Global Thyroid Cancer Indicators: Compression the Highest Survival Rate

Baraa Ali Mohammed[1] , **Rabiah Muayad Sabri Shawkat[2]** , **Hawraa l.Kadhim[3], Abedaljasim M.Aljibouri[4], Sarah Abdulsalam wahwah[5], Nathier A. Ibrahim[6], Tareq Hafdi Abdtawfeeq[7] and Ashjan Mohammed Hussein[8]**

[1]Department of Clinical Laboratory Sciences, College of pharmacy, AL-Qadisiyah University, Diwaniyah, Iraq
[2,8] Department of Experimental therapy / Iraqi Center for Cancer and Medical Genetics Research, Mustansiriyah University, Baghdad, Iraq
[3] Department of Medical Genetics Research, Iraqi Center for Cancer and Medical Genetics Research, Mustansiriyah University, Baghdad, Iraq
[4]Al-Salam University College Department of Criminal Evidence
[5] Medical Techniques Department, Imam Jaafar Alsadiq university
[6]Department of Radiological Technique, collage of Health and Medical Technologies, Al-turth University
[7]Department of Medical Techniques, Al-Farahidi University, Baghdad, Iraq

*Corresponding Author: Ashjan Mohammed Hussein

ABSTRACT: Background: Thyroid cancer is a cancer that develops from the tissues of the thyroid gland. It is a disease in which cells grow abnormally and have the ability to spread to other parts of the body. This paper discusses the prevalence and mortality of this type of cancer by continent and region for females and males with reference to the countries with the highest and lowest injuries and deaths.
Material & Methods: Publications from WHO, the International Agency for Research & Cancer, and Cancer Today 2024 on the incidence and mortality of male and female thyroid cancer in global continents and UN regions were used, with a comparison made to find their indicators, especially survival rates, illustrated with charts.
Results: The results indicated that the number of incidences is not few, but the mortality rate was limited due to the development of medical technology, and the results indicated that the number of incidences and mortality in females is much higher than in males.
Conclusion: The cause of thyroid cancer is still unknown, but since the thyroid gland is very sensitive to radiation, radiation exposure can cause cancerous changes in it. Thyroid cancer is more common in people who have been treated with radiation in the head, neck, or chest areas. The results obtained were a comparison between logic and continents and that the patient needs follow-up and health care.

Keywords: Global Indicators, Thyroid Cancer, Survival Rate

1. INTRODUCTION

Thyroid cancer is a cell tumor that begins in the thyroid gland. And the thyroid gland is a butterfly-shaped gland located at the base of the neck, just below the Adam's apple [1-3]. The thyroid gland secretes hormones to regulate heart rate, blood pressure, body temperature, and weight. Thyroid cancer may not cause any symptoms at first [4]. But as it grows, it causes signs and symptoms, such as a lump in the neck, changes in voice, and difficulty swallowing [5-8].

There are many types of thyroid cancer [9, 10]. Most species grow slowly, but some species may be very voracious. Most thyroid cancers can be cured with treatment. But the incidence of thyroid cancer seems to be increasing [11]. This increase may be due to improved imaging techniques that allow doctors to detect small thyroid cancers in CT and MRI scans performed on people with other diseases (incidentally detected thyroid cancers) [12, 13]. This paper is looking for indicators of the disease that causes problems for many people. We considered the World Health Organization publications, analyzing their indicators and comparing them by UN regions and continents.

2. METHODS

Data resources :Data for this study were drawn from WHO, international agency for research on Cancer, the Global Cancer Observatory, and Cancer Today, 2024.The International Agency for Research on Cancer produced GLOBOCAN estimates by first generating incidence and mortality rates using cancer registry data-population-based, by continents, regions, and countries. The data were analyzed and graphically illustrated while finding the survival rate [13-33].

