
ALIVE WITH DISEASE
12%

Survival Distribution of Chronic Leukemia, 2017-2019, Median Follow Up 9 Months



LEUKEMIA SUBTYPE	2017	2018	2019	TOTAL	%
ACUTE MYELOID LEUKEMIA	11	8	11	**30**	**38%**
ACUTE LYMPHOBLASTIC LEUKEMIA	8	5	4	**17**	**22%**
CHRONIC LYMPHOCYTIC LEUKEMIA	5	6	5	**16**	**21%**
CHRONIC MYELOID LEUKEMIA	5	2	1	**8**	**10%**
ACUTE PROMYELOCYTIC LEUKEMIA	1		2	**3**	**4%**
HAIRY CELL LEUKEMIA		3		**3**	**4%**
BURKITT CELL LEUKEMIA			1	**1**	**1%**
Total	**30**	**24**	**24**	**78**	

Lymphoma

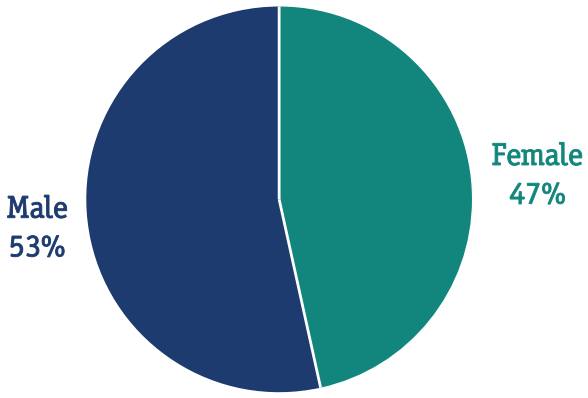


Non-Hodgkin Lymphoma (NHL)

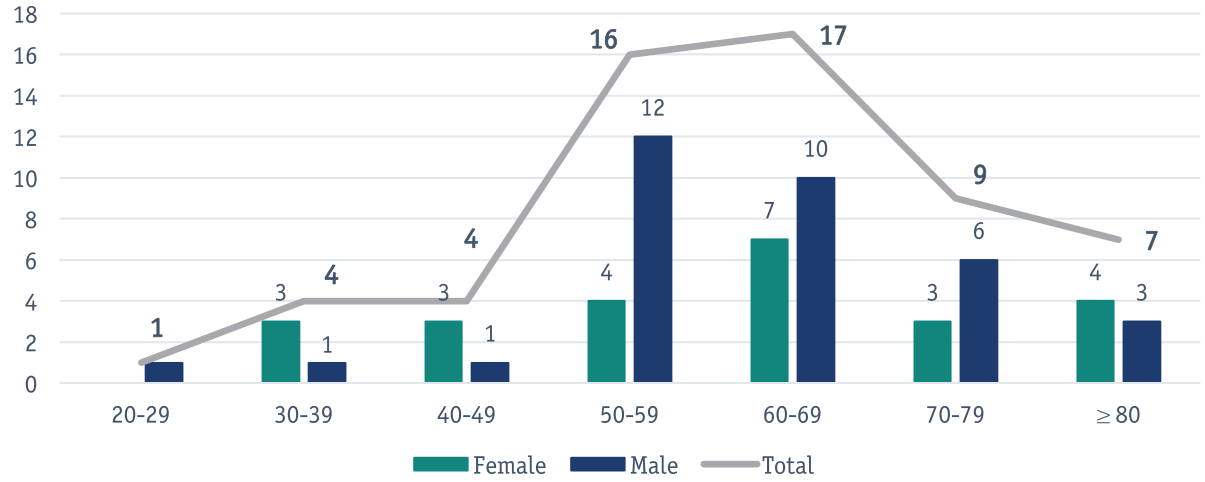
As expected, the most common non-Hodgkin lymphoma subtypes are diffuse large B-cell lymphoma (DLBCL) and follicular lymphoma (FL), comprising 60% of non-Hodgkin lymphoma cases.

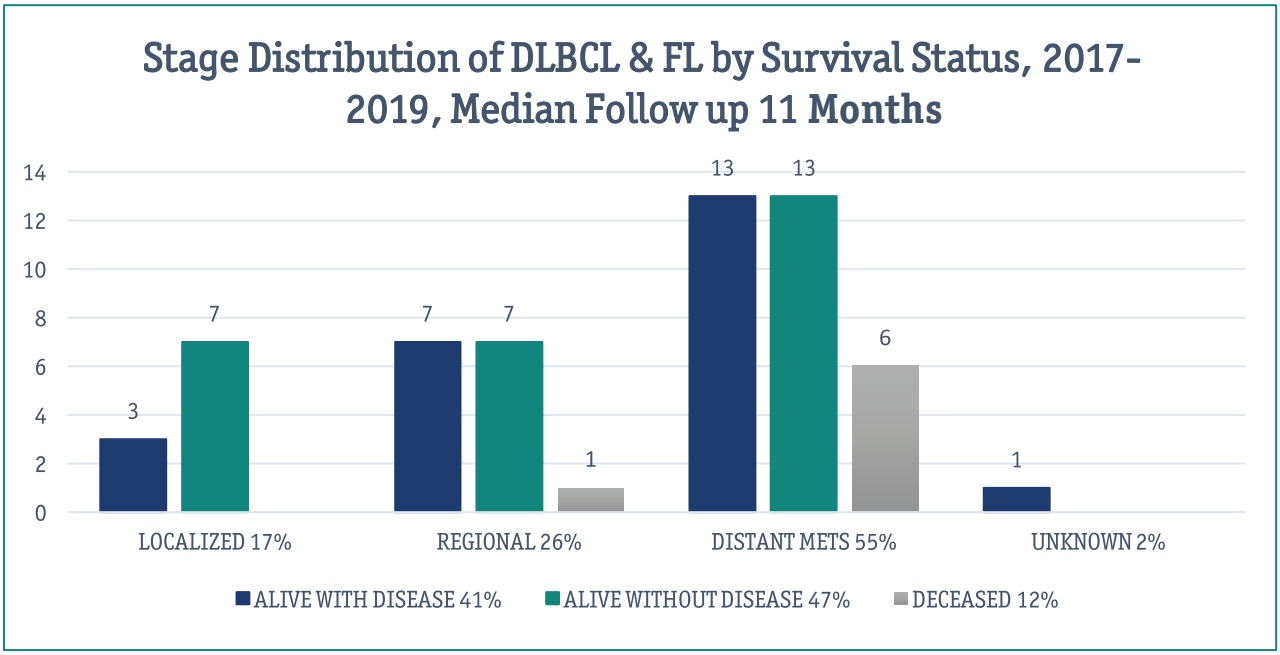
In 2017 to 2019, our center diagnosed three cases with uncommon histology patterns: 1 case of subcutaneous panniculitis-like T-cell lymphoma and 2 cases of angioimmunoblastic t-cell lymphoma. Almost 84% of the DLBCL and FL were in the age group older than 50. The majority of the DLBCL and FL had advanced disease, with only 40% alive without disease. Patients with early disease had a very good outcome as all were alive.

