

Cancer incidence and mortality for 22 Arab countries in 2020: Profile of total and top major cancers

Hussein Khaled (✉ khussein528@gmail.com)

Cairo University

Amal S Ibrahim

Cairo University

Rana H. Khaled

Cairo University

Research Article

Keywords: Cancer profile, Arab countries

Posted Date: July 5th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1744528/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

Introduction. Cancer is a leading cause of mortality worldwide, with a significant economic, social, and health impact on humanity. The aim of this work was to explore epidemiologic cancer profile in the 22 Arab countries with special emphasis on the most common cancer subtypes.

Material and Methods. Data estimates for the year 2020 were generated from the web site of cancer today. Incidence, mortality, and prevalence were gathered, analyzed, and tabulated in total then typed by age group, sex, geographic site, economic level, and specific cancer subtype. The five most common tumors, collectively and for each individual country were also emphasized.

Results. Collectively in the 22 Arab countries, about 450 thousand new cases, 280 thousand deaths, and prevalence of over a million cases were estimated. Age standardized incidence rate (ASIR) for both sexes were 135.4 per 100,000 population, being 135.2 among males and 139.4 among females, while mortality rate was 86 per 100,000 population for both sexes, being 96.2 for males and 78 for females. The highest ASIR and ASMR occurred in Egypt (159.4 and 108.6/100,000, respectively) while the lowest ASIR were in Djibouti (91/100,000), and the lowest ASMR were in Saudi Arabia (51.3/100,000). Both ASMR and ASMR were higher for the 10 African (140.5 and 89.9) compared to the 12 Asian countries (120.3 and 74). The highest incidence (148.1) and mortality (93.4) rates occurred in low-middle-income countries compared to lowest incidence (97.6) and mortality (52.7) in the high-income countries. ASIR of cancer increased with age, but it was less than that observed for world and the USA adjusted incidence rate. On the contrary ASMR among Arab countries specially after the age of 59 years was lower than mortality rates of the world and the USA.

Conclusion. Available data emphasize the value of developing and improving accurate national population-based cancer registries in the Arab world being the most important needed step for better cancer control.

Introduction

Cancer continues to be a leading global cause of death, despite the outstanding recent developments and major technological and scientific advances in the field of cancer control (1). A comprehensive strategy that promotes prevention, early detection, treatment, and pain control is critical to saving lives and alleviating suffering (2).

The Arab nations in Africa and Asia include 22 countries that are members of the Arab league. The league was created to unify the Arab nations politically. They have a total area of over 5 million square miles: and total population around 423 million.

Tremendous economic, demographic, and social diversity exist across the Arab nations, despite the common Arabic language (3). Knowing the magnitude of the cancer burden in Arab countries is a key issue in assessing cancer control planning and allocating the needed resources on the regional and country levels.

The aim of this study was to explore cancer incidence and mortality profile in the 22 Arab countries. It was done for all cancers excluding nonmelanoma skin cancer, and for the top cancers. Results were stratified by sex, age, geographic regions, and economic standards.

Material And Methods

Incidence, mortality, and prevalence of different types of cancer for the year 2020 by sex and age groups were generated for each of the 22 Arab countries from the web site of CANCER TODAY (4), which are based on the GLOBOCAN estimates of 2020. incidence, mortality, and prevalence of 36 cancer types by sex and age group. The detailed source of information used to estimate the burden of cancer in each country is given in the file : GLOBOCAN2020_Annex_A.xlsx file available at: <https://gco.iarc.fr> (4), and in the population fact sheet for each country available at: <https://gco.iarc.fr/today/fact-sheets-populations> (5).

The methodology used to estimate these rates differed from country to another based on the availability and accuracy of data (6). The methods used for estimation of incidence rates were either:

1. The observed national incidence rates that were projected to 2020 for 9 countries (Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, and UAE),
2. The most recently observed incidence rates (national or regional) that were applied to the 2020 population for 7 countries (Algeria, Egypt, Libya, Morocco, Sudan, Tunisia, Yemen), and
3. the rates are those of neighboring countries or registries in the same area for 6 countries (Somalia, Djibouti, Mauritania, Comoros, Syria, and Palestine).

The prevalence estimates for 2020 of all countries were computed using sex-, site-, and age-specific ratios of incidence to 5-year prevalence from Nordic countries for the period 2006–2015 with the following formula:

$$Prevalence_{Country} = Incidence_{Country} \cdot \left(\frac{Prevalence_{Nordic}}{Incidence_{Nordic}} \right) \cdot \left(\frac{HDI_{Country}}{HDI_{Nordic}} \right)$$

Results are presented for cancer sites defined according to the 10th edition of the International Classification of Diseases (8). The individual data were then gathered, analyzed, and tabulated. Data were classified according to different factors including sex, age group, geographical site, economic level, and the 5 most common tumors, collectively and for each individual country.

Results

Overall cancer profiles.

Table 1 summarizes 2020 data of the total population, estimated numbers of new cancer cases and cancer deaths as well as the 5-year prevalence in the 22 Arab countries stratified by gender. There were just over 450 thousand new cases of cancer, (excluding non-melanoma skin cancer), 280 thousand deaths, and prevalence of over a million cases.

Table 1
Estimated 2020 total population, number of new cancer cases, number of deaths, and 5-year prevalence in 22 Arab countries.

Country	population			new cases			deaths			5-year prevalence		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Egypt	102334403	51702862	50631541	134632	66542	68090	89042	48290	40752	278165	122663	155502
Algeria	43851043	22153808	21697235	58418	27328	31090	32802	17902	14900	150390	64379	86011
Sudan	43849269	21907295	21941974	27382	10853	16529	17055	7348	9707	48694	18220	30474
Iraq	40222503	20357778	19864725	33873	14070	19803	19786	9418	10368	79057	29301	49756
Morocco	36910558	18316887	18593671	59370	29171	30199	35265	20325	14940	127120	54134	72986
Saudi Arabia	34813867	20131308	14682559	27885	14253	13632	13069	7693	5376	82640	39241	43399
Yemen	29825968	15024985	14800983	16476	7159	9317	12103	5667	6436	26651	11158	15493
Syria	17500657	8760065	8740592	20959	9243	11716	12967	6398	6569	39020	15573	23447
Somalia	15893219	7924087	7969132	10134	3723	6411	7439	2827	4612	13212	4704	8508
Tunisia	11818618	5860752	5957866	19446	10473	8973	11855	7279	4576	45541	22147	23394
Jordan	10203140	5165979	5037161	11559	5311	6248	6190	3337	2853	28608	11715	16893
U A Emirates	9890400	6836349	3054051	4807	2155	2652	1896	1012	884	14816	6056	8760
Libya	6871287	3468737	3402550	7661	3748	3913	4750	2579	2171	17531	7813	9718
Lebanon	6825442	3435746	3389696	11589	5787	5802	6438	3457	2981	28764	13407	15357
Oman	5106622	3370230	1736392	3713	2232	1481	2029	1351	678	10386	5856	4530
Palestine	5101416	2586971	2514445	4779	2274	2505	2895	1541	1354	10566	4477	6089
Mauritania	4649660	2334981	2314679	3079	1209	1870	2121	884	1237	5480	1983	3497
Kuwait	4270563	2614446	1656117	3842	1840	2002	1719	948	771	10885	4700	6185
Qatar	2881060	2165135	715925	1482	901	581	704	465	239	4231	2454	1777
Bahrain	1701583	1100474	601109	1215	572	643	593	312	281	3380	1454	1926
Djibouti	988002	518993	469009	765	286	479	527	213	314	1328	470	858
Comoros	869595	438653	430942	609	228	381	411	161	250	1114	379	735
All Countries	436 378 875	226176521	210202354	463 675	219358	244317	281 656	149407	132249	1 027 579	442284	585295

After adjusting for population age structure's, the estimated age standardized incidence rate (ASIR) for the 22 Arab countries for both sexes were 135.4 per 100,000 population, being 135.2 among males and 139.4 among females. Estimated age standardized mortality rate (ASMR) was 86 per 100,000 population for both sexes while it was 96.2 for males and 78 for females. The highest ASIR and ASMR occurred in Egypt (159.4 and 108.6/100,000, respectively) while the lowest ASIR were in Djibouti (91/100,000) and Sudan (95.7/100,000). The lowest ASMR were in Saudi Arabia (51.3/100,000) and United Arab Emirates (55.9/100,000), (Table 2 and Fig. 1)

Table 2
Estimated 2020 age standardized incidence rate (ISIR), and age standardized mortality rate (ASMR) for the 22 Arab countries, all types, all ages, and both sexes.