Statistical analyses & Indicators :The data contains the incidence and mortality cases by continents, UN regions, and countries for males and females. The age-specific rate was calculated as [34].

$$\frac{Number\ of\ cancer\ cases\ in\ specific\ group}{Total\ population\ in\ that\ same\ age\ group} \times 100000 \qquad (1)$$

The crude rate of cancer is calculated as

$$CR = \frac{Total\ numer\ cases\ (incidence\ \&\ mortality)\ in\ a\ specific\ population}{Total\ population\ at\ risk} \times 100000 \quad (2)$$

Estimated Cumulative Risk, which represents the percentage of new cases during a period in which the denominator is the initial number of in1fected people, is calculated from the following equation:

$$R_{Cumulative} = \frac{N_{d+newcases}}{N_{all\ persons\ at\ risk}} \qquad (3)$$

Where

$N_{d+newcases}$ → The number of new cases of the disease under observation during a given period.
$N_{all\ persons\ at\ risk}$ → The number of all persons at risk for getting ill with the disease under observation at the beginning of.

It should be noted that the survival rate is calculated by dividing the number of people alive after a specific time period by the total number of people diagnosed with that cancer.

These processes were repeated for each group to allow for fair comparisons between populations or over time.

3. RESULT

Incidences of ASR, crude rate, cumulative risk, and survival rate vary from continent to continent according to the population density and health culture of each continent. As for mortality, it depends on the income level of the countries of each continent and the level of health technological progress and the use of necessary treatments before the aggravation of the health crisis, as we note that the highest incidences were in Asia (596599), followed by Europe (78552), then Latin America and the Caribbean (63530), North America (57747), Africa (19740), and the least is Oceania (5046). In mortality their size was very limited and proportional to the size of the incidences for each continent. And this analysis was reflected on ASR, crude rate, and cumulative risk. The survival rate was very high; the highest was North America (96%), followed by Asia (95%); the lowest was Africa (75%); globally, the survival rate was 94%, table (1), figure (1).

Table 1. - Incidence & Mortality both sexes by Continent

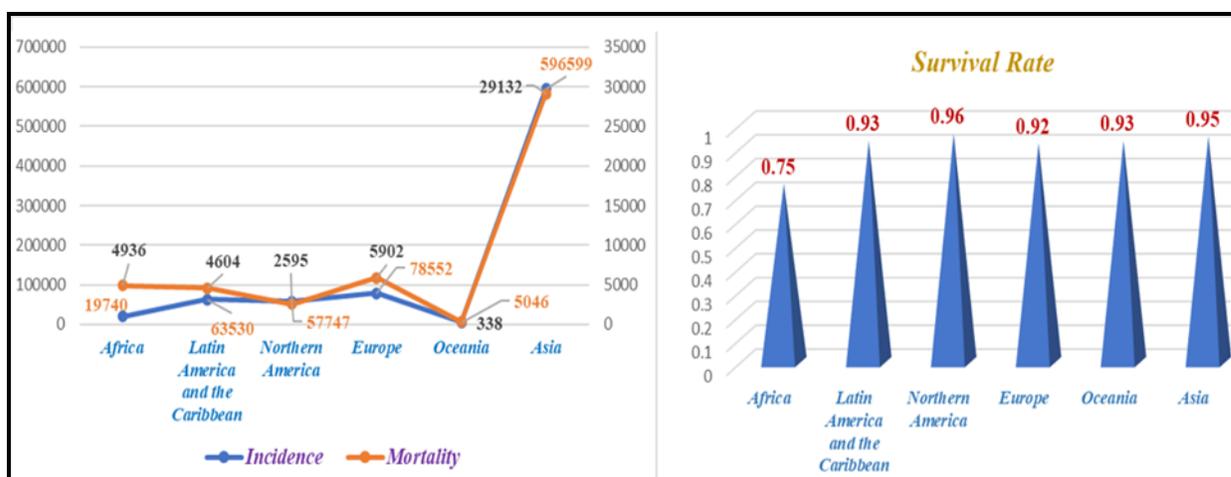| Continents	Incidence	Mortality	ASR (World)		Crude rate		Cumulative risk		Survival Rate
			Incidence	Mortality	Incidence	Mortality	Incidence	Mortality	
Africa	19740	4936	2.1	0.64	1.4	0.35	0.23	0.07	0.75
Latin America and the Caribbean	63530	4604	8.3	0.52	9.6	0.69	0.84	0.06	0.93
Northern America	57747	2595	11.9	0.30	15.5	0.70	1.2	0.03	0.96
Europe	78552	5902	7.5	0.30	10.5	0.79	0.75	0.03	0.92
Oceania	5046	338	9.5	0.47	11.5	0.77	0.97	0.05	0.93
Asia	596599	29132	10.7	0.46	12.8	0.63	1.1	0.05	0.95
Total	**821214**	**47507**	**9.1**	**0.44**	**10.4**	**0.60**	**0.91**	**0.05**	**0.94**