Gender Distribution of DLBCL & FL, 2017- 2019



Age Distribution of DLBCL & FL, 2017-2019





Distribution of Leukemia Cancer Cases by Subtype, 2017-2019

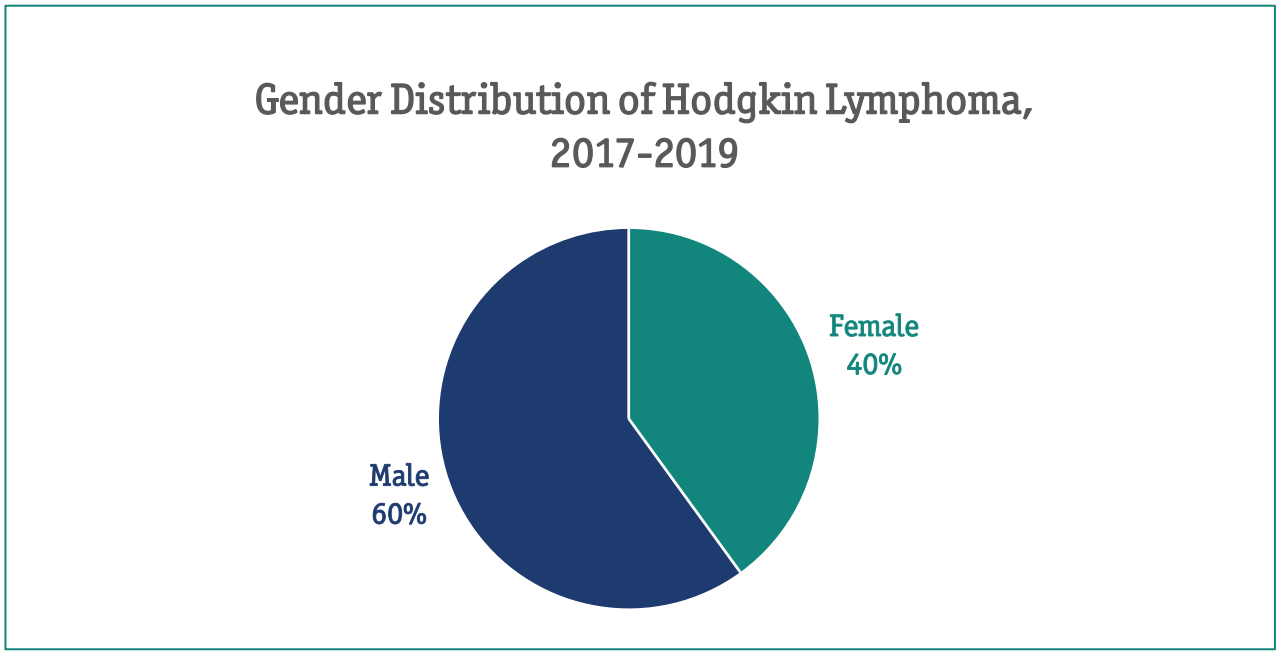
Morphology	2017	2018	2019	Total	%
DIFFUSE LARGE B-CELL LYMPHOMA	8	11	14	**33**	**34%**
FOLLICULAR LYMPHOMA	10	9	6	**25**	**26%**
CUTANEOUS T-CELL LYMPHOMA	2	5	4	**11**	**11%**
MARGINAL ZONE B-CELL LYMPHOMA	1	4	2	**7**	**7%**
NON-HODGKIN LYMPHOMA NOS	1	2	2	**5**	**5%**
MANTLE CELL LYMPHOMA		3	2	**5**	**5%**
SMALL LYMPHOCYTIC LYMPHOMA	1		2	**3**	**3%**
LYMPHOBLASTIC LYMPHOMA	1		2	**3**	**3%**
ANGIOIMMUNOBLASTIC T-CELL LYMPHOMA			2	**2**	**2%**
LYMPHOPLASMACYTIC LYMPHOMA	1			**1**	**1%**
BURKITT LYMPHOMA		1		**1**	**1%**
Total	**25**	**35**	**36**	**96**	

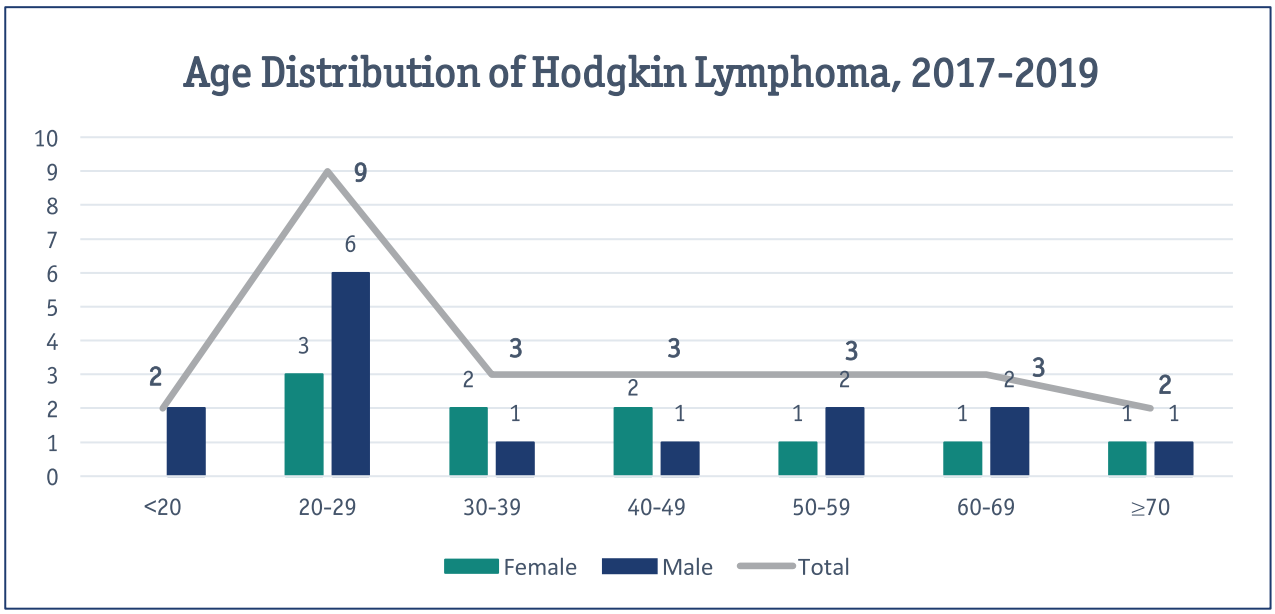
Hodgkin Lymphoma (HL)