Country	Age Standardized Incidence Rate			Age Standardized Mortality Rate		
	Total	Male	Female	Total	Male	Female
Egypt	159.4	168.8	152.4	108.6	127.7	92.4
Algeria	135.3	129.7	141.7	76.1	84.2	68.5
Sudan	95.7	81.1	109.8	63.2	58.3	68.1
Iraq	134.9	127.0	144.6	84.7	90.5	81.2
Morocco	148.3	153.5	145.1	87.9	109.3	70.7
Saudi Arabia	96.4	89.0	111.9	51.3	53.5	50.0
Yemen	97.0	92.7	102.2	76.5	77.9	76.1
Syria	149.3	145.5	155.3	95.6	103.7	90.0
Somalia	118.1	90.8	144.5	90.9	72.4	108.8
Tunisia	133.5	153.5	118.7	78.7	105.5	57.0
Jordan	155.3	154.6	159.3	88.5	102.2	77.2
U A Emirates	106.7	82.5	170.9	55.9	46.9	79.0
Libya	132.2	147.7	122.4	88.2	108.4	73.6
Lebanon	156.8	159.1	159.8	85.6	94.4	80.2
Oman	103.8	108.4	108.7	64.6	73.0	56.8
Palestine	158.8	166.5	155.3	103.5	120.3	90.5
Mauritania	108.6	98.1	121.6	78.3	74.7	84.0
Kuwait	115.7	101.3	144.6	63.6	59.8	71.0
Qatar	107.2	101.4	139.3	64.5	61.2	76.9
Bahrain	112.2	108.5	130.7	64.3	68.1	65.6
Djibouti	91.0	71.5	112.9	65.3	55.2	76.9
Comoros	111.8	97.7	128.4	79.0	70.2	89.2
All Countries	135.4	135.2	139.4	86	96.2	78

Among Arab countries, and for the total population, Lebanese had the highest risk of developing cancer (16.4%), while Egyptians had the highest risk of dying from cancer (10.9%) before the age of 75. Among male population, Egypt had the highest risk of developing and of dying from cancer (17.3% and 12.6%, respectively), while among females United Arab Emirates had the highest risk (18.2%) of developing cancer before the age of 75 years and Somalia had the highest risk of dying from cancer (11.8%).

On the other hand, among both genders, Djibouti had the lowest risk of developing cancer (9.7%) and Saudi Arabia had the lowest risk of dying from cancer (5.4%). Among males the lowest risk of developing cancer occurred in Djibouti (7.9%), and of dying from cancer in United Arab Emirates, 4.3). Among females the rates were 10.3% in Yemen, and 5.3% in Saudi Arabia (Table 3, and Fig. 2).

Table 3
Estimated population risk of developing and of dying from cancer before the age of 75 years for the 22 Arab countries, all ages, and both sexes.

Country	Risk of developing cancer before the age of 75 years (%)			Risk of dying from cancer before the age of 75 years (%)		
	Total	Male	Female	Total	Male	Female
Lebanon	16.4	16.5	16.6	9.2	9.6	8.8
Egypt	16.3	17.3	15.4	10.9	12.6	9.3
Jordan	16.1	16.3	16.2	9.6	10.9	8.3
Palestine	16	16.4	15.7	10.6	11.6	9.6
Syria	15.6	15.3	15.9	10.3	10.9	9.7
Morocco	15.3	16.0	14.5	9.1	10.8	7.4
Iraq	14.1	13.5	14.8	9.1	9.7	8.7
Algeria	13.9	13.7	14.1	7.9	8.6	7.3
Libya	13.5	15.0	12.4	8.7	9.9	7.6
Tunisia	13.5	15.6	11.8	7.9	10.3	5.8
Somalia	12.4	9.8	14.8	9.9	7.9	11.8
Kuwait	12.4	10.9	15.3	6.5	6	7.5
Bahrain	12.2	11.2	14.1	6.8	6.5	7.4
Comoros	12.1	10.9	13.4	8.9	7.8	9.9
Mauritania	11.7	10.5	13.1	8.6	7.8	9.5
Qatar	11.6	11	14.4	6.7	6.3	8
U A Emirates	11.3	8.4	18.2	5.5	4.3	8.2
Oman	11.2	11.7	11.3	7.3	8	6.5
Saudi Arabia	9.9	9.1	11.4	5.4	5.5	5.3
Sudan	9.8	8.4	11.2	6.4	5.5	7.1
Yemen	9.8	9.3	10.3	7.9	7.9	7.9
Djibouti	9.7	7.9	11.7	7.4	6.4	8.5

The estimated age standardized cancer incidence and mortality rates of all 22 Arab countries, in relation to continent and economic level; are shown in supplementary figure S3. Both incidence and mortality rates were higher for the 10 African countries compared to the 12 Asian ones: being 140.5 and 89.9 for African vs. 120.3 and 74 for Asian countries, respectively. The highest incidence (148.1) and mortality (93.4) rates occurred in low-middle-income countries while the lowest incidence (97.6) and mortality (52.7) rates were in the high-income countries.

As shown in supplementary figure S4A, the ASIR of cancer increased with age, from 11 cases per 100,000 in persons less than 20 years of age to a peak of 780.5 cases per 100,000 in those more than 65 years of age. However, this increase was less than that observed for world and the USA adjusted incidence rates, especially after the age of 59 years. The increase in ASIR with age among Arab countries was more depicted in males compared to females (Supplementary Figure S4B)

On the contrary to ASIR, the increase in ASMR among Arab countries specially after the age of 59 years was lower than mortality rates of the world and the USA (Supplementary Figure S5A), being 609.5, 762.3, and 713.9 per 100,000 respectively; with more increase in males compared to females (Supplementary Figure S5B).

Top five common cancer sites by sex.

Table 4 and Fig. 6 (A, S B, and S C) depict the top 5 most common leading types of cancer in terms of new cases in total and stratified by gender. Collectively and in total as shown in Fig. 6A, the most frequent cancer sites in the Arab world were female breast cancer (86,502 cases, 18.7% of all cancer cases), followed by liver cancer (36,399 cases, 7.9%), colorectal cancer (35,510 cases, 7.7%), lung cancer (33,677 cases, 7.3%) and bladder cancer (24,301 cases, 5.2%). These five cancers represented almost half (46.8%) of the estimated overall burden of cancer in 22 Arab countries in 2020.

In males, the most common cancer sites are lung cancer (27,102 cases, 12%), followed by liver cancer (23,250 cases, 11%), prostate cancer (22,343 cases, 10%), bladder cancer (19,688 cases, 9%) and colorectal cancer (19,261 cases, 9%) representing 51% of the estimated overall burden of cancer (Supplementary

Fig. 6S B). In females and as shown in supplementary Fig. 6 SC, the top 5 cancers include breast (86,502 cases, 36%), colorectal cancer (16,249 cases, 7%), liver cancer (13,149 cases, 5%), thyroid cancer (13,09 cases, 7%), carcinoma of uterine cervix (10,365 cases, 4%).

Also, the top six most common types of cancer deaths in terms of numbers and frequency in both sexes, males, and females, are illustrated in Fig. 7(A, S B, and S C). These include Liver cancer (34,671 deaths, 12%), Breast cancer (33,374 deaths, 12%), lung cancer (30,221 deaths, 11%), colorectal cancer (20,002 deaths, 7%), and bladder cancer (13,570 deaths, 5%).