FIGURE 1. - Incidence & Mortality, survival rate both sexes by continents

The incidence of thyroid cancer was higher in females than males and at high rates; this also affected mortality and at higher rates. The lowest percentage of male incidence was 23% in Latin America and the Caribbean; the highest percentage was in Asia (35%) and globally (34%). For mortality, the percentage was higher; the lowest percentage for males is 33% in Africa, and the highest percentage is 88% in Latin America and the Caribbean. The survival rate of females was higher than that of males by about 5%, table (2), figure (2).

Table 2. - Percentage of Incidence & Mortality of Males to Females by Continent

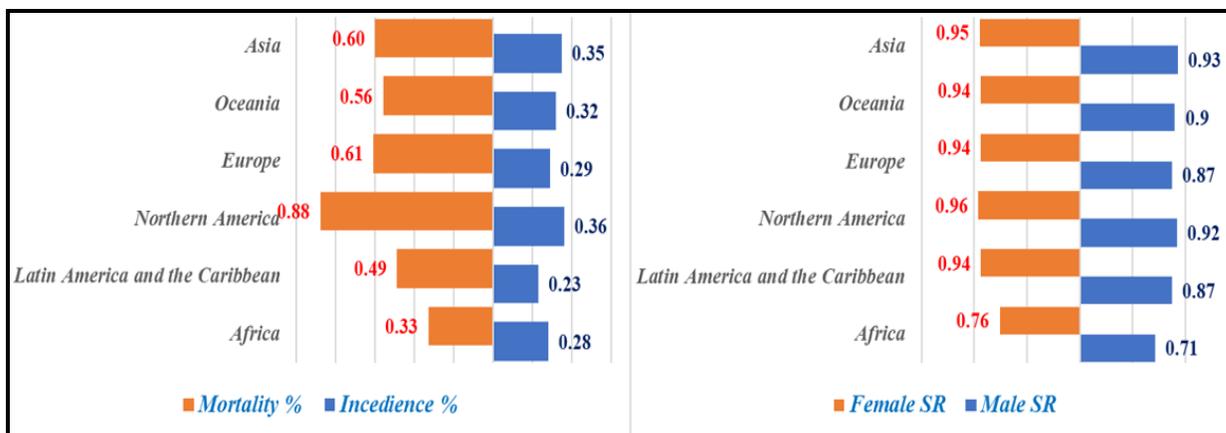| Continents	Incidence			Mortality			Survival Rate	
	Male	Female	%	Male	Female	%	Male	Female
Africa	4297	15443	0.28	1236	3700	0.33	0.71	0.76
Latin America and the Caribbean	11955	51575	0.23	1518	3086	0.49	0.87	0.94
Northern America	15282	42465	0.36	1211	1384	0.88	0.92	0.96
Europe	17449	61103	0.29	2247	3655	0.61	0.87	0.94
Oceania	1228	3818	0.32	122	216	0.56	0.90	0.94
Asia	156274	440325	0.35	10907	18225	0.6	0.93	0.95
Total	206485	614729	0.34	17241	30266	0.57	0.91	0.95

FIGURE 2. - Incidence & Mortality percentage, male & female survival rate

The highest incidence was in Eastern Asia (501310 cases), followed by Northern America (57747) cases, then South America (47581 cases). The lowest was in Micronesia with (37) cases, which has no mortality cases, associated with the same level in ASR, crude rate, and cumulative risk. The lowest survival rate was in Western Africa (55%), and the highest survival rate was in Eastern Asia (77%), table (3), figure (3).