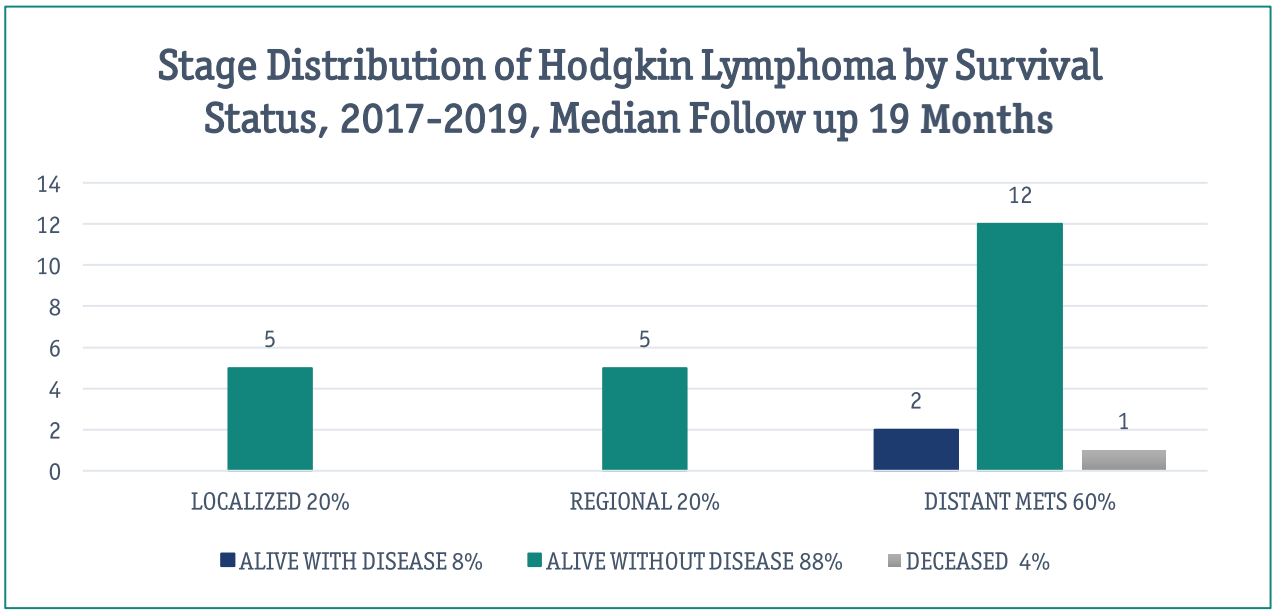
In 2017 to 2019, 21% of all lymphomas were Hodgkin lymphoma, higher than the 10% reported by the USA and European registries. However, nodular lymphocyte-predominant Hodgkin lymphoma (NLPHL) constitutes 20% of all Hodgkin lymphoma, which is higher than the reported 10% in the western population.

The literature describes a bimodal distribution of Hodgkin lymphoma as our database is relatively small in number, and many retirees leave the JHAH system to other institutions. This may explain the lack of a late age peak. Hodgkin Lymphoma affects more males than females.

The outcome of Hodgkin lymphoma is good in the three years, from 2017-2019. 88% of Hodgkin lymphoma patients are alive and free of cancer, with only one patient passing away. As expected, the two patients that are alive with the disease have the diagnosis of NLPHL. As in economically developed countries, nodular sclerosis classic Hodgkin lymphoma is the most frequent subtype in about 70% of the cases, followed by mixed cellularity subtype in 15%. Current treatment standards do not differ based on histology subtypes of classic Hodgkin lymphoma.







Distribution of Hodgkin Lymphoma Cases by Morphology, 2017-2019

Morphology	2017	2018	2019	Total	%
HODGKIN LYMPHOMA NODULAR SCLEROSIS NOS	4	8	2	**14**	**56%**
HODGKIN LYMPHOMA NODULAR LYMPHOCYTE PREDOMINANCE	2		3	**5**	**20%**
HODGKIN LYMPHOMA MIXED CELLULARITY NOS	2	1		**3**	**12%**
HODGKIN LYMPHOMA NOS	1	1	1	**3**	**12%**
Total	**9**	**10**	**6**	**25**	

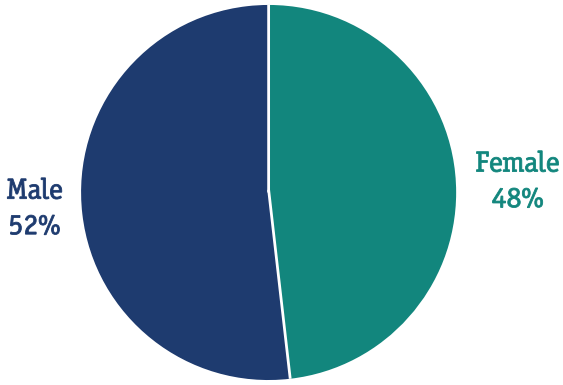
3. Colorectal Cancer

There were 97, 75, 72 cases of colorectal cancers reported in 2017, 2018 and 2019, respectively. There has been a gradual increase in the percentage of male to female with colorectal cancer that needs observation. There has been no significant change in the colorectal cancer site distribution over the last three years. As far as age distribution goes, there has been no significant change over the last three years, and most of the cases diagnosed were between the ages of 50-69.

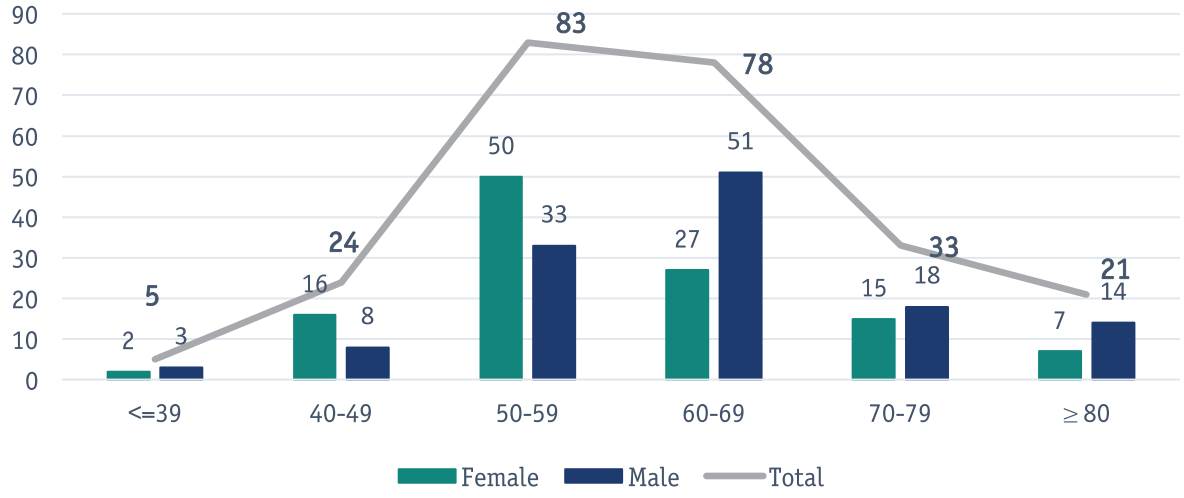
As expected, most of the patients with metastatic disease diagnosed in 2017 are deceased. The percentage of deceased patients went down gradually in 2018 and 2019 but is expected to go up with time, keeping with the natural history of metastatic disease.