The numbers of male cancer deaths are lung cancer (24,350 deaths), liver cancer (22,101 deaths), colorectal cancer (10,836 deaths), bladder cancer (10,976 deaths), and prostate cancer (9,649 deaths), representing frequencies of 16%, 15%, 7%, 7%, and 7% respectively. In females, the most common cause of cancer deaths is breast cancer with 33,374 deaths (25%) followed by liver, colorectal, ovarian and cervical cancers (12,516, 9%; 9,166, 7%; 6,684, 5%, and 6,288, 5% deaths, respectively).

In addition, and in terms of estimated age standardized incidence rates (in thousands), Tables 5, and 6 as well as Figs. 8 (A, S B, SC) supplementary 9 (SA, S B, SC), and supplementary 10 (SA, S B, SC), present the estimated incidence and mortality rates by sex, site, and continent of the top 5 cancers for the 22 Arab countries. The highest estimated age standardized incidence rate for males was lung cancer (17.8), with an age standardized mortality rate of 16.1 per 100,000 normal population. On the other hand, the fifth ranked incidence rate was 11.4 for colorectal cancer, with a mortality rate of 6.6 per 100,000 normal population. For females, breast cancer represents the highest ASIR (48.3) with ASMR of 18.9, while cervical cancer is ranked the fifth with an ASIR of 6.1 and an ISMR of 3.9 per 100,000 population.

Table 5
ASIRs of the top cancers in each of the 22 Arab countries distributed by sex.

Country	Top common cancers														
	Breast Cancer			Prostate Cancer			Liver Cancer			Lung Cancer			CRC		
	F	M		T	M	F	T	M	F	T	M	F	T	M	F
Algeria	55.8	17		1.5	1.7	1.2	11.5	20.2	2.9	15.3	16.5	14.2	7.6	13.2	2.1
Bahrain	44.2	13.3		3.7	4	3.4	11.7	16.2	7.5	13.9	13.7	14.6	8.1	9.3	2.3
Comoros	21.1	34.1		5.6	7	4.2	2.3	2.8	1.8	4.5	3.7	5.2	5.2	7.2	3.8
Djibouti	42.2	11.1		3.8	5.4	2.3	3	3.8	2.3	6.9	7.8	5.9	2.3	3.7	1
Egypt	48.7	13.9		34.1	45.9	22.7	8	12.8	3.8	6.1	5.8	6.2	13.2	22.5	5.2
Iraq	54.5	12.9		3.3	3.6	2.9	12	23.3	3.2	8.7	10.8	6.9	6	9.8	2.7
Jordan	59.5	15.8		3	3.6	2.5	15.6	27.6	4.7	17.7	17.2	18.4	8.5	15.8	1.8
Kuwait	50.3	19.6		5	5.4	4.1	8	9.5	5.6	12.5	13.1	11.9	5.3	7.4	2.2
Lebanon	54.8	28.5		2.3	2.5	2.1	18.7	24.4	13.5	12.2	15.2	9.5	8.4	12.8	4.3
Libya	34.6	18.6		4.4	5.9	3.1	16.6	32	3.3	15.7	16.7	15.1	8.2	15.8	1.8
Mauritania	31.8	28.4		9.8	12.8	7.2	2	2.9	1.2	7.2	8.6	6.1	2.3	2.8	1.9
Morocco	56.4	23.6		3.2	3.9	2.8	18.3	33.7	4	11.3	12.9	9.9	5.6	10.2	1.5
Oman	38.5	13.8		4.4	5.8	2.5	5.4	7.2	2.9	9.9	11.2	7.7	5.1	7.8	1.7
Palestine	53.5	16.7		6.5	8.3	4.9	20.8	35.6	7.7	18.6	20.7	16.7	6.4	11.5	1.7
Qatar	42.7	21.1		5	5.7	4	9.2	10.4	5.8	15.7	13.6	20.6	4.7	6.2	1.8
S Arabia	28.8	7		5.2	6.8	3.3	5.1	6.2	3.4	13.9	16.1	10.9	3.4	4.8	1.3
Somalia	41.7	17.1		3.6	4.3	3	3.7	4	3.5	9.3	10.1	8.6	2.5	3.5	1.5
Sudan	41.2	13.1		4.4	5.9	3	2.5	3.3	1.8	6.3	6.6	6	2.3	3.4	1.4
Syria	57.1	19		2.9	3.2	2.5	15.3	24.9	7.2	12.9	14.4	11.7	7.4	12.5	2.9
Tunisia	41.4	17		4.3	4.7	4	19.5	37	4.4	12.7	14	11.7	9.4	17.9	2.1
UA Emirates	58.5	13.4		2.9	2.8	3.2	6.6	7.4	5.2	13.1	11.5	17.3	6.4	7.8	3.7
Yemen	30.5	2.8		5.1	7.1	3.5	5.8	6.7	5.1	10.7	12	9.5	2.3	4	0.9

Table 6
ASMRs of the top cancers in each of the 22 Arab countries distributed by sex.

Country	Top common cancers															
	Breast Cancer		Prostate Cancer			Liver Cancer			Lung Cancer			CRC		Bladder Cancer		
	F	M	T	M	F	T	M	F	T	M	F	T	M	F		
Algeria	18.5	6.8	1.4	1.6	1.2	10.4	18.3	2.6	8.3	9	7.7	4.3	7.5	1.1		
Bahrain	13.6	4.5	3.6	4	3.3	10.6	15.1	6.1	7.1	6.8	7.5	2.6	4.1	0.99		
Comoros	10.4	19.5	5.6	7	4.2	2.3	2.8	1.8	3	2.3	3.7	3.2	4.5	2.3		
Djibouti	24.6	6.6	3.8	5.4	2.3	2.9	3.6	2.1	5.3	6.1	4.6	1.5	2.6	0.55		
Egypt	20.4	7.9	32.5	43.7	21.7	7.2	11.5	3.4	3.4	3.3	3.4	7.8	14.1	3		
Iraq	23.3	5.2	3.2	3.6	2.9	11.1	21.5	2.8	5.4	6.8	4.4	3.2	5.4	1.3		
Jordan	19.7	5.3	3	3.5	2.5	14.3	25.4	4.3	9.6	9.7	9.6	3.6	6.6	0.86		
Kuwait	17	6.6	4.7	5.1	3.9	7.2	8.7	4.8	6.6	7	6.1	2.1	3.2	0.74		
Lebanon	19.9	9.7	2.2	2.4	2.1	16.6	21.6	12	6.7	8.8	5	3.9	6.2	1.9		
Libya	14.3	9.4	4.2	5.8	3	14.9	28.7	3	10.2	11	9.8	5	10.2	1		
Mauritania	17	17	9.6	12.5	7.1	1.8	2.7	1.1	5.4	6.5	4.6	1.4	1.8	1.2		
Morocco	17.5	11.8	3.1	3.6	2.7	16.3	30.1	3.5	6.2	7.2	5.4	3.1	5.8	0.84		
Oman	14.5	6	4.1	5.4	2.4	5	6.7	2.7	5.7	6.2	4.5	2.8	4.5	0.91		
Palestine	22.6	6	6.4	8.2	4.9	19.2	32.7	7.4	11.2	12.7	9.9	3.4	6.1	0.94		
Qatar	13.2	4.8	4.9	5.7	3.9	8.5	9.6	5.5	9	8	10.9	2.8	4	1.4		
S Arabia	8.9	2.5	5.1	6.6	3.1	4.6	5.5	3.2	7.3	8.7	5.6	1.6	2.4	0.59		
Somalia	27.2	11.3	3.6	4.3	3	3.5	3.8	3.3	7.7	8.4	7.1	1.7	2.5	1.1		
Sudan	21.2	7.3	4.3	5.7	3	2.3	3	1.6	3.9	4.2	3.6	1.7	2.8	0.91		
Syria	26.2	7.5	2.8	3.2	2.4	14.1	23.3	6.4	8.2	9.4	7.2	4.1	7.2	1.6		
Tunisia	12.5	7.4	4	4.4	3.6	17.4	33.4	3.8	6.4	7.3	5.6	5.2	10.3	1.2		
UA Emirates	16.6	3.4	2.8	2.6	3.2	5.7	6.6	4	6.9	6.2	8.7	2.7	3.3	1.5		
Yemen	18.9	1.7	5	7	3.4	5.5	6.5	4.8	7.7	8.6	6.9	1.6	2.9	0.63		

A brief description of the cancer patterns for the leading cancers in Arab countries is provided below.