Table 2. - Incidence & Mortality, ASR, crude rate, & cumulative risk both sexes UN regions

UN Regions	Incidence Cases	Mortality Cases	ASR (World)		Crude rate		Cumulative risk		Survival Rate
			Incidence	Mortality	Incidence	Mortality	Incidence	Mortality	
Northern America	57747	2595	11.9	0.30	15.5	0.70	1.2	0.03	0.95
Eastern Asia	501310	14339	23.1	0.45	31.0	0.89	2.2	0.05	0.97
Eastern Africa	5773	1820	2.1	0.80	1.2	0.39	0.23	0.10	0.68
Middle Africa	1169	475	1.2	0.55	0.61	0.25	0.13	0.07	0.59
Northern Africa	9319	1494	3.9	0.65	3.7	0.59	0.41	0.06	0.83
Southern Africa	1341	200	2.1	0.36	1.9	0.29	0.21	0.04	0.85
Western Africa	2138	947	0.94	0.50	0.51	0.22	0.11	0.06	0.55
Caribbean	1970	247	3.7	0.36	4.5	0.56	0.38	0.04	0.87
Central America	13979	1301	7.2	0.65	7.6	0.71	0.72	0.08	0.90
South-Eastern Asia	35446	5007	4.6	0.64	5.2	0.73	0.46	0.07	0.85
South Central Asia	34533	7646	1.6	0.38	1.7	0.37	0.16	0.04	0.77
Western Asia	25310	2140	8.5	0.79	8.8	0.74	0.86	0.09	0.91
Eastern Europe	30006	2231	7.4	0.34	10.3	0.76	0.75	0.04	0.92
Northern Europe	8761	782	5.9	0.26	8.2	0.73	0.58	0.03	0.91
Southern Europe	19698	1237	9.0	0.26	13.0	0.82	0.89	0.03	0.93
Western Europe	20087	1652	7.4	0.27	10.2	0.84	0.73	0.03	0.91

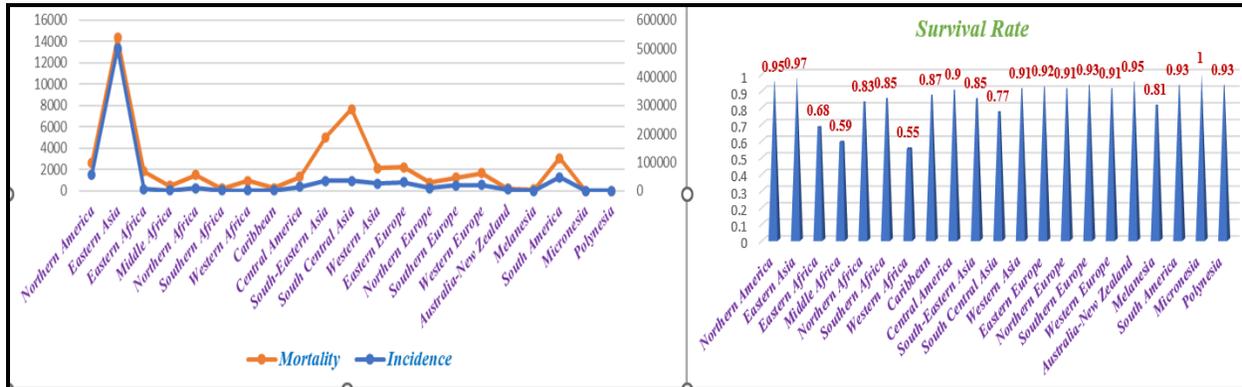|								
Australia-New Zealand	4205	201	10.3	0.28	13.6	0.65	1.0	0.03	0.95
Melanesia	696	130	7.5	1.7	6.0	1.1	0.81	0.19	0.81
South America	47581	3056	9.1	0.49	10.9	0.70	0.93	0.05	0.93
Micronesia	37	0	6.5	0.00	6.6	0.00	0.69	0.00	1
Polynesia	108	7	14.7	0.95	15.6	1.0	1.6	0.14	0.93
Total	**821214**	**47507**	**9.1**	**0.44**	**10.4**	**0.60**	**0.91**	**0.05**	**0.94**

FIGURE 4. - Incidence, Mortality, survival rates, male & female

For UN regions, the highest incidence and mortality was in Eastern Asia for both sexes, then North America, but South-Central Asia was the second area in mortality. The lowest was Polynesia with no mortality and a 100% survival rate. Noticed that Micronesia has no incidence and mortality, table (4), figure (4).