As far as patients with localized and regional disease, the majority of the patients diagnosed in the years 2017 and 2018 are alive without disease, while patients diagnosed in 2019 are still alive with disease, which likely reflects that they are still undergoing treatment. Unfortunately, the majority of patients are diagnosed with diagnostic colonoscopy because of symptoms and not during routine screening colonoscopies. This explains why more patients are diagnosed with regional and metastatic disease at the time of initial presentation.
There have been no significant gender-related discrepancies in the pathological subtype distribution.

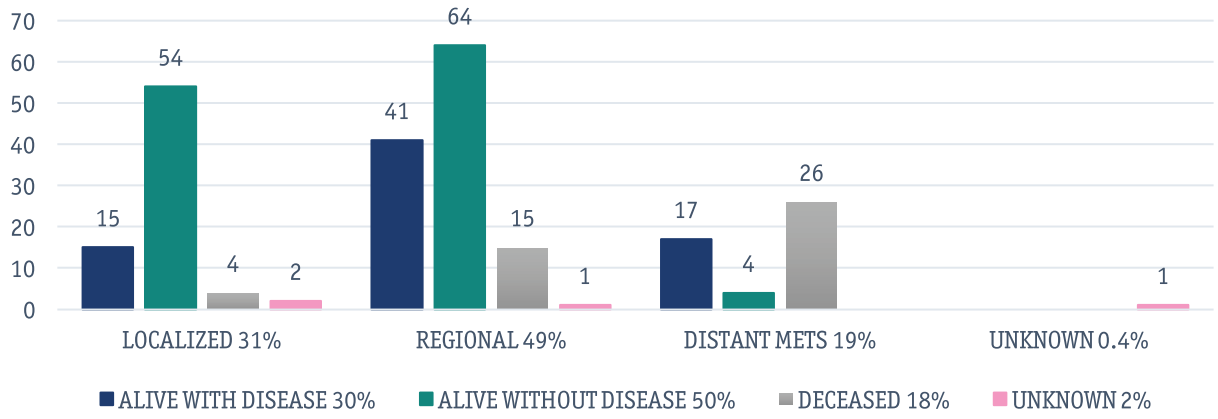
Gender Distribution of Colorectal Cancer, 2017-2019



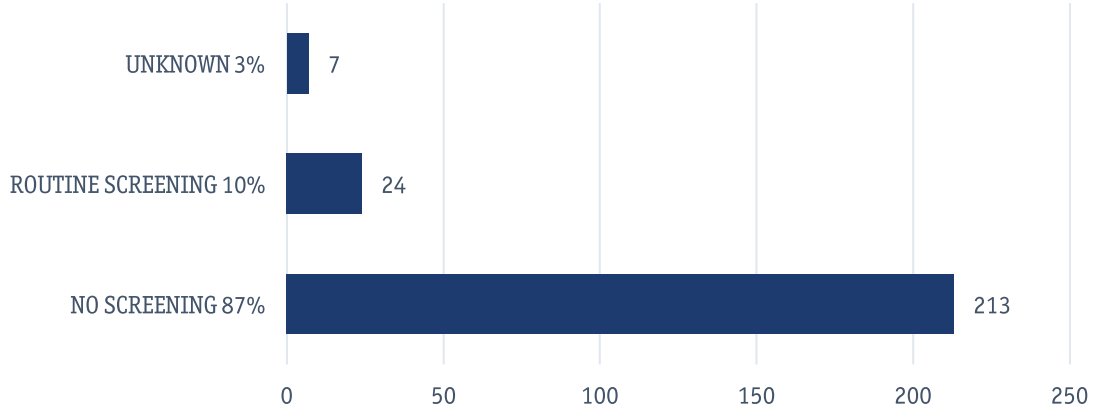
Age Distribution of Colorectal Cancer, 2017-2019



Stage Distribution of Colorectal Cancer by Survival Status, 2017-2019, Median Follow up 12 Months



Routine Screening Distribution of Colon Cancer, 2017-2019



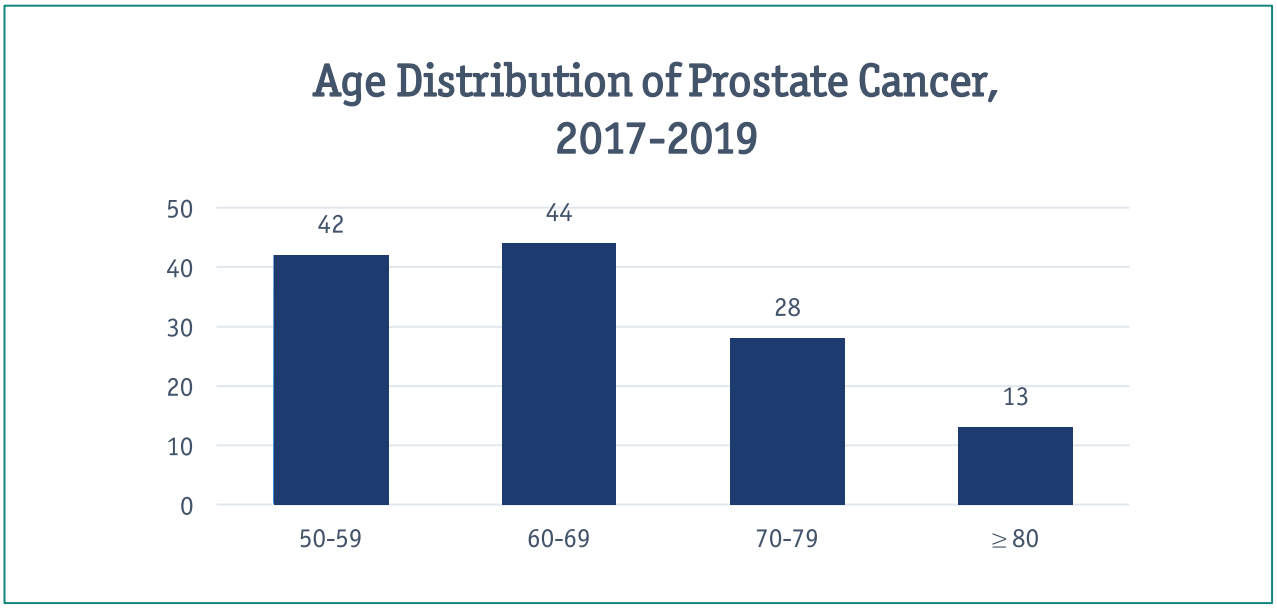
Distribution of Colorectal Cancer Cases by Morphology, 2017-2019