Female breast cancer

Breast cancer is the most common cancer site in women in all Arab countries except in Comoros (Table 4), and in consequence, breast cancer is the most frequent cancer in the Arab world (18.7%).

There is no clear geographic variation in the estimated incidence rates. However, and as shown in the map (Figure 11), most of the top 11 countries are situated north while most of the lower incidence 11 countries are situated south. The calculated age specific incidence rates (ASIR) for breast cancer in all Arab countries compared to that of world and USA are shown in figure 12. The 3 ASIR curves are close to each other for patients under 40 years, and then the curves diverge for older patients.

The range ASIR is between 59.5 for Jordan, and 21.1 for Comoros (Table 5 and Supplementary Figure 13) while the range of mortality rates varies (Table 6, and Supplementary Figure 13), with highest rates seen in Somalia (27.2) and the lowest mortality rates in Saudi Arabia (8.9). So, breast cancer is the leading cause of cancer deaths in females (25%).

Prostate cancer

As shown in tables 5, 6 and supplementary figure 14, incidence rates of prostate cancer vary ten-fold, with the highest rate in Comoros, Lebanon, and Mauritania (34.1, 28.5, and 28.4 respectively) and the lowest in Yemen (2.8), and Saudi Arabia (7). In comparison with incidence, mortality rates are likewise, ranging from the highest elevated rates in Comoros (19.5) and Mauritania (17) to lowest rates in Saudi Arabia (2.5) and United Arab Emirates (3.4).

Liver cancer

The incidence rates of liver cancer are higher in men than in women being 14.3 vs 8.3 per 100,000 (Figure 9 B and C). Highest rate of incidence was estimated in Egypt (34.1 per 100,000) being 45.9 in males and 22.7 among females, while the incidence rates in the other Arab countries range between 9.8 in Mauritania to 1.5 in Algeria (Tables 5,6, and Supplementary Figure 15).

Patterns of mortality partially follow incidence, because of the relatively poor prognosis of the disease after diagnosis, where more than 90% of patients succumb to the disease (Figure 9 A).

Lung cancer

In men, the highest incidence rate was in Tunisia and Palestine (37 and 35.6, respectively), with the lowest rates observed in Mauritania (2) and Comoros (2.3). Contrary in women, the highest incidence rate was 13.5 in Lebanon, 7.7 in Palestine, and 7.5 in Bahrain, with low rates for Sudan and Comoros (1.8, each) and Mauritania (1.2). These data are detailed in Tables 5,6, and supplementary figure 16.

As in liver cancer patterns of mortality follow those of incidence for both sexes because of the relatively poor prognosis of the disease after diagnosis. Thus, Lung cancer is the leading cause of cancer deaths amongst men with a frequency of 16% (Figure 8 A and S B)

Colorectal cancer

As shown in Tables 5, 6 and supplementary figure 17, Comoros has the lowest incidence rates both in men and women being 3.7 and 5.2 respectively. Incidence rates were slightly higher in Egyptian men (5.8), and in Sudanese women (6.6). On the other hand, there were about 5-fold increase in rates among men in Palestine (20.7), and 4-fold increase among women in Qatar (20.6) and Jordan (17.2).

In males, mortality rates were highest in Palestine (12.7) and Yemen (11), and lowest in Sudan (4.2) and Egypt (3.3), while in females the highest rates occurred in Qatar (10.9) and Palestine (9.9), and the lowest rates in Sudan (3.6) and Egypt (3.4).

Bladder cancer

Among males, Egypt reported the highest incidence rate; being 22.5 which is more than 7-fold increase compared to the lowest incidence rate (2.8) in Mauritania. Tunisia followed Egypt with a rate of 17.9 per 100,000 normal population. While in most countries the male to female ratio is around 2:1, in Egypt it is 4:1. Also, most of the countries with higher incidence rates are of agricultural nature (Table 5, and Supplementary Figure 18).

Table 6 and supplementary figure 18, illustrate that mortality rates were highest in Egyptian (14.1) and Tunisian males (10.3), and lowest in males of Djibouti (1.0) and Mauritania (1.8), while in females the highest rates occurred in Egypt (3.0) and Comoros (2.3), and the lowest rates in Saudi Arabia (0.59) and Djibouti (0.55).

Discussion

To our knowledge, this is the first time to report on cancer incidence and mortality rates of the 22 Arab countries in Africa, and Asia. In 2020, the total population of the 22 Arab countries represented about 5.6% of the world population (3).

The quality of each country specific estimates depends on many factors including covered area, accuracy of data, and the timeline of the reported numbers, for both incidence and mortality rates. Up-to-date population-based cancer registries across many Arab countries are either deficient or increasingly encountering serious operational challenges even among high-income countries (4, and 5). Thus, while 16 countries had their incidence rates estimated from observed or recent national incidence rates that are projected to 2020, 6 countries had no data, and their rates are those of neighboring countries or registries in the same area. In case of mortality rates, they were estimated by modeling, using incidence-to-mortality ratios derived from cancer registries in neighboring countries (5)

In general, cancer mortality data are usually of lower validity than incidence rates especially in countries with limited resources. This lowered accuracy is mainly due to difficulties in defining and certifying the cause of death. Mortality accuracy may also be affected by the redistribution of the ill-defined causes of death and ill-defined cancers across specific categories. Furthermore, inclusion of metastatic disease together with primary cancers might increase the number of deaths from some organs affected, e.g., Liver, lung, and brain.

The number of 2020 new cancer cases and deaths in the 22 Arab countries; were estimated to be more than 450 thousand new cases representing 2.4% of worldwide data, and about 281 thousand cancer deaths representing 2.8% of world data (4 and 5). Table 7 and Fig. 19 illustrate the number and percent of new cancer cases, mortalities, and 5-year prevalent cases in Arab countries compared to those of Asia, Latin and North America and the Caribbean, and Europe. The percent ratios of new cancer cases in Arab countries, Africa, and Asia in relation to total world data of new cancer cases were 2.4%, 5.8%, and 49.3%, respectively, while the percent ratios of cancer deaths in relation to total world data in the same 3 regions were 2.8%, 7.1%, and 58.3%, respectively, i.e., percent ratios of cancer deaths were higher than percent ratios of their respective new cancer cases.

Table 7
Number and percent of 2020 new cancer cases, mortalities from cancer, and 5-year prevalent cancer cases in different regions of the world.

Item	Arab Countries	Africa	Asia	Latin America	Europe	North America	World (including Oceania)
New cases	463,675 (2.4%)	1,109,209 (5.75%)	9,503,710 (49.3%)	1,470,274 (7.6%)	4,398,443 (22.8%)	2,556,862 (13.3%)	19,292,789
Cancer mortalities	281,656 (2.8%)	711,429 (7.1%)	5,809,431 (58.3%)	713,414 (7.2%)	1,955,231 (19.6%)	699,274 (7%)	9,958,133
Prevalent cases	1,027,579 (2%)	2,166,740 (4.3%)	20,606,063 (40.8%)	3,837,718 (7.6%)	13,496,763 (26.7%)	9,456,199 (18.7%)	50,550,287

On the opposite, the percent ratios of new cancer cases were 22.8% in Europe, and 13.3% in North America in relation to the total world population, while their respective percent ratios of cancer deaths were 19.6% and 7%, respectively, i.e., percent ratios of cancer deaths were lower than percent ratios of their respective new cancer cases.

These differences reflect the differences in underlying etiologic, risk factors, disease stage, changing levels of proper application of national cancer control plans, and efficacy in screening, diagnosis, and management of different types of malignancies.

