

Cancer incidence and mortality in Libya, 2011- 2016: Evidence from Misurata Cancer Center Registry

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Abstract: Cancer is constantly recognized as a serious public health problem in Northern Africa and it has a major impact in Libya and across the world³. Using longitudinal retrospective- descriptive survey, an incidence and mortality of cancer was identified in 6 years period from 2011 to 2016. The data collected and analyzed from Misurata Cancer Center Registry, out of 3, 711 registered cancer cases, (54%) were female and (46%) were male, (21%) from aged 51 to 60(20%) from age 41 to 50 and (19%) were age 61 to 70. The study singled out lung cancer (21%), as the most diagnosed cancer in men, followed by cancer of the colon (17%) and prostate cancer (11%), as to female, breast cancer marked (39%), cancer of the colon (13%) and cancer of the ovary (12%).

From the total of 724 recorded deaths, men contributed (53%) and women (47%) from age grouped of 51 to 60 and 61 to 70 (20%) correspondingly combined male and female. The most common cause of death among male was lung cancer (28%), colon cancer (13%) and lymphoma (9%). Whereas, among female were breast cancer (24%), lymphoma (10%) and lung cancer (9%). The average number of new cases of cancer (incidence rate), in male accounted to 3.8, and 4.6 for female and 8.4 combined age and gender for every 1,000 population. On the other hand, the average number of cancer deaths (mortality rate), were 1.3 in male 1.2 among female and 2.5 combined age and gender per (1,000) population. These findings are essential to Libya to give direction to the planning programs of cancer in the areas of prevention, screening, and treatment. The continuous support and effort on fighting the disease will make sure the health of the Libyan population.

Keyword: Cancer, Cancer Center Registry, Incidence. Mortality.

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I. Introduction

According to the International Agency for Research in Cancer [IARC] as cited in American Cancer Society, (2011) cancer is an emerging public health problem in Africa². There are about 715,000 new cancer cases and 542,000 cancer deaths occurred in 2008. These numbers are projected to nearly double (1.28 million new cancer cases and 970,000 cancer deaths) by 2030 simply due to the aging and growth of the population, with the potential to be even higher because of the adoption of behaviors and lifestyles associated with economic development, such as smoking, unhealthy diet, and physical inactivity². WHO (2014) cited that this pattern is largely due to more limited availability of screening and early detection, as well as poorer access to treatment¹¹.

World Health Organization as cited in American Cancer Society, (2016) also mentioned that increases in life expectancy and changes in diet and lifestyle incite to increase the cancer burden in Northern Africa over the coming years¹. Despite the growing impediment, cancer continues to receive low public health priority in Libya, largely because of limited resources and pressing political problems of the country. This endeavor of collecting data are critical to prioritize efforts that address Libya's cancer problem.

This study will help the Libyan government, health professionals, and researchers to understand the impact of cancer on the population, to measure the success of efforts to control and manage cancer, and to develop strategies to address the challenges that cancer poses to the society.

II. Material And Methods

This study utilized the longitudinal retrospective- descriptive survey wherein quantitative methodology was employed. Data were collected, examined and analyzed for a period of 6-years and identified its distribution each year. The researchers hope to identify the incidence and mortality of cancer as to gender, age, and site or location from the year 2011 to 2016. Incidence rate and mortality rate were also determined between male and female.

Study Design: Longitudinal Retrospective- descriptive survey research design

Study Location: The Misurata Cancer Center registry is a population-based registry funded and under the jurisdiction of the Ministry of Health (MOH). The reference geographic area for the registry is the city of Misurata which is located at the central part of Libya. The data recorded in the registry was from the clinical departments of Misurata Cancer Hospital, the only cancer specialized hospital in Misurata City.

Study Duration: October 2015 to February 2017.

Procedure Methodology

Prior to the data collection, the researchers secured all necessary permission from concerned authorities in the conduct of the study. Consent from the Administrator of the Misurata Cancer Center registry was obtained. The purpose and research strategy was explained, as well as the process of collecting data.

The data from the patient pertinent medical record from all the clinical department of Misurata Cancer Hospital was retrieved, reviewed and analyzed. During the data collection, validation was conducted, to make sure of the data accuracy through double checking of the patients' list who do not have the diagnosis, or those classified as cancer or non –cancer. Also, checking essential demographic data like age, gender and type of cancer were verified.

Only patients with cancer- based on clinical and histopathological diagnosis from January 1, 2011, to December 31, 2016, were noted. Furthermore, internal quality checks like random checking of some records were done systematically to ensure completeness and accurateness of the collected information. The retrieved and abstracted data were the personal profile of patient which includes age, gender and cancer site/location or organ involved.

Statistical analysis

The data gathered were classified, tabulated and analyzed. The researcher used the descriptive statistics such as frequency and percentage as a statistical tool. Such tool shows the number of observations falling in each range or the percentage observations.

It is used to identify the distribution of cancer in terms of age, gender, and cancer site/location or organ involved. In addition, incidence rate and the mortality rate were identified between male and female for 6 years. Incidence rate and mortality rate was defined as new cases and recorded death related to cancer per 1,000 members of the total Misurata population each year. Rate was computed using formula adopted from Communicable Disease Control [CDC], 2015. Tables and graphs were also used to describe the information gathered from the research study. The researcher utilized SPSS version 24 in processing the data.

III. Result

After collecting and analyzing abstracted data, table 1 shows the incidence and percentage distribution of cancer according to gender from the year 2011 to 2016. Data reveals that out of 3,711 incidences of cancer 54 percent (n= 1990) were female while, 46 percent (n=1721) were male. Above table further reveals that, in 2012 and 2013 male dominantly affected with all the types of cancer, whereas a female shows a significant increase in incidence during 2011, 2014, 2015 and 2016. In addition, the trend of cancer continually increased (n=241), (n= 397), (n=499), (n=755), (n=845) and (n=974) respectively from year 2011 to 2016. Figure 1 further illustrates the incidence and percentage distribution of cancer as gender.