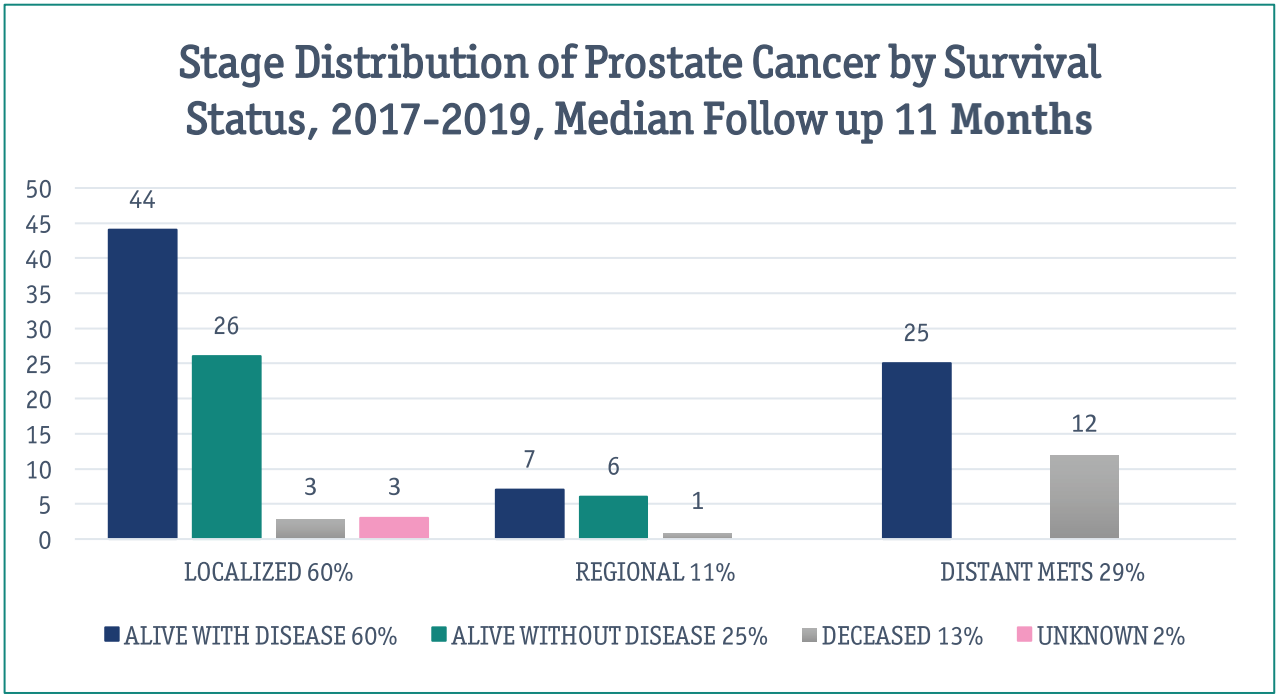
Morphology	2017	2018	2019	Total	%
ADENOCARCINOMA	95	73	70	**238**	**98%**
NEUROENDOCRINE CARCINOMA	1	2	1	**4**	**2%**
NEOPLASM MALIGNANT NOS	1		1	**2**	**1%**
Total	**97**	**75**	**72**	**244**	**3**

4. Prostate Cancer

Prostate cancer remains one of the most common cancers in men, both in the KSA and worldwide. As illustrated by the age group distribution, prostate cancer remains a disease of older men.

Like all cancers, survival is better in the earlier stage at diagnosis. While screening for prostate cancer is still considered controversial, it should be discussed with the patient, considering the potential benefit to particular patient groups.



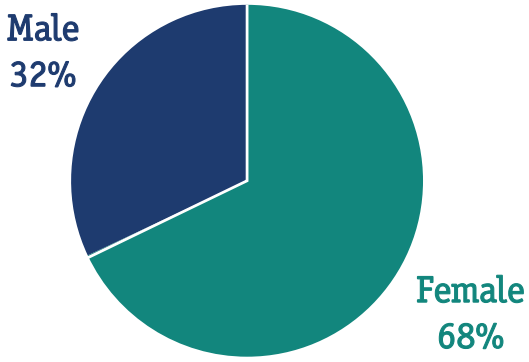


5. Thyroid Cancer

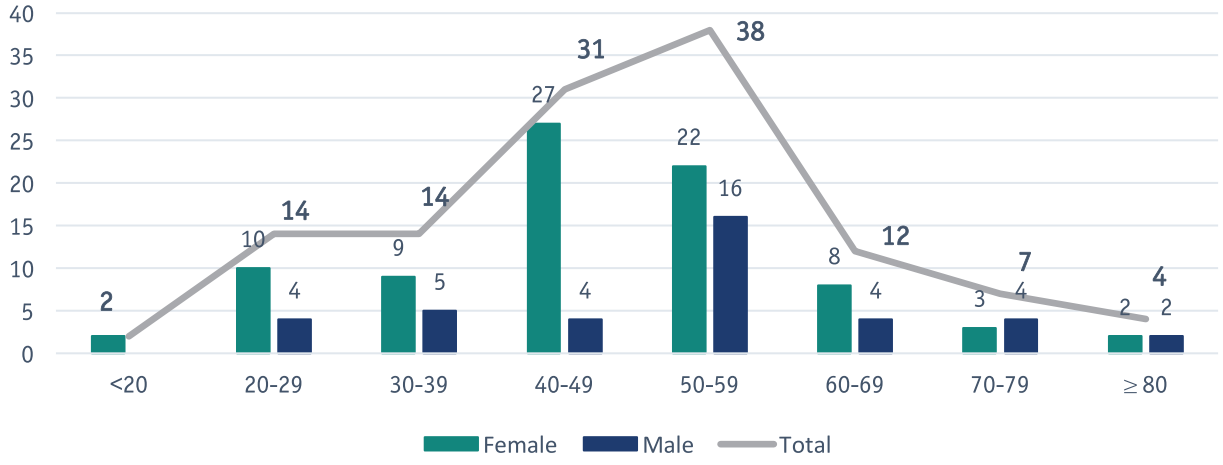
During the 2017-2019 period, thyroid cancer was reported as the 7th most common cancer at JHAH with 62-80% female predominance making it the 5th most common cancer in females (7.7%) and 8th most common cancer in males (4.3%).