In the Arab world, cancers of the female breast, colon and rectum, prostate, bladder, and lung represented almost half of the overall burden of cancer in both sexes. The same cancer types were also the major causes of cancer mortality

Breast cancer, as in many other countries all over the world (9), was the most common cancer among women in every Arab country except Comoros where cancer of the cervix uteri represents 27% of female cancer. Breast cancer is also the leading overall cause of death from cancer in women. It is likely that the variations observed in breast cancer incidence can at least in part be attributable to the degree of efficient and opportunistic screening activities, and differences in the prevalence of the major risk factors. Also, lower breast cancer mortality observed in some countries may have been resulted from the combined effects of earlier detection (part due to screening, and part due to increasing breast cancer awareness), and a range of improvements in treatment. The same applies to incidence and mortality rates of colorectal cancer, especially with the more use of a diet that includes high consumption of cereals, vegetables and maintenance of a healthy bodyweight and regular physical activity that are all protective against disease development (10).

Egypt is the only Arab country where liver cancer is the top malignancy among males, and the second most common among females. The high prevalence of HCV especially genotype IV would explain this high incidence. Prevalence of HCV antibodies and RNA were reported to be around 10%, and 9% respectively (11). However, during the last 4 years, a huge HCV detection and treatment campaign was launched, and the great majority of infected patients were freely treated (12). It is thus expected that incidence and mortality rates would decrease among Egyptian population over the coming decades.

There is a general belief that prostate cancer incidence rates are rising in most Arab countries, probably resulting from the rapid increase in the detection of more cases with early-stage prostate cancers. This is surely caused by the wide use of PSA testing (13).

Lung cancer is the fifth cause of deaths from cancer. It is expected that with the increasing tobacco use that both the incidence and mortality rates are going to increase in the coming few years. So, better tobacco control is mandatory, together with concerted efforts to diagnose and treat such patients better early (14).

So, in conclusion, the available data points to the need of more support to national population-based cancer registries in the Arab world that are increasingly encountering serious operational challenges including insufficient funding, a shortage of qualified staff, and a requirement to ensure compliance with the international WHO standards, Natural cancer registries represent a critical evidence base for better cancer control and patients' management.

Declarations

• Ethics approval and consent to participate

Not applicable.

• Consent for publication

The authors hereby agree to publish this article.

• Availability of data and materials

The authors agree to let these data and materials available for researchers.

• Competing interests

There are no competing interests.

• Funding

There was no funding.

• Authors' contributions

H K has contributed to suggesting the idea, designing the methodology.

R K has collected the data and shared in writing the manuscript with HK.

A I has reviewed the outcome, and the editing of the manuscript.

• Acknowledgements

The authors acknowledge secretary Khaled Mansour who have helped in writing the manuscript.

• Conflict of Interests

The authors declare that they have no conflict of interests.

References

1. Mattiuzzi C, and Lippi G (2019): Current Cancer Epidemiology, J Epidemiol Glob Health ;9(4):217-222.
2. <https://www.who.int/cancer/FINAL-Advocacy-Module%206.pdf>.
3. <https://worldpopulationreview.com/country-rankings/arab-countries>
4. <https://gco.iarc.fr>
5. <https://gco.iarc.fr/today/fact-sheets-populations>
6. <https://gco.iarc.fr/today/data-sources-methods>
7. Danckert B, Ferlay J, Engholm G , Hansen HL, Johannesen TB, Khan S, K t lum JE,  lafsd ttir E, Schmidt LKH, Virtanen A and Storm HH. NORDCAN: Cancer Incidence, Mortality, Prevalence and Survival in the Nordic Countries, Version 8.2 (26.03.2019). Association of the Nordic Cancer Registries. Danish Cancer Society. Available from <http://www.ancr.nu>, accessed on 07/01/2020).
8. World Health Organization. Tenth Revision. In: International statistical classification of diseases and related health problems vol. Geneva, Switzerland: WHO; 2013.
9. <https://www.wcrf.org/dietandcancer/breast-cancer-statistics>.
10. Rawla P, Sunkara T, and Barsouk A (2019): Epidemiology of colorectal cancer: incidence, mortality, survival, and risk factors, Prz Gastroenterol; 14(2): 89–103.
11. Kandeel A, Genedy M, El-Refai S, Funk AL, Fontanet A, Talaat M (2017):The prevalence of hepatitis C virus infection in Egypt 2015: implications for future policy on prevention and treatment.; Liver Int.,37(1):45-53.
12. El Kassas M, Elbaz T, Elsharkawy A, Omar H, Esmat G. Expert (2018); Rev Anti Infect Ther. ;16(4):345-350.
13. Osman ZA, and Ibrahim ZA (2018): Prostate cancer in the Arab population: an overview, Saudi Med J. 2018 May; 39(5): 453–458.
14. Schabath M B and Cote M L (2019): Cancer Progress and Priorities: Lung Cancer, Cancer Epidemiol Biomarkers Prev. 2019 Oct; 28(10): 1563–1579.

Table 4

Table 4 is available in the Supplementary Files section.

Figures

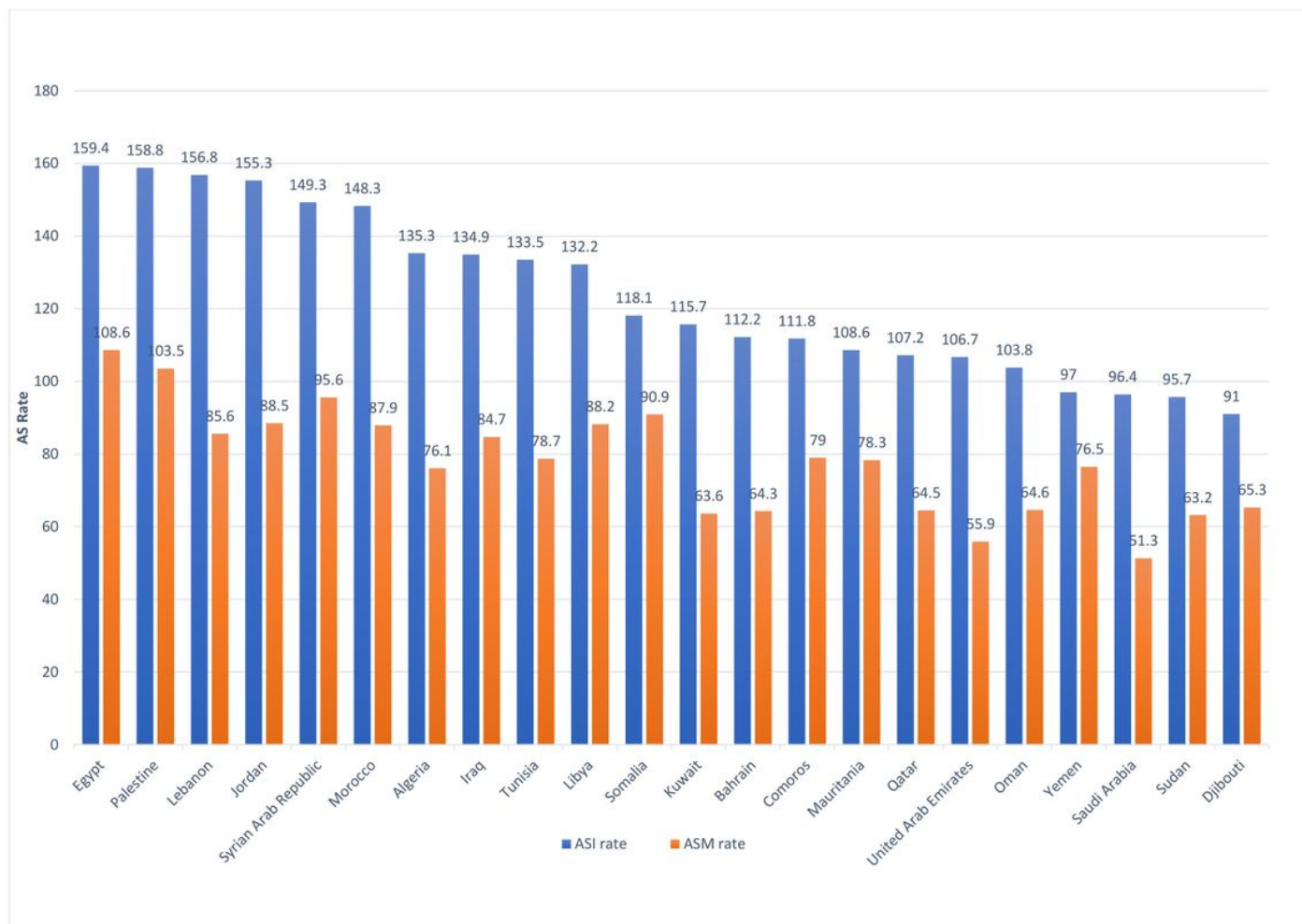


Figure 1

1. Estimated age-standardized incidence and mortality rates (World) in 2020 for all Arab countries, all cancers, both sexes, all ages