Table 1. Incidence and Percentage Distribution of Cancer According to Gender, 2011- 2016

Year	2011		2012		2013		2014		2015		2016		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Male	109	36	206	51.9	261	59	330	43.7	376	44.5	439	45.0	1721	46
Female	132	64	191	48.1	238	41	425	56.3	469	55.5	535	55.0	1990	54
Total	241	100	397	100	499	100	755	100	845	100	974	100	3,711	100



Figure 1.Incidence and Percentage Distribution of Cancer According to Gender, 2011- 2016

As to incidence and percentage distribution of all cancer types according to age from 2011 to 2016, table 2 demonstrates that 21 percent (n=781) were 51 to 60 years old, 20 percent (n=744) were 41 to 50 years old 18.8 percent belong to 61 to 70 years old while, 13.8 percent (n=513) were from aged 71 to 80 thus, 12.7 percent (n=473) aged 31 to 40. Patient with the lowest percentage of cancer were people aged 21 to 30 and 81 to 90 with 5.4 percent (n=201 and n= 199) respectively. Likewise, aged 91 to 100 and below 10 years old obtained 0.8 percent (n= 33) and 0.1 percent (n=5) correspondingly. This finding means that most of the people affected by cancer were from midlife and mature adulthood of life cycle. Figure 2 further illustrates the incidence and percentage distribution of cancer according to age.

Table 2.Incidence and Percentage Distribution of Cancer According to Age, 2011- 2016

Year	2011		2012		2013		2014		2015		2016		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Below 10	0	0	1	0.3	1	0.2	2	0.3	1	0.1	0	0	5	0.1
11-20	4	1.7	4	1	8	1.6	21	2.8	14	1.7	14	1.4	65	1.8
21-30	21	8.7	23	5.8	24	4.8	54	7.2	36	4.3	41	4.2	199	5.4
31-40	36	15.0	53	13.4	53	10.6	101	13.4	97	11.5	133	13.7	473	12.7
41-50	49	20.3	66	16.6	97	19.4	153	20.3	187	22.0	192	19.7	744	20.0
51-60	54	22.4	72	18	101	20.2	139	18.4	173	20.5	242	24.8	781	21.0
61-70	39	16.2	87	22	101	20.2	133	17.6	160	18.9	177	18.2	697	18.8
71-80	23	9.5	56	14	79	15.8	105	13.9	132	15.6	118	12.1	513	13.8
81-90	14	5.8	30	7.6	28	5.6	46	6.1	41	4.9	42	4.3	201	5.4
91-100	1	0.4	5	1.3	7	1.4	1	0.1	4	0.5	15	1.5	33	0.8
Total	241	100	397	100	499	100	755	100	845	100	974	100	3,711	100

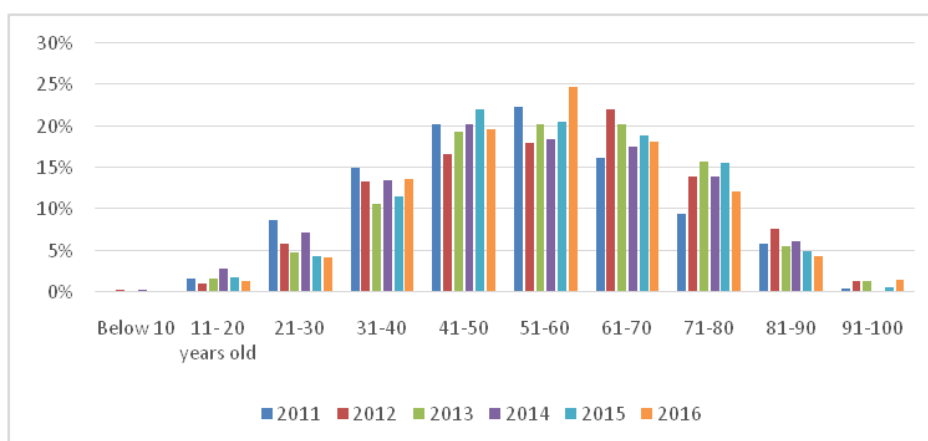


Figure 2. Incidence and Percentage Distribution of Cancer According to Age, 2011- 2016

Table 3 exposes the incidence and percentage distribution of cancer according to site or location among male. The result displays that the significant finding among the 22 types of cancer identified were, 21 percent (n=369) lung cancer, 17 percent (n=296) colon cancer and 11.5 (n=196) prostate cancer. Incidentally, 9.7 percent of patient (n=167) suffers from lymphoma, 5.6 percent (n=97) with leukemia, 4 percent (n=68) and (n=66) agonized with urinary bladder cancer and prostate cancer respectively. Nevertheless, 3.4 percent (n=59) and (n=58) of patient endured stomach and brain cancer consecutively. Finally, 2.6 percent of patient (n=44) had nasopharynx cancer. The statistical trend of cancer in 6 year period among male are consistently caused by lung cancer, prostate cancer and colon cancer. Table 4 further explains the top 10 most common cancer among male.

Table 3. Male Incidence and Percentage Distribution of Cancer According to Site or Location, 2011- 2016