Table 4. - Percentage of Incidence, Mortality & survival rates of Males and Females by UN Regions

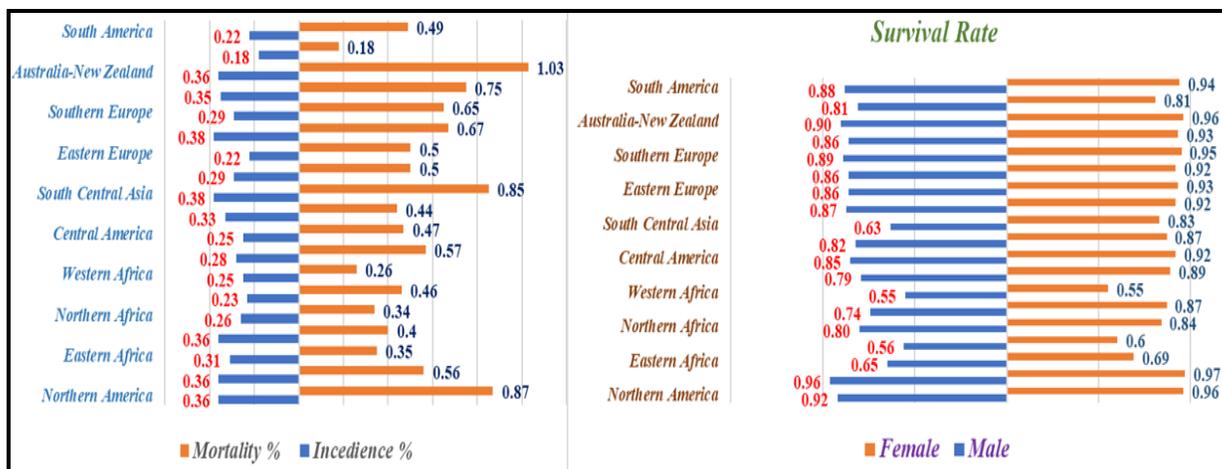| UN Regions	Incidence			Mortality			Survival Rate	
	Male	**Female**	**%**	**Male**	**Female**	**%**	**Male**	**Female**
Northern America	15282	42465	0.36	1211	1384	0.87	0.92	0.96
Eastern Asia	132449	368861	0.36	5156	9183	0.56	0.96	0.97
Eastern Africa	1363	4410	0.31	467	1353	0.35	0.65	0.69
Middle Africa	310	859	0.36	135	340	0.4	0.56	0.60
Northern Africa	1946	7373	0.26	378	1116	0.34	0.80	0.84
Southern Africa	249	1092	0.23	63	137	0.46	0.74	0.87
Western Africa	429	1709	0.25	193	754	0.26	0.55	0.55
Caribbean	431	1539	0.28	90	157	0.57	0.79	0.89
Central America	2809	11170	0.25	415	886	0.47	0.85	0.92
South-Eastern Asia	8697	26749	0.33	1538	3469	0.44	0.82	0.87
South Central Asia	9476	25057	0.38	3502	4144	0.85	0.63	0.83
Western Asia	5652	19658	0.29	711	1429	0.5	0.87	0.92
Eastern Europe	5384	24622	0.22	740	1491	0.5	0.86	0.93
Northern Europe	2399	6362	0.38	314	468	0.67	0.86	0.92
Southern Europe	4444	15254	0.29	487	750	0.65	0.89	0.95
Western Europe	5222	14865	0.35	706	946	0.75	0.86	0.93
Australia-New Zealand	1104	3101	0.36	102	99	1.03	0.90	0.96
Melanesia	106	590	0.18	20	110	0.18	0.81	0.81
South America	8715	38866	0.22	1013	2043	0.49	0.88	0.94
Micronesia	0	0	0	0	0	0	0	1
Polynesia	18	90	0.20	0	0	0	0	1
Total	206485	614729	0.34	17241	30266	0.57	0.91	0.95