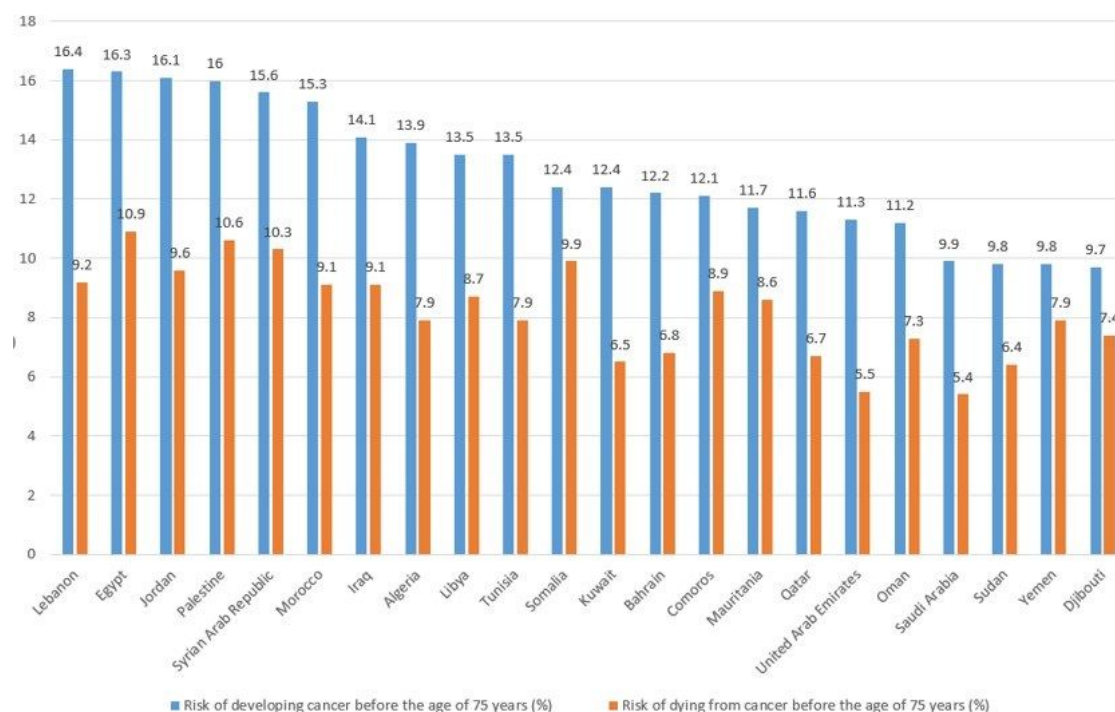


Figure 2

2. Risk of developing or dying from cancer before the age of 75

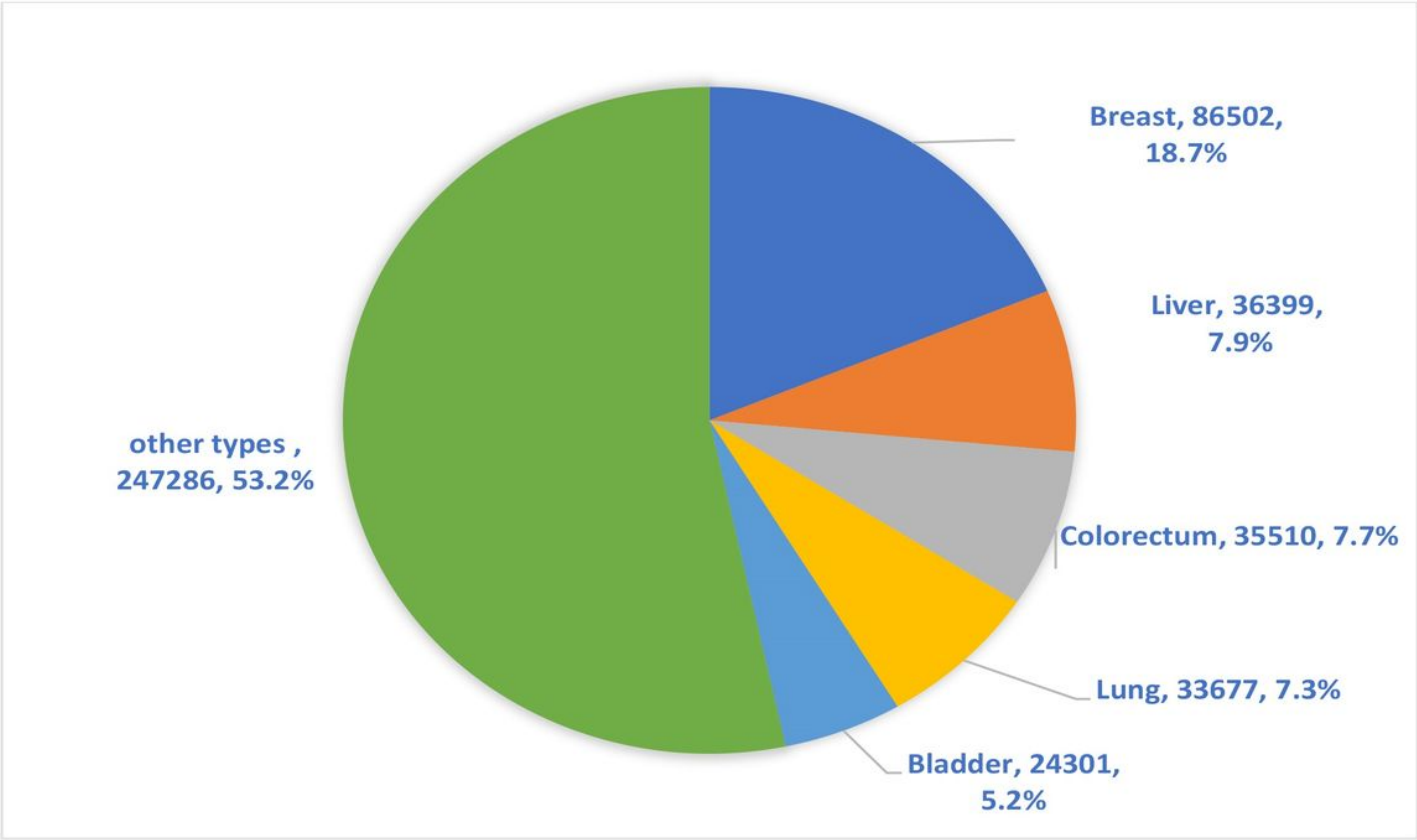


Figure 3

6A. Number and frequency of new cases, for the 5 most common cancers in Arab countries 2020, both sexes