Year Cancer Site/Location	2011		2012		2013		2014		2015		2016		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Tongue	0	0	0	0	0	0	0	0	4	1.0	0	0	4	0.2
Mouth	0	0	0	0	0	0	0	0	0	0	3	0.7	3	0.1
Larynx	0	0	0	0	2	0.8	2	0.6	5	1.3	5	1.1	12	0.8
Nasopharynx	3	2.8	3	1.5	8	3.1	3	0.9	11	2.9	16	3.7	44	3
Esophagus	0	0	0	0	0	0	2	0.6	3	0.8	2	0.5	7	0.4
Stomach	3	2.8	6	2.9	7	2.7	9	2.7	16	4.3	18	4.1	59	3.4
Colon	21	19.3	31	15.1	45	17.3	55	16.7	61	16.2	83	19	296	17
Liver	0	0	3	1.5	11	4.2	15	4.5	3	0.8	11	3	43	2.5
Gall bladder	0	0	5	2.4	4	1.5	5	1.5	4	1.1	7	1.6	25	1.5
Pancreas	4	3.7	9	4.4	8	3.1	16	4.8	14	3.7	15	3	66	4
Lung	15	13.8	52	25.2	56	21.5	78	23.6	88	23.4	80	18.3	369	21
Bone	0	0	0	0	1	0.4	0	0	1	0.3	0	0	2	0.1
Bone marrow	0	0	0	0	0	0	9	2.7	7	1.9	0	0	16	0.9
Connective tissue	0	0	0	0	0	0	0	0	0	0	2	0.5	2	0.1
Sarcoma	0	0	0	0	0	0	9	2.7	11	2.9	9	2.1	29	1.7
Skin	1	0.9	9	4.4	14	5.4	13	3.9	5	1.3	0	0	42	2.4
Breast	2	1.8	4	1.9	0	0	3	0.9	3	0.8	3	0.7	15	0.9
Prostate	24	22	24	11.7	33	12.6	20	6	39	10.4	57	13	196	11.4
Testes	0	0	0	0	0	0	1	0.3	3	0.8	6	1	10	0.6
Urinary bladder	5	4.6	8	3.9	15	5.7	8	2.4	16	4.3	16	4	68	4
Kidney	4	3.7	6	2.9	2	0.8	8	2.4	10	2.7	7	2	37	2.1
Brain	5	4.6	6	2.9	7	2.7	18	5.5	4	1.1	18	4	58	3.4
Thyroid	0	0	2	0.1	2	0.8	2	0.6	2	0.5	3	0.7	11	0.6
Lymphoma	13	11.9	18	8.7	25	9.6	37	11.2	32	8.5	42	10	167	9.7
Leukemia	4	3.7	11	5.3	13	5	13	3.9	25	6.6	31	7	97	5.6
Other cancer unspecified	5	4.6	9	4.4	8	2.7	4	1.2	9	2.4	6	0	41	2.4
Total	109	100	206	100	261	100	330	100	376	100	439	100	1721	100

Table 4. Ten Most Common Cancer among Male, 2011-2016

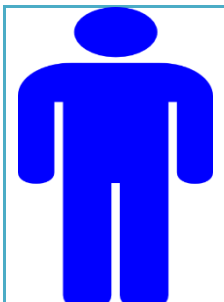
	Cancer Site/Location	Rank	Frequency	Percentage
	Lung	1	369	21.4
	Colon	2	296	17.1
	Prostate	3	196	11.4
	Lymphoma	4	167	9.7
	Leukemia	5	97	5.6
	Urinary bladder	6	68	4.0
	Pancreas	7	66	3.8
	Stomach	8	59	3.4
	Brain	9	58	3.4
Nasopharynx	10	44	2.6	

Table 5. Female Incidence and Percentage Distribution of Cancer According to Site or Location, 2011 - 2016

Year Cancer Site/Location	2011		2012		2013		2014		2015		2016		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Tongue	0	0	0	0	0	0	0	0	1	0.2	3	0.6	4	0.2
Salivary gland	0	0	0	0	0	0	0	0	1	0.2	0	0	1	.05
Mouth	0	0	0	0	0	0	0	0	0	0	1	0.2	1	.05
Nasopharynx	2	1.5	1	0.5	1	0.4	7	1.6	6	1.3	5	1	22	1.1

Esophagus	0	0	0	0	0	0	0	0	1	0.2	1	0.2	2	0.1
Stomach	1	0.8	4	2.1	4	1.7	12	2.8	10	2.1	20	3.7	51	2.6
Colon	20	15.2	31	16.2	37	15.5	49	11.5	60	12.8	66	12	263	13.2
Rectum	0	0	0	0	0	0	0	0	0	0	1	0.2	1	.05
Liver	0	0	3	1.6	5	2.1	6	1.4	4	0.9	4	0.7	22	1.1
Gall bladder	4	3.0	2	1.1	6	2.5	8	1.9	13	2.8	8	1.5	41	2.0
Pancreas	3	2.3	5	2.6	5	2.1	8	1.9	11	2.3	12	2.2	44	2.2
Lung	2	1.5	7	3.7	10	4.2	15	3.5	14	3	12	2.2	60	3.0
Bone	0	0	0	0	3	1.3	0	0	0	0	0	0	3	0.1
Bone marrow	0	0	0	0	0	0	15	3.5	5	1.0	1	0.2	21	1.0
Connective tissue	0	0	0	0	0	0	0	0	1	0.2	0	0	1	.05
Sarcoma	0	0	0	0	0	0	7	1.6	8	1.7	14	3	29	1.5
Skin	4	3.0	5	2.6	5	2.1	9	2.1	3	0.6	5	0.9	31	1.6
Breast	47	35.6	57	29.8	84	35	183	43.1	177	37.7	225	42	773	39
Ovary	17	12.9	31	16.2	27	11.3	43	10.1	66	14.1	63	12	247	12.4
Urinary bladder	0	0	2	1.1	0	0	0	0	1	0.2	2	0.4	5	0.2
Kidney	3	2.3	6	3.1	2	0.8	5	1.2	4	0.9	8	1	28	1.4
Brain	1	0.8	2	1.1	3	1.3	10	2.4	5	1.0	14	3	35	1.8
Thyroid	0	0	4	2.1	6	2.5	9	2.1	6	1.3	19	4	44	2.2
Endocrine	0	0	0	0	0	0	0	0	2	0.4	1	0.2	3	0.2
Lymphoma	13	9.8	15	7.9	20	8.4	32	7.5	31	6.6	31	6	142	7.3
Leukemia	8	6.1	12	6.3	9	3.8	7	1.6	33	7.0	16	3	85	4.2
Other cancer unspecified	8	6.1	4	2.1	5	2.5	0	0	6	1.3	3	0.6	26	1.3
Total	132	100	191	100	238	100	425	100	469	100	535	100	1990	100

In terms of incidence and percentage of cancer according to site or location among females, Table 5 discloses the significant results among the 26 types of cancers identified. Data presents that 39 percent of a female patient (n= 773) had breast cancer, 13.2 percent (n= 263) were distinguished with colon cancer and 12.4 percent (n=247) with cancer of the ovary. Additionally, 7.3 percent (n= 142) of cancer among female were contributed by lymphoma, 4.2 percent (n= 85) were leukemia and 3.0 percent (n= 60) were cancer of the lungs. Meanwhile, stomach cancer obtained 2.6 percent (n= 51), 2.2 percent (n= 44) from cancer of the pancreas and thyroid, 2.0 percent (n= 41) gall bladder cancer and lastly 1.8 percent (n= 35) were caused by brain cancer.