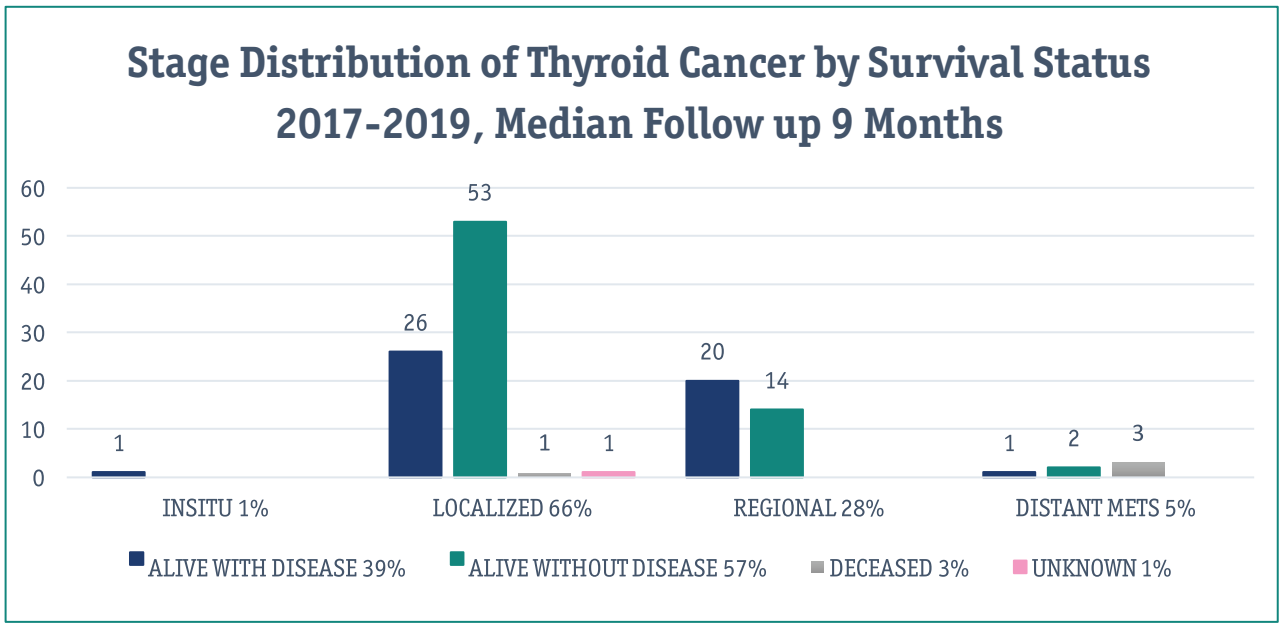
Thyroid cancer in adults was reported in all age groups, yet the highest incidence was in 40-49 (23-27%) and 50-59 (23-41%) age groups. Most thyroid cancer cases were localized (25-28%) and regional (8-13%). Papillary thyroid cancer was the major type of thyroid cancer at JHAH (82%), with very good prognosis and survival rate.

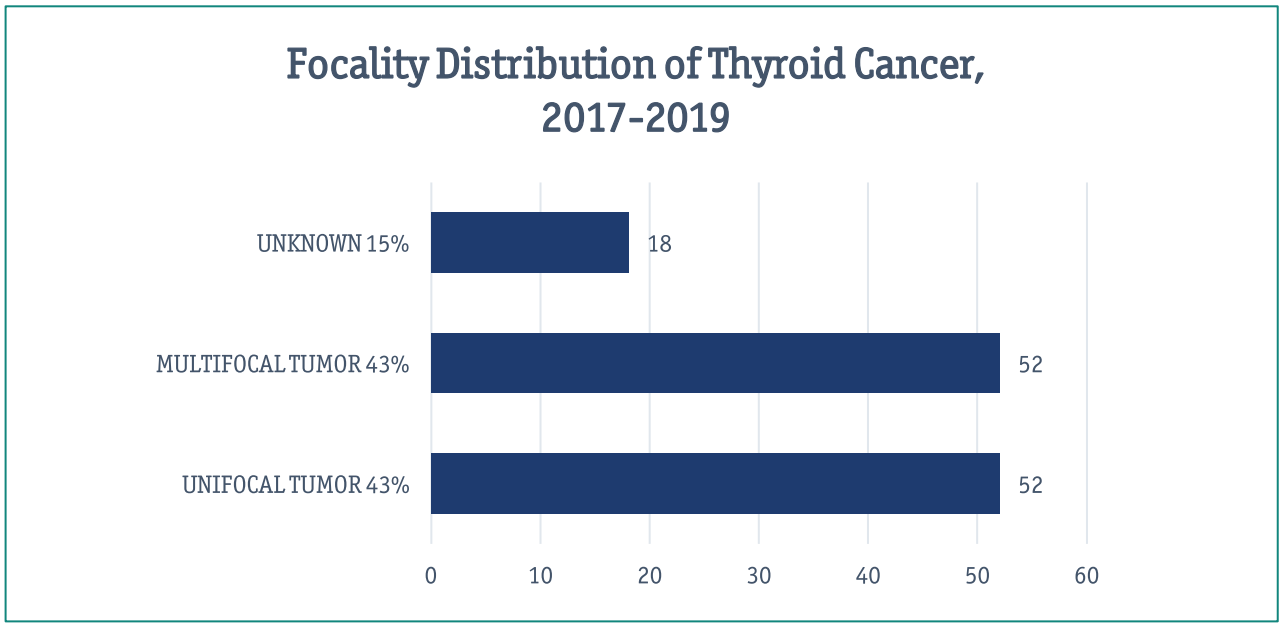
Gender Distribution of Thyroid Cancer, 2017-2019



Age Distribution of Thyroid Cancer, 2017-2019




Stage Distribution of Thyroid Cancer by Survival Status
2017-2019, Median Follow up 9 Months
60
50
40
30
20
10
0
1
26
53
1
1
20
14
1
2
3
INSITU 1%
LOCALIZED 66%
REGIONAL 28%
DISTANT METS 5%
ALIVE WITH DISEASE 39%
ALIVE WITHOUT DISEASE 57%
DECEASED 3%
UNKNOWN 1%


Focality Distribution of Thyroid Cancer,
2017-2019
UNKNOWN 15%
18
MULTIFOCAL TUMOR 43%
52
UNIFOCAL TUMOR 43%
52
0
10
20
30
40
50
60