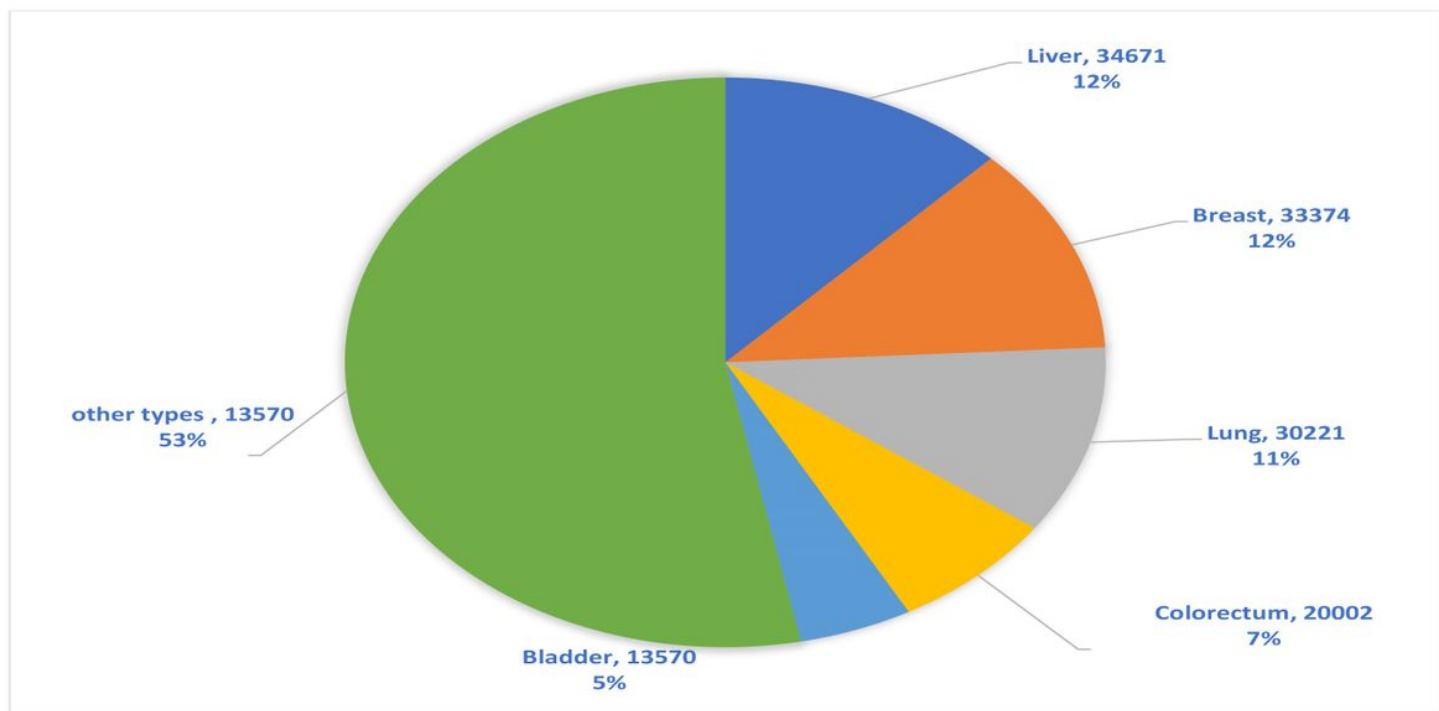


Figure 4

7A. Number and frequency of deaths from the top 5 cancers in Arab countries 2020, both sexes.