The results presented, reveals that the most consistent common cancer site or location among female from 2011 to 2016 were breast cancer, followed by cancer of the colon and cancer of the ovary on the third rank. Table 6 further exemplifies the top 10 female incidences and percentage distribution of cancer according to site or location.

Table 6. Female Incidence and Percentage Distribution of Cancer According to Site or Location, 2011 - 2016


	Cancer Site/Location	Rank	Frequency	Percentage
	Breast	1	773	39
	Colon	2	263	13.2
	Ovary	3	247	12.4
	Lymphoma	4	142	7.3
	Leukemia	5	85	4.2
	Lung	6	60	3.0
	Stomach	7	51	2.6
	Pancreas	8.5	44	2.2
	Thyroid	8.5	44	2.2
Gall bladder	9	41	2.0	
Brain	10	35	1.8	

Table 7. Mortality and Percentage Distribution of Cancer According to Gender, 2011 - 2016

Year	2011		2012		2013		2014		2015		2016		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Male	7	50	26	49	68	54.8	94	62.3	110	52.1	80	47.3	385	53
Female	7	50	29	51	56	45.2	57	37.7	101	47.9	89	52.7	339	47
Total	14	100	55	100	124	100	151	100	211	100	169	100	724	100

Table 7 unveils the mortality and percentage distribution of cancer according to gender from year the 2011 to 2016. Finding reveals that from a total of 724 people died from cancer in 6 years period, 53 percent (n= 385) were male and only 47 percent (n= 339) were female.

This result signifies that the majority of the patient died from cancer were male than female. The table further explains the trend of the patient dying from cancer was obviously increasing from 2011 to 2015, however a slight decrease observed in 2016. Figure 3 exhibits the mortality and percentage distribution of cancer according to gender.

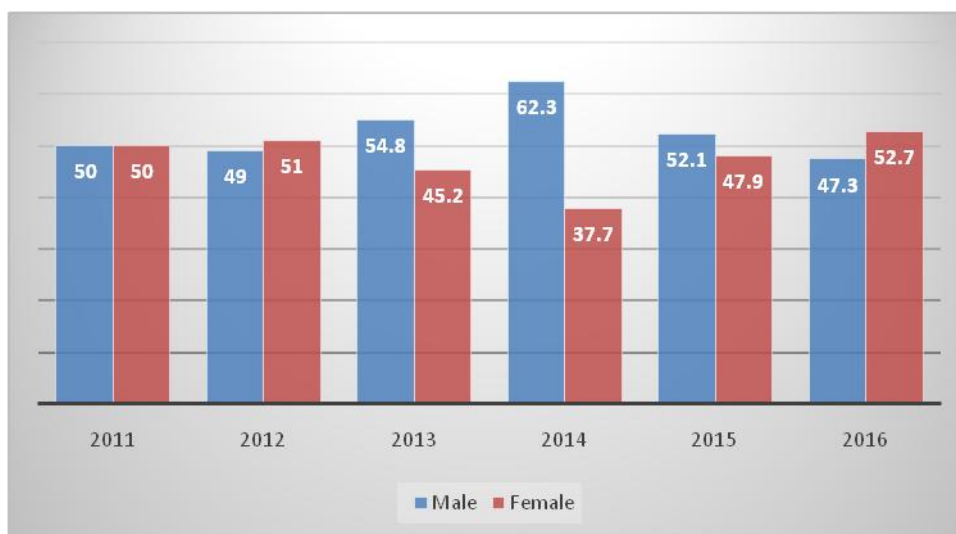


Figure 3. Mortality and Percentage Distribution of Cancer According to Gender, 2011 - 2016

Table 8. Mortality and Percentage Distribution of Cancer According to Age, 2011 - 2016

Year	2011		2012		2013		2014		2015		2016		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Below 10	0	0	0	0	0	0	5	3.3	5	2.4	2	1.2	12	1.7
11-20	0	0	2	3.6	2	1.6	4	2.6	3	1.4	3	1.8	14	1.9
21-30	0	0	1	1.8	5	4.0	7	4.6	6	2.8	12	7.1	31	4.3
31-40	5	35.7	7	12.0	14	11.2	13	8.6	28	13.2	21	12.4	88	12.2
41-50	5	35.7	4	7.0	12	9.6	29	19.2	32	15.2	18	10.7	100	13.8
51-60	2	14.3	11	21.8	24	19.4	25	16.6	42	19.9	41	24.2	145	20
61-70	2	14.3	9	16.0	28	22.5	26	17.2	45	21.3	38	22.4	148	20.4
71-80	0	0	12	21.8	25	20.1	30	19.9	27	12.7	24	14.2	118	16.3
81-90	0	0	9	16.0	11	8.9	10	6.6	19	9	10	5.9	59	8.2
91-100	0	0	0	0	3	2.4	2	1.3	4	1.9	0	0	9	1.2
Total	14	100	55	100	124	100	151	100	211	100	169	100	724	100

The tabulated result of mortality and percentage distribution of cancer according to age as shown in table 8 describes that out of 724 patients died from cancer, 20.4 percent (n= 148) were aged 61 to 70, 20 percent (n= 145) were aged 51 to 60 and 16.3 percent (n=118) were from 71 to 80 years old. Moreover, 13.8 percent (n=100) were age group from 41 to 50, 12.2 percent (n=88) were 31 to 40 years old and 8.2 percent (n=59) from age group 81 to 90. Likewise, 4.3 percent (n=31) were age from 21 to 30 years old, 1.9 percent (n=14) aged 11 to 20, 1.7 percent (n=12) below 10 years old and lastly, 1.2 percent (n=9) patient aged 91 to 100.