FIGURE 4. - Incidence & Mortality percentage, male & female survival rate, Microsoft excel, elaborated by the authors

As for the human development index, high HDI countries have the highest incidence, mortality, ASR, crude rate, and cumulative risk, as well as the highest survival rate, followed by very high HDI countries. On the other side, low HDI countries have the lowest in all measures, table (5), figure (5).

Table 5. - Incidence & Mortality, Both Sexes, HDI levels

| HDI Levels	Incidence Cases	Mortality Cases	ASR (World)		Crude rate		Cumulative risk		Survival Rate
			Incidence	Mortality	Incidence	Mortality	Incidence	Mortality	
Very HDI country	203747	13589	9.2	0.34	12.4	0.83	0.91	0.04	0.93
High HDI country	558737	20675	16.0	0.49	20.3	0.75	1.5	0.05	0.96
Medium HDI country	45952	9300	2.0	0.44	2.0	0.41	0.20	0.05	0.79
Low HDI country	12575	3922	1.6	0.61	1.0	0.32	0.17	0.08	0.68
Total	821011	47486	9.1	0.44	10.4	0.60	0.91	0.05	0.94

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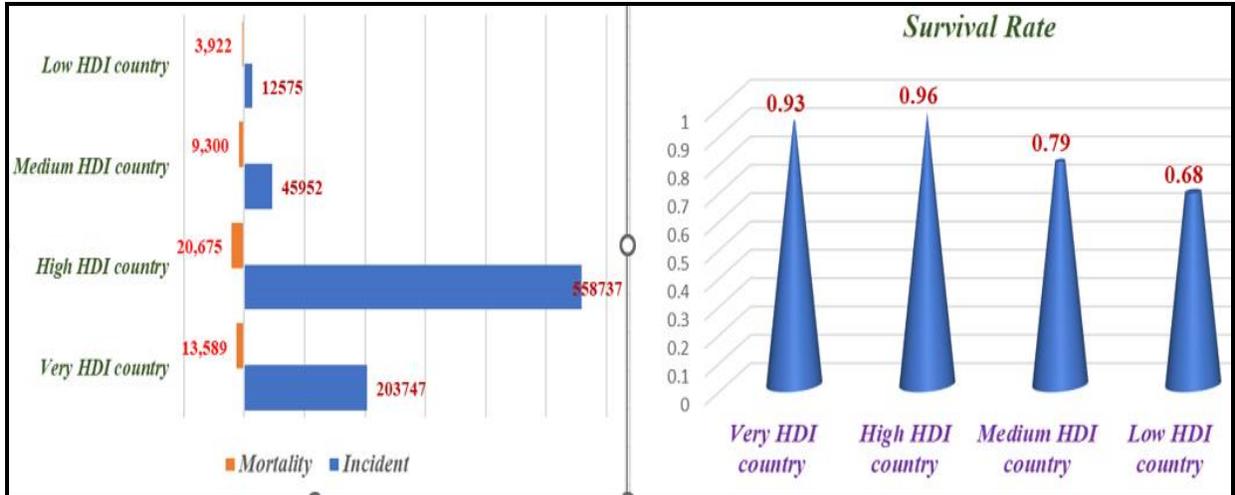
FIGURE 4. - **Incidence, Mortality & survival rates, male & female.**

China ranked the highest in incidence cases, followed by Korea, Japan, Russia, and Turkey. Cape Verde ranked the lowest incidence country. In mortality the compression was different; Indonesia ranked the highest, then Russia, the Philippines, and Ethiopia. French Guyana and Guyana were the lowest countries. Noticed that Sao Tome and Principe has no incidence case. Meanwhile, there were nine countries without mortality cases, which are the Bahamas, Bhutan, Belize, Equatorial Guinea, France, Guadeloupe, Guam, Saint Lucia, Sao Tome and Principe, and Sierra Leone, table (6), figure (6) and (7).