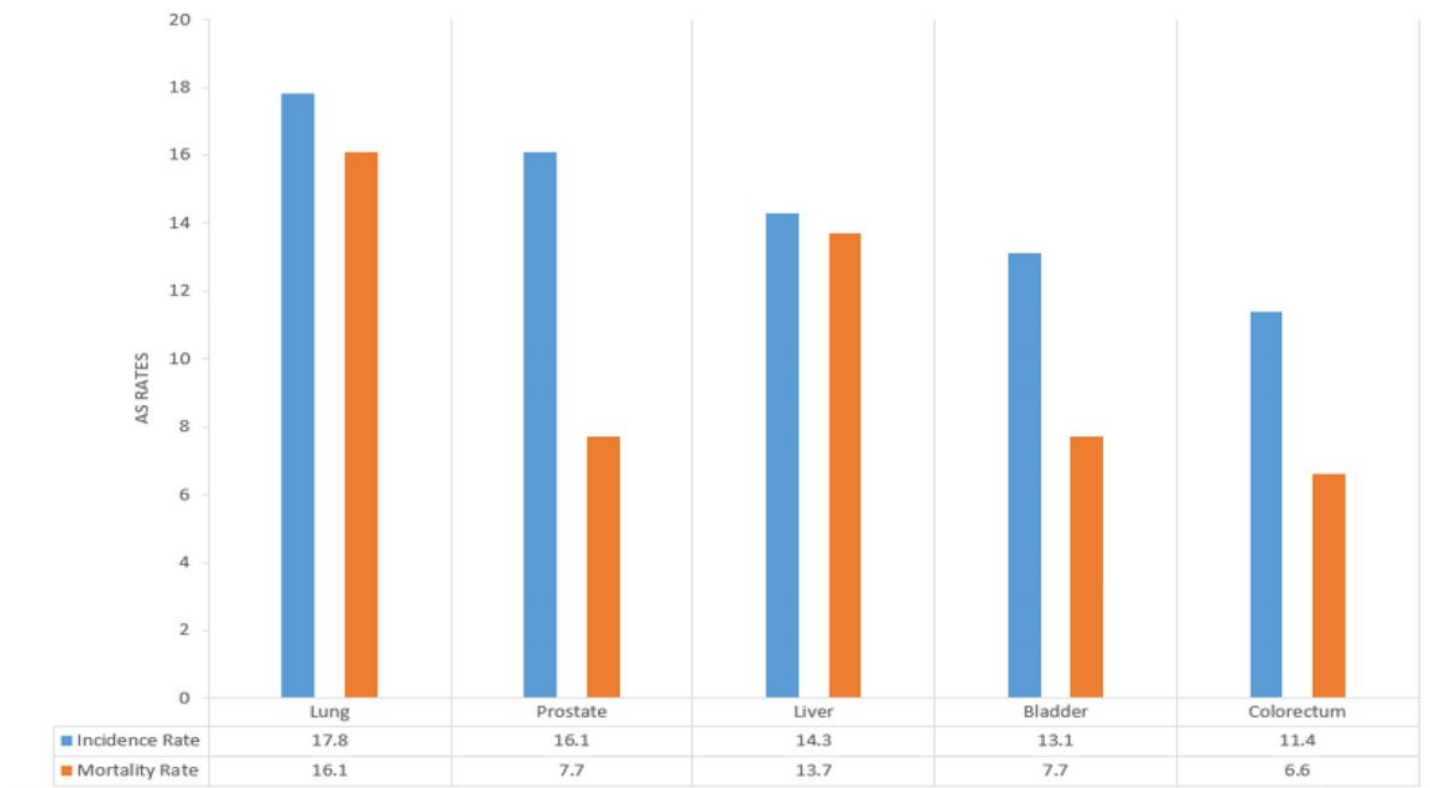


Figure 5

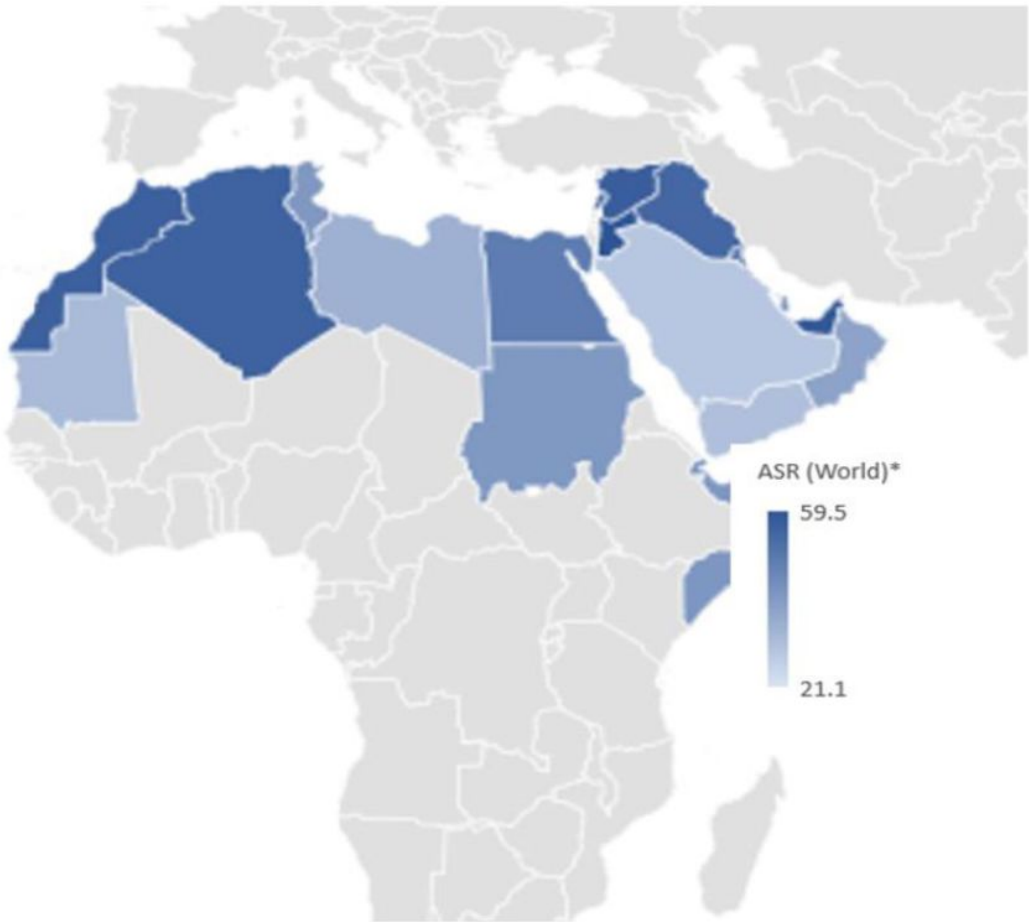


Figure 6

11. Geographic gradient variations in the estimated incidence rates of breast cancer in 22 Arab countries.

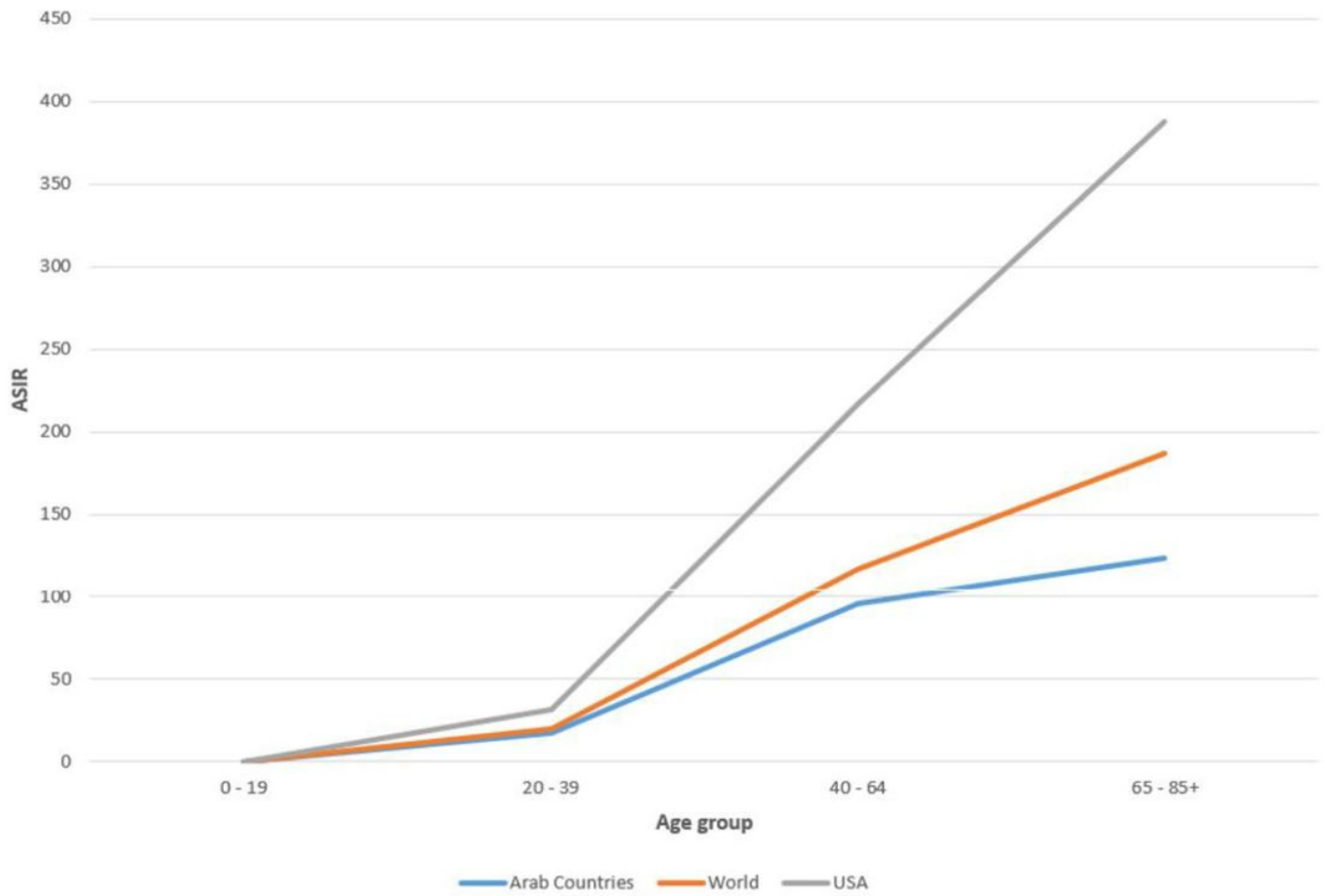


Figure 7

12. The calculated ASIR for breast cancer in all 22 Arab countries compared to that of world and the USA.

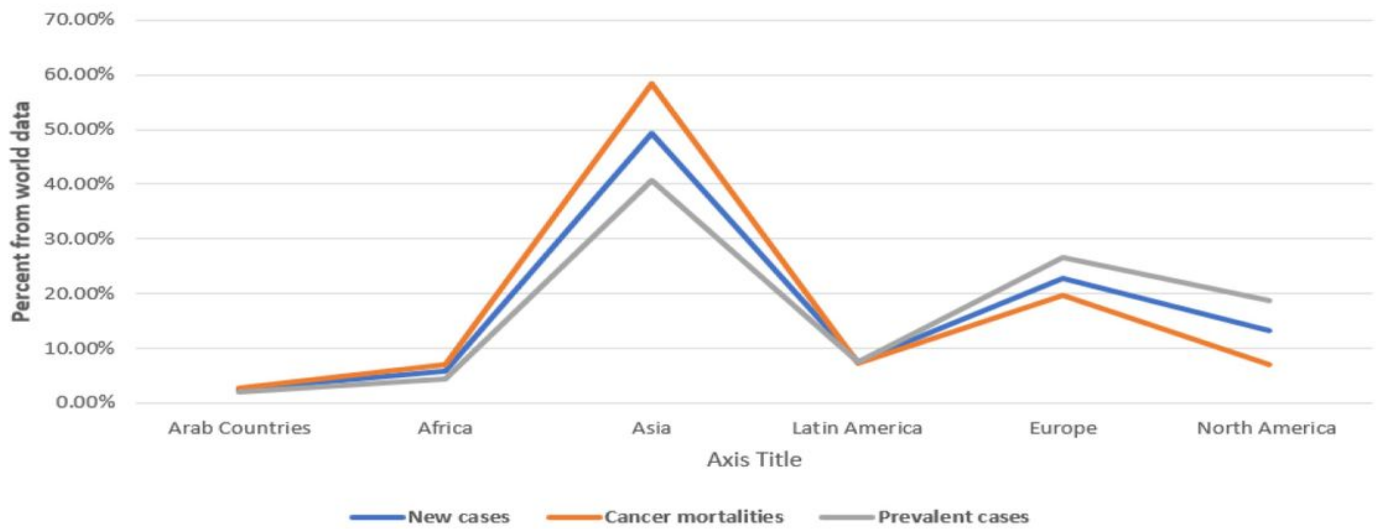


Figure 8

19. Number and percent of 2020 new cancer cases, mortalities, and 5-year prevalent cancer cases in different regions of the world.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Table4.docx](#)
- [supplement.docx](#)