These findings reveal that people died from cancer were usually from age 61 to 70, followed by age group 51 to 60 and third were from aged 71 to 80. The mortality of cancer according to age from 2011 to 2016 is consistently observed among these age bracket. Figure 4 displays the mortality and percentage distribution of cancer according to age.

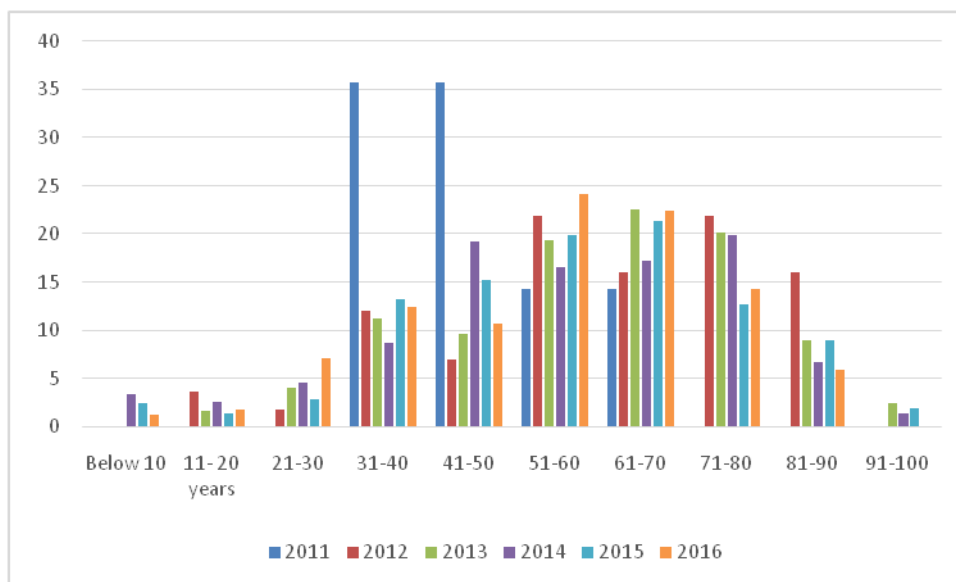


Figure 4. Mortality and Percentage Distribution of Cancer According to Age, 2011 - 2016

Table 9. Male Mortality and Percentage Distribution of Cancer According to Site or Location, 2011 - 2016

Year	2011		2012		2013		2014		2015		2016		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Tongue	0	0	0	0	0	0	0	0	1	0.9	0	0	1	0.2
Salivary gland	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mouth	0	0	0	0	0	0	0	0	1	0.9	0	0	1	0.2
Nasopharynx	0	0	0	0	1	1.5	0	0	1	0.9	0	0	2	0.5
Larynx	1	14.3	0	0	1	1.5	0	0	1	0.9	0	0	3	0.8
Esophagus	0	0	0	0	0	0	0	0	1	0.9	0	0	1	0.2
Stomach	0	0	1	3.8	6	8.8	7	7.4	4	3.6	3	4	21	5.5
Colon	0	0	2	8	10	14.7	6	6.4	18	16	12	15	48	12.5
Rectum	1	14.3	0	0	2	3	3	3.2	2	1.8	1	1	9	2.3
Liver	0	0	1	3.8	1	1.5	4	4.3	3	2.8	2	3	11	2.9
Gall bladder	1	14.3	0	0	4	5.9	3	3.2	3	2.8	0	0	11	2.9
Pancreas	0	0	4	15	2	3	3	3.2	8	7.3	5	6	22	5.7
Lung	1	14.3	10	38.5	17	25	25	26.6	28	25.5	26	33	107	28
Prostate	2	29	1	3.8	4	5.8	5	5.3	6	5.5	12	15	30	7.8
Bone	0	0	0	0	0	0	0	0	0	0	1	1	1	0.2
Bone marrow	0	0	0	0	2	3	0	0	0	0	0	0	2	0.5
Connective tissue	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcoma	0	0	0	0	0	0	1	1	0	0	2	3	3	0.8
Skin	0	0	1	3.8	1	1.5	3	3.2	3	2.8	1	1	9	2.3
Breast	0	0	1	3.8	0	0	0	0	0	0	0	0	1	0.2
Urinary bladder	0	0	0	0	1	1.5	3	3.2	3	2.8	1	1.3	8	2.1
Kidney	0	0	0	0	1	1.5	2	2.1	4	3.6	2	3	9	2.3
Brain and CNS	1	14.3	1	3.8	2	3	7	7.4	4	3.6	0	0	15	3.9
Thyroid	0	0	0	0	0	0	0	0	0	0	1	1	1	0.2
Endocrine	0	0	0	0	0	0	1	1	0	0	1	1	2	0.5
Lymphoma	0	0	3	12	8	11.7	9	9.6	7	6.4	6	8	33	8.6
Leukemia	0	0	0	0	4	5.9	10	10.6	8	8	4	5	26	6.7
Other cancer unspecified	0	0	1	3.8	1	1.5	2	2.1	4	3.6	0	0	8	2.1
Total	7	100	26	100	68	100	94	100	110	100	80	100	385	100

Above table shows the male mortality and percentage distribution of cancer as to site or location from 2011 to 2016. Data reveals the significant mortality findings of 28 percent (n=107) lung cancer while, 12.5 percent (n=48) colon cancer and 8.6 percent (n=33) lymphoma. Furthermore, prostate cancer with 7.8 percent (n=30) and pancreas with 5.7 percent (n=22).