Morphology Distribution of Thyroid Cancer Cases by Stage, 2017-2019

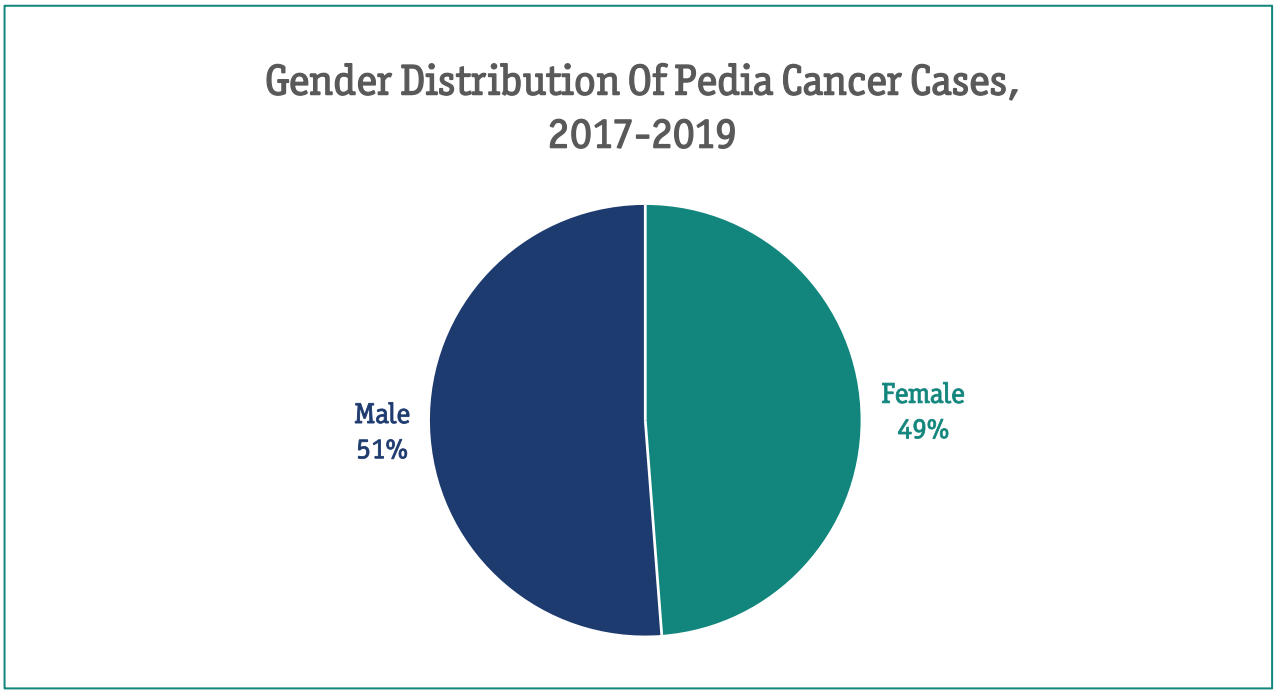
Morphology	ALIVE WITH DISEASE	ALIVE WITHOUT DISEASE	DECEASED	UNKNOWN	Total	%
PAPILLARY CARCINOMA	42	57		1	**100**	**83%**
OXYPHILIC ADENOCARCINOMA	2	4			**6**	**5%**
FOLLICULAR CARCINOMA	1	4			**5**	**4%**
CARCINOMA ANAPLASTIC	1		2		**3**	**3%**
NONENCAPSULATED SCLEROSING CARCINOMA	1	1			**2**	**2%**
CARCINOMA NOS			1		**1**	**1%**
MEDULLARY CARCINOMA		1			**1**	**1%**
PSEUDOSARCOMATOUS CARCINOMA			1		**1**	**1%**
NON-INVASIVE FOLLICULAR THYROID NEOPLASM	1				**1**	**1%**
	48	**67**	**4**	**1**	**120**	

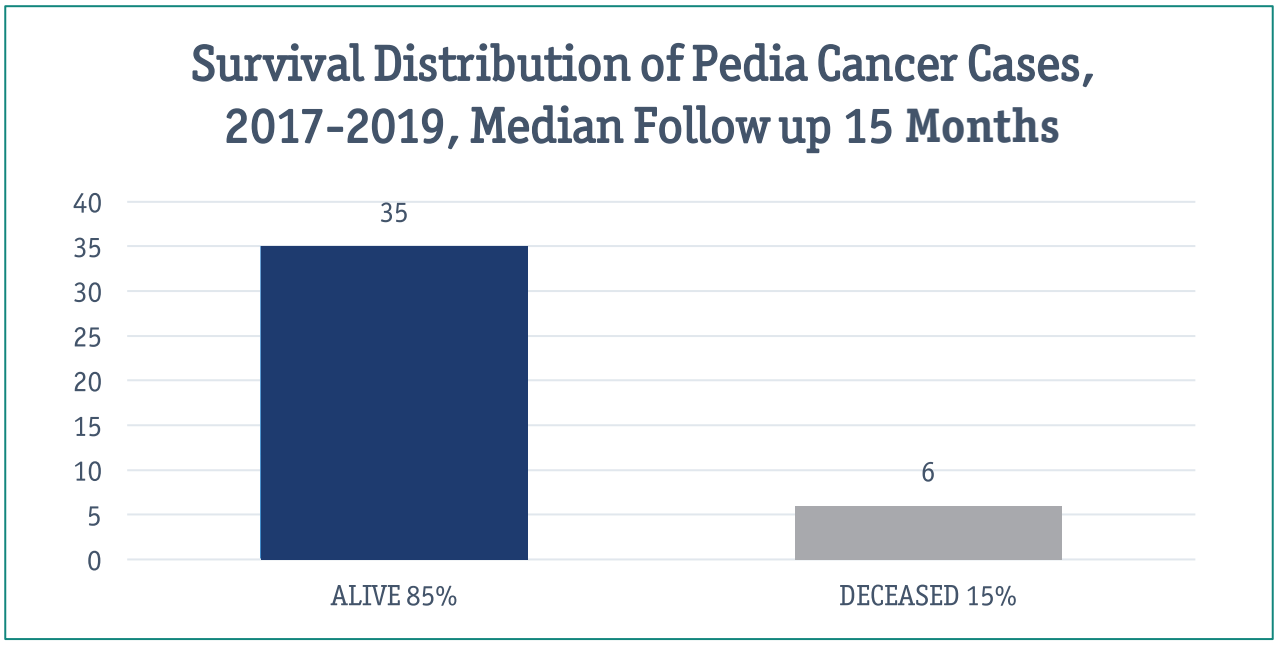
Oncology Institute Spotlight 2017

Pediatrics

Despite being an uncommon disorder, childhood cancer still constitutes a significant cause of death in children. Fortunately, modern medicine has made giant leaps in finding cures and enhancing survival for children with cancer. Childhood cancer diagnosis is extremely distressing and causes severe disturbance in family life. Strong support for the patient and family with easy access to the treating team and answers to their questions are essential parts of management. At JHAH, we are proud to be patient-centered, and we ensure that our patients have direct access throughout their treatment journey.