Table 6. - Highest & lowest incidence & mortality countries

Incidence				Mortality			
Highest		Lowest		Highest		Lowest	
Argentina	4229	Cape Verde	3	Iran	446	French Guyana	1
United Kingdom	4760	Comoros	3	France	476	Guyana	1
Colombia	4885	Sierra Leone	3	Egypt	483	Comoros	2
Spain	5233	Guinea	4	Colombia	517	Lesotho	2
Canada	5559	Guinea-Bissau	4	Nigeria	537	Luxembourg	2
Viet Nam	6122	Eswatini	4	Italy	563	France, Martinique	2
Germany	6537	Lesotho	5	Pakistan	688	Guinea-Bissau	2
Philippines	7771	Bhutan	6	Germany	706	Timor-Leste	2
Italy	8948	Guyana	7	Vietnam	858	Suriname	2
France	9618	Gambia	8	Türkiye	867	Eswatini	2
Mexico	11392	Botswana	9	Ethiopia	906	Botswana	3
Indonesia	13761	Saint Lucia	10	Philippines	941	Solomon Islands	3
Türkiye	15376	Belize	11	Russian Federation	987	Brunei Darussalam	3
Russian Federation	16145	Gabon	12	Mexico	993	French Polynesia	3
Japan	16419	French Guyana	13	Brazil	1103	Gabon	3
Korea, Republic of	17642	Guam	13	Indonesia	2141	Gambia	3
India	21873	Congo	14	Japan	2193	Malta	3
Brazil	31385	Timor-Leste	15	USA	2244	Samoa	3
USA	52169	Maldives	17	India	5455	Barbados	4
China	466118	Samoa	17	China	11564	Cape Verde	4
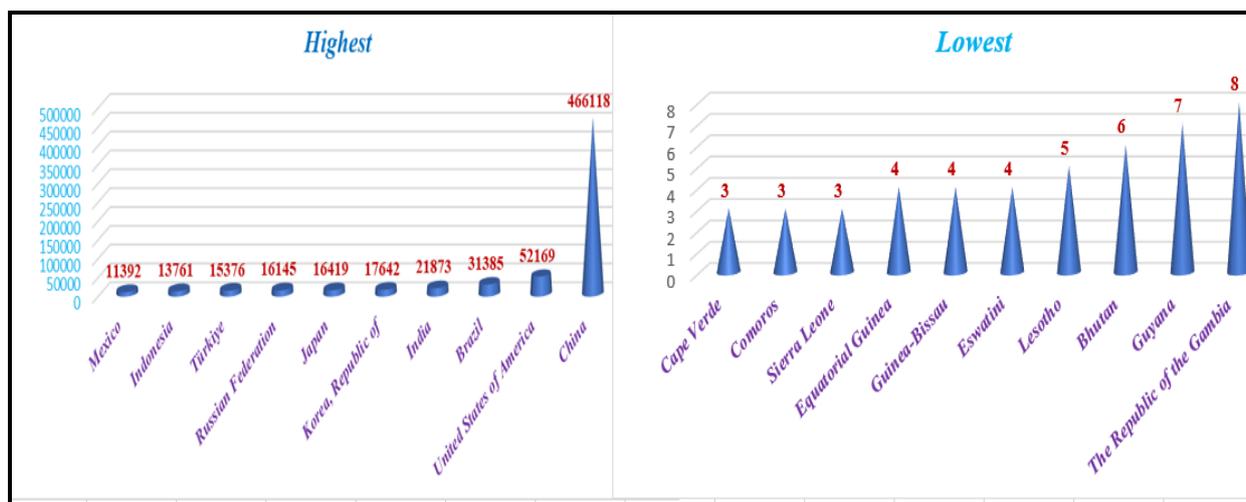
FIGURE 6. - Highest & lowest incidence countries

Corresponding author: ashjan.mh96@uomustansiriyah.edu.iq
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