This data implies that the number one cause of death among male patient with cancer was lung cancer followed by colon cancer and third was lymphoma. It is also noteworthy that prostate cancer and cancer of the pancreas also contributed a considerable number of deaths among male patient with cancer. Table 10 further shows the top 10 male mortality and percentage distribution as to site or location of cancer.

Table 10. Male mortality and percentage distribution of cancer according to site or location

Cancer Site/Location	Rank	Frequency	Percentage	
			n	%
Lung	1	107	28	
Colon	2	48	12.5	
Lymphoma	3	33	8.6	
Prostate	4	30	7.8	
Leukemia	5	26	6.7	
Pancreas	6	22	5.7	
Stomach	7	21	5.5	
Brain CNS	8	15	3.9	
Gall bladder	9.5	11	2.9	
Liver	9.5	11	2.9	
Kidney	10	9	2.3	

Table 11. Female Mortality and Percentage Distribution of Cancer According to Site or Location, 2011 - 2016

Year	2011		2012		2013		2014		2015		2016		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Cancer Site/Location														
Tongue	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3
Salivary gland	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mouth	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nasopharynx	1	14.3	0	0	0	0	2	3.5	1	1	2	2.2	6	2
Esophagus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stomach	0	0	1	3.4	1	1.8	4	7	1	1	0	0	7	2
Colon	0	0	3	10.3	8	14	1	1.8	10	9.9	3	3.4	25	7.4
Rectum	0	0	3	10	1	1.8	2	3.5	2	2	4	4.5	12	3.5
Liver	0	0	1	3.4	1	1.8	3	5.3	2	2	2	2.2	9	3
Gall bladder	1	14.3	0	0	2	3.6	2	3.5	1	1	2	2.2	8	2.4
Pancreas	0	0	0	0	2	3.6	1	1.8	6	5.9	0	0	9	3
Lung	1	14.3	6	21	7	12.5	5	8.8	8	7.9	5	5.6	32	9.4
Bone	0	0	0	0	0	0	2	3.5	0	0	3	3.4	5	1.5
Bone marrow	0	0	0	0	0	0	0	0	1	1	4	4.5	5	1.5
Connective tissue	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcoma	0	0	0	0	1	1.8	1	1.8	1	1	0	0	3	1
Skin	0	0	3	10.3	1	1.8	1	1.8	1	1	0	0	6	1.8
Breast	1	14.3	2	7	10	17.9	12	21	29	28.7	27	30	81	24
Ovary	0	0	6	21	3	5.4	6	10.5	9	8.9	2	2.2	26	7.7
Urinary bladder	0	0	1	3.4	1	1.8	1	1.8	1	1	2	2.2	6	2
Kidney	0	0	0	0	6	10.7	4	7	8	7.9	7	8	25	7.4
Brain and CNS	1	14.3	0	0	2	3.6	2	3.5	1	1	2	2.2	8	2.4
Thyroid	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Endocrine	0	0	0	0	0	0	1	1.8	0	0	0	0	1	0.3
Lymphoma	2	28.5	2	7	7	12.5	2	3.5	6	5.9	14	16	33	10
Leukemia	1	14.3	1	3.4	2	3.6	2	3.5	10	9.9	9	10.2	25	7.4
Other cancer unspecified	0	0	0	0	2	3.6	2	3.5	2	2	0	0	6	2
Total	7	100	29	100	56	100	57	100	101	100	89	100	339	100

As to female mortality and percentage distribution as presented in table 11, data exhibits the major findings wherein 24 percent (n=81) mortality was from breast cancer, 10 percent (n= 33) caused by lymphoma, 9.4 percent brought by lung cancer and 7.7 (n= 26) from cancer of the ovary. Likewise, significant findings also include leukemia, colon cancer, and cancer of the kidney which obtained (n= 25) respectively.

This data signifies that the utmost cause of death among women with cancer is breast cancer followed by lymphoma and lung cancer. In addition, mortality of cancer also contributed by cancer of the ovary, leukemia, colon cancer and cancer of the kidney. Table 12 displays the top 10 mortality of cancer among female from 2011 to 2016.

Table 12. Ten Most Common Mortality of Cancer among Females, 2011 - 2016

Cancer Site/Location	Rank	Frequency	Percentage
Breast	1	81	24
Lymphoma	2	33	10
Lung	3	32	9.4
Ovary	4	26	7.7
Leukemia	6	25	7.4
Kidney	6	25	7.4
Colon	6	25	7.4
Rectum	7	12	3.5
Liver	8.5	9	3

	Pancreas	8.5	9	3
	Brain CNS	9.5	8	2.4
	Gall bladder	9.5	8	2.4

Table 13.Incidence Rate of Cancer per (1,000) Population by Gender, 2011 – 2016

Year	2011	2012	2013	2014	2015	2016	Total Average
Gender							
Male	0.48	1.06	5.56	4.9	4.78	6.2	3.8
Female	0.82	1.01	4.24	6.87	6.45	8.2	4.6
Total	1.3	2.1	9.8	11.8	11.2	14.4	8.4

The data presented in table 13 simply implies that 2016 recorded the highest incidence rate of cancer in 6 years among female patients, wherein there were 8 people had cancer for every 1,000 female population whereas, 6 male had cancer for every 1,000 population on the same year which is the most remarkable in 6 years. Another year that caught attention is 2014 and 2015 which contributed about 6 to 7 female and 4 to 6 male who had cancer for every 1,000 population. While in 2013 there were 4 female and 5 to 6 male affected with cancer for every 1,000 population. It is therefore determined that incidence of cancer as years passed by significantly increase. It is noteworthy that in computing the incidence rate, number of the population contributed to its findings. Results may also be influenced by the population, wherein in Libya, population is well dominated by women. Figure 5 further illustrates the incidence rate of cancer from 2011 to 2016 from all categories.