From 2017 to 2019, 41 cases of childhood cancer were reported at JHAH. Of these, 51% were male and 49% were female compared to 58% males and 42% female in international data. The overall survival rate was around 85%. At 31% of cases, leukemia was the most common childhood cancer at JHAH, again similar to numbers in the USA and KSA at 31% and 34% respectively, where childhood leukemia is also the most common cause of childhood cancer.





Morphology Distribution of Pedia Cancer Cases, 2017-2019

Morphology	2017	2018	2019	Total	%
B LYMPHOBLASTIC LEUKEMIA	3	3	3	**9**	**22%**
ASTROCYTOMA	2		5	**7**	**17%**
NEUROBLASTOMA	1	3	1	**5**	**12%**
ACUTE MYELOID LEUKEMIA	1	1	1	**3**	**7%**
MEDULLOBLASTOMA			2	**2**	**5%**
EWING SARCOMA		1	1	**2**	**5%**
EMBRYONAL RHABDOMYOSARCOMA	1		1	**2**	**5%**
HODGKIN LYMPHOMA		2		**2**	**5%**
LANGERHANS CELL HISTIOCYTOSIS			1	**1**	**2%**
PAPILLARY ADENOCARCINOMA			1	**1**	**2%**
PAPILLARY MICROCARCINOMA			1	**1**	**2%**
RETINOBLASTOMA			1	**1**	**2%**
SUBCUTANEOUS PANNICULITIS-LIKE T-CELL LYMPHOMA			1	**1**	**2%**
MUCINOUS CYSTADENOCARCINOMA		1		**1**	**2%**
MYCOSIS FUNGOIDES		1		**1**	**2%**
MIXED PHENOTYPE ACUTE LEUKEMIA, B/MYELOID	1			**1**	**2%**
EPITHELIOID CELL MELANOMA	1			**1**	**2%**
Total	**10**	**12**	**19**	**41**	

Conclusion

The JHAH Oncology Institute places the patient and family at the center of care from the initial encounter through survivorship and palliative care.
Our staff uses the Partners in Care Model to ensure quality and continuity of care. All institute staff, including physicians, OCN (Oncology Certified Nursing) nurses and technicians, keep on top of their fields through training and education and use the latest equipment and technologies to provide the best quality of compassionate care.

Incidence Table

ICD 10	Site	2017	2018	2019	Total	%
C-01C02	TONGUE	4	2	5	11	0.6%
C03	GUM	1	1		2	0.1%
C04	FLOOR OF MOUTH	1			1	0.1%
C05	PALATE	2	2	1	5	0.3%
C06	CHEEK MUCOSA		1		1	0.1%
C07	PAROTID GLAND	1		1	2	0.1%
C08	SUBMANDIBULAR GLAND			1	1	0.1%
C09	TONSIL		1		1	0.1%
C10	OROPHARYNX	1			1	0.1%
C11	NASOPHARYNX	4	6	1	11	0.6%
C13	HYPOPHARYNX			2	2	0.1%
C15	ESOPHAGUS	5	8	3	16	0.8%
C16	STOMACH	12	13	11	36	1.8%
C17	SMALL INTESTINE	4	1	1	6	0.3%
C18	COLON	57	54	43	154	7.7%
C-19C20	RECTOSIGMOID JUNCTION	40	23	30	93	4.7%
C21	ANAL CANAL	2	2	1	5	0.3%
C22	LIVER	20	12	13	45	2.3%
C-23C24	GALLBLADDER etc.	4	5	9	18	0.9%
C25	PANCREAS	14	13	15	42	2.1%
C26	GI TRACT NOS		1	2	3	0.2%
C31	ACCESSORY SINUSES			1	1	0.1%
C32	LARYNX		3	3	6	0.3%
C34	BRONCHUS AND LUNG	28	34	34	96	4.8%
C37	THYMUS	3	1	2	6	0.3%
C38	HEART, MEDIASTINUM, AND PLEURA		1		1	0.1%
C41	BONE	2	1	4	7	0.4%
C43	MELANOMA OF SKIN	6	2	2	10	0.5%
C44	SKIN	50	42	35	127	6.4%
C45	MESOTHELIOMA	3		2	5	0.3%
C46	KAPOSI SARCOMA	1	1	2	4	0.2%
C48	RETROPERITONEUM AND PERITONEUM	1	1	3	5	0.3%
C49	CONNECTIVE AND SOFT TISSUES	4		4	8	0.4%

C50	BREAST	124	129	154	407	20.4%
C51	VULVA	1	1	4	6	0.3%
C52	VAGINA			1	1	0.1%
C53	CERVIX UTERI		1	3	4	0.2%
C54	CORPUS UTERI	15	18	32	65	3.3%
C55	UTERUS	4		2	6	0.3%
C56	OVARY	5	9	8	22	1.1%
C57	FEMALE GEN UNSPECIFIED	1	2		3	0.2%
C61	PROSTATE GLAND	47	37	43	127	6.4%
C62	TESTIS NOS	3	2	3	8	0.4%
C64	KIDNEY NOS	22	26	21	69	3.5%
C65	RENAL PELVIS		1	1	2	0.1%
C66	URETER			2	2	0.1%
C67	BLADDER	20	13	12	45	2.3%
C69	EYE			1	1	0.1%
C71	BRAIN MALIGNANT	14	12	18	44	2.2%
C72	SPINAL CORD	2	1		3	0.2%
C73	THYROID GLAND	41	40	41	122	6.1%
C74	ADRENAL GLAND	1	1	1	3	0.2%
C76	HEAD/FACE/NECK NOS		1		1	0.1%
C80	UNKNOWN PRIMARY SITE	5	8	9	22	1.1%
C81	HODGKIN LYMPHOMA	9	10	6	25	1.3%
C-82C86;C96	NON-HODGKIN LYMPHOMA	25	36	37	98	4.9%
C90	MULTIPLE MYELOMA	4	4	6	14	0.7%
C91	LYMPHOID LEUKEMIA	13	11	10	34	1.7%
C-92C94	MYELOID LEUKEMIA	18	10	14	42	2.1%
C95	LEUKEMIA NOS		3		3	0.2%
D32	BENIGN MENINGES	10	7	14	31	1.6%
D33	BENIGN BRAIN, SPINAL CORD	1		4	5	0.3%
D35	BENIGN PITUITARY GLAND	1	1	3	5	0.3%
D45	POLYCYTHEMIA VERA	4	2	1	7	0.4%
D46	MYELODYSPLASTIC SYNDROME	6		5	11	0.6%
D47	OTHER HEMATOPOIETIC	7	7	14	28	1.4%
Total		673	624	701	1998	100%