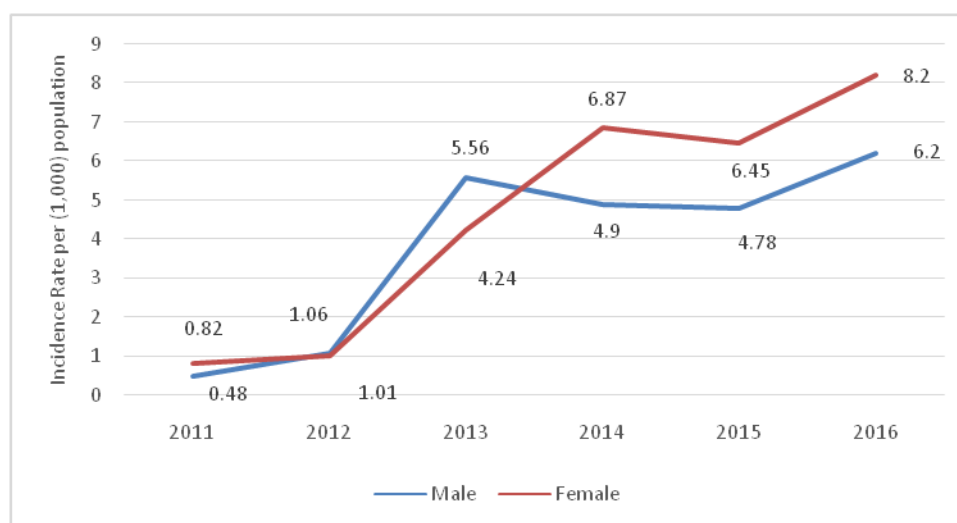


Figure 5.Incidence Rate of Cancer per (1,000) Population by Gender, 2011 – 2016

Table 14. Mortality Rate of Cancer per (1,000) Population by Gender, 2011- 2016

Year	2011	2012	2013	2014	2015	2016	Total Average
Gender							
Male	0.03	0.14	1.48	2.0	2.31	1.65	1.3
Female	0.04	0.16	1.34	1.36	2.34	2.06	1.2
Total	0.07	0.3	2.82	3.36	4.65	3.71	2.5

This result conveys that there were 1 to 2 male and female died from cancer per (1,000) population each year from 2013 to 2016. However, only negligible mortality rate recorded in 2011 and 2012. Furthermore, the mortality rate of cancer among male and female progress within 5 years period while a slight decrease observed in 2016. Figure 6, further clarifies the mortality rate of cancer in all categories from the year 2011 to 2016.

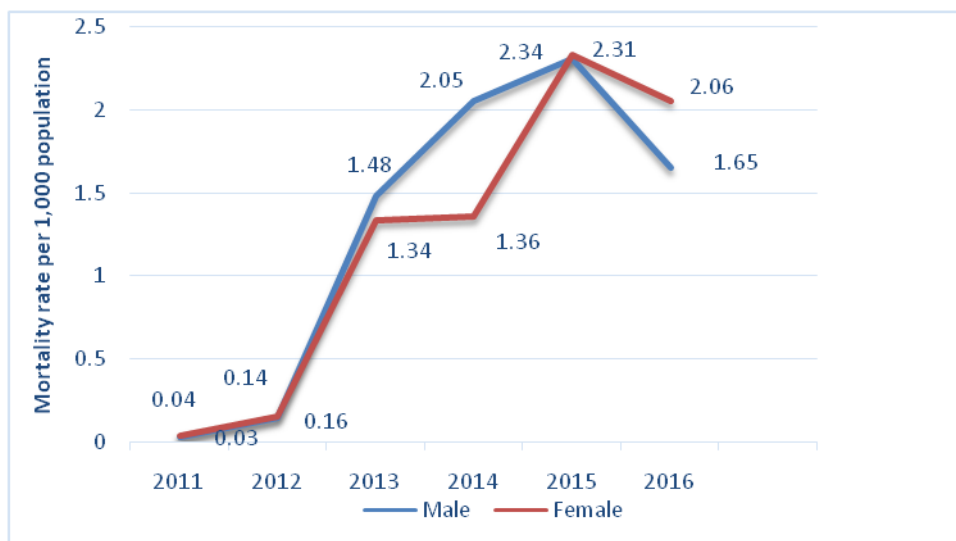


Figure 6. Mortality Rate of Cancer per (1,000) Population by Gender, 2011- 2016

IV. Discussion

This research highlights the importance of cancer center registry in Libya which provides a picture of the affliction of cancer in the community. This is the first study to examine and understand better how many people are diagnosed and die from cancer each year, from year 2011 to 2016 in the Central part of Libya. It also tells us the most frequently diagnosed cancer each year among groups defined by site or location, age, and gender. Moreover, incidence rate and mortality rate of cancer each year were also identified.

The findings of this study imply that females suffered from cancer more than males and the number of cases drastically increased from year 2011- 2016. The sudden increase of cancer cases among females in the years 2014 to 2016 contributed to the high incidence of cancer among Libyan women. This result opposes the compiled report from the National Cancer Intelligence Network (NCIN) which stated that men are 16 percent more likely to get the disease than women and men were 60 percent more likely to get cancer than women³. In 2012, a study published in the European Journal of Epidemiology as cited in Cancer Center Treatment for America (2016) confirmed other studies that, most often, cancer affects men more often than women because of known risk factors, such as smoking and drinking⁵.

Looking at the trend of cancer as to age from 2011 to 2016, it is observed that Libyans die from cancer were usually from midlife adult and late adulthood. These findings proved other findings that the incidence of cancers is usually noticed within these age brackets. A similar result is seen for many cancer types according to the National Cancer Institute (2015) which supports that cancer is primarily a disease of older people, with incidence rates increased with age for most cancers⁹. In the UK in 2012-2014, on average each year half (50%) of cases were diagnosed in people aged 70 and over. They believed that advancing age is the most important risk factor for cancer overall, and for many individual cancer types. In addition, according to the most recent statistical data from NCI's Surveillance, Epidemiology, and End Results program as cited in National Cancer Institute (2015) the median age of a cancer diagnosis is 66 years. This means that half of the cancer cases occur in people below 66 years old and half of the people above 66 years old. It is therefore considered that one-quarter of new cancer cases are diagnosed in people aged 65 to 74⁹.

We also found out that incident cases of lung cancer still number one cause of death among men. For more than 12 years, the incidence of cancer among men reported the same findings in Eastern part Libya, Mistiriet *al.*, (2015) found out that the principal cancers in males were lung, colorectal and bladder⁸. However, recently the Center for Disease Control and Prevention [CDC] (2015) stated that the three most common cancers among men are prostate cancer, which is first among men of all races and Hispanic origin populations while lung cancer is second among white, black, American Indian/Alaska Native, and Asian/Pacific Islander men and thirdly is colorectal cancer among white, black, American Indian/Alaska Native, and Asian/Pacific Islander men⁷.

Comparably, among Libyan women and in general it is found out that breast cancer is the most common type of cancer. Similar to the data obtained by the National Cancer Institute that the most common type of cancer on the list is breast cancer, with more than 255,000 new cases expected in the United States in 2017¹⁰. The U.S. Cancer Statistics Working Group (2016) also cited that the three most common cancers among women are breast cancer which is first among women of all races and Hispanic origin populations. Lung cancer was second among white, black, Asian/Pacific Islander, and American Indian/Alaska Native women while colorectal

cancer was second among Hispanic women and third among white, black, Asian/Pacific Islander, and American Indian/Alaska Native women¹⁰. Lung cancer as number 6 most common cancer among Libyan female brought special attention. The National Institutes of Health study, as cited in Cancer Center Treatment of America (2016) pointed out that the growing number of young women who have lung cancer have never smoked. One of the leading causes of lung cancer in nonsmokers is exposure to radon gas. Other exposures include secondhand smoke, cancer-causing agents in the workplace, air pollution and gene mutations⁵.

When it comes to the cancer mortality among male and female Libyan, similar findings from National Cancer Institute (2016) emphasized that the cancer mortality is higher among men than women (207.9 per 100,000 men and 145.4 per 100,000 women)¹⁰. It is highest in African American men (261.5 per 100,000) and lowest in Asian/Pacific Islander women (91.2 per 100,000) based on 2008-2012 deaths⁹. Moreover, data compiled by Cancer Research UK, (2016) shows that men are 40 percent more likely to die from cancer than women overall, and 16 percent more likely to get the disease. Mortality trends over the last decade in the UK vary by cancer type and sex. The trends largely reflect changes in incidence and survival, e.g. increased incidence without sufficient survival improvement results in increased mortality⁴. Research shows that women are far more likely to survive cancer than men⁸. American Cancer Society highlighted that historically, men are more likely to get cancer and women are more likely to survive it and this evidence is backed by numerous statistics, estimated that nearly one in two men will be diagnosed with cancer in his lifetime, compared with one in three women. While the statistics are straightforward, the causes behind the disparity have been harder to explain¹.

In addition, when it comes to mortality among male Libyan, it is concluded that the usual cause of death is lung cancer followed by colon cancer and third was lymphoma while among female it is found out that the utmost cause of death among women are breast cancer followed by lymphoma and lung cancer. The data gathered is comparable to the findings of Cancer Research UK (2016) wherein stated that lung cancer is by far the most common cause of cancer deaths in males accounting for almost a quarter (23%) of all male cancer deaths in 2014. The next most common causes of cancer death in UK males are prostate (13%) and bowel cancer (10%)⁴.

Mortality in terms of age among Libyan was usually from age 61 to 70, followed by age group 51 to 60 and third was from aged 71 to 80. Likewise, this proved that over half (53% in 2012-2014) of all cancer deaths in the UK each year occur in the elderly aged 75+. A further 43% occur in adults aged 50-74. Furthermore, children, teenagers and young adults (aged 0-24) each account for less than 1% of all cancer deaths in the UK each year⁴.

The highest incidence rate of cancer among Libyan were noted in 2016, wherein there were 8 people for every 1,000 female population had cancer while, 6 male for every 1,000 population. This result is the most remarkable in 6 years. Another year that caught attention is 2014 and 2015 which contributed about 6 to 7 female and 4 to 6 male developed cancer for every 1,000 population. In terms of mortality rate, there were 1 to 2 male and female died from cancer per (1,000) population each year from 2013 to 2016. However, only negligible mortality rate recorded in 2011 and 2012. The negligible results in 2011 and 2012 might be affected by the revolution at that time. This finding implies that the incidence rate of cancer peaked in 2016 while mortality in 2015 and decreased in 2016. Similarly, from the most recent Annual report to the nation on the status of cancer published in the US in 2016, it is registered that the cancer death rates decreased by 1.8 percent per year among men, 1.4 percent per year among women and 2.0 percent per year among children ages 0-19. Although death rates for many individual cancer types have also declined, rates for a few cancers have stabilized or even increased. As the overall cancer death rate has declined, the number of cancer survivors has increased⁹.

V. Conclusion

The data collected and analyzed from Misurata Cancer Center Registry revealed that, out of 3, 711 registered cancer cases from the year 2011 to 2016, 54 % were female and 46 % were male, 21% from aged 51 to 60, (20%) age 41 to 50 and (19%) age 61 to 70 respectively. The study singled out lung cancer (21%), as the most diagnosed cancer in men, followed by cancer of the colon (17%) and prostate cancer (11%), as to female, breast cancer marked (39%), cancer of the colon (13%) and cancer of the ovary (12%). From the total of 724 recorded death, men were (53%) and women were (47%) from age group of 51 to 60 and 61 to 70 (20%) correspondingly. The most common cause of death among male was lung cancer (28%), colon cancer (13%) and lymphoma (9%). Whereas, among female breast cancer (24%), is the most leading cause of death followed by lymphoma (10%) and lung cancer (9%). The number of new cases of cancer (incidence rate), average in 6 years for the male is 3.8, and 4.6 for female and 8.4 combined age and gender for every 1,000 population. The number of cancer deaths (mortality rate), in average for 6 years is 1.3 in male 1.2 among female and 2.5 combined age and gender per (1,000) population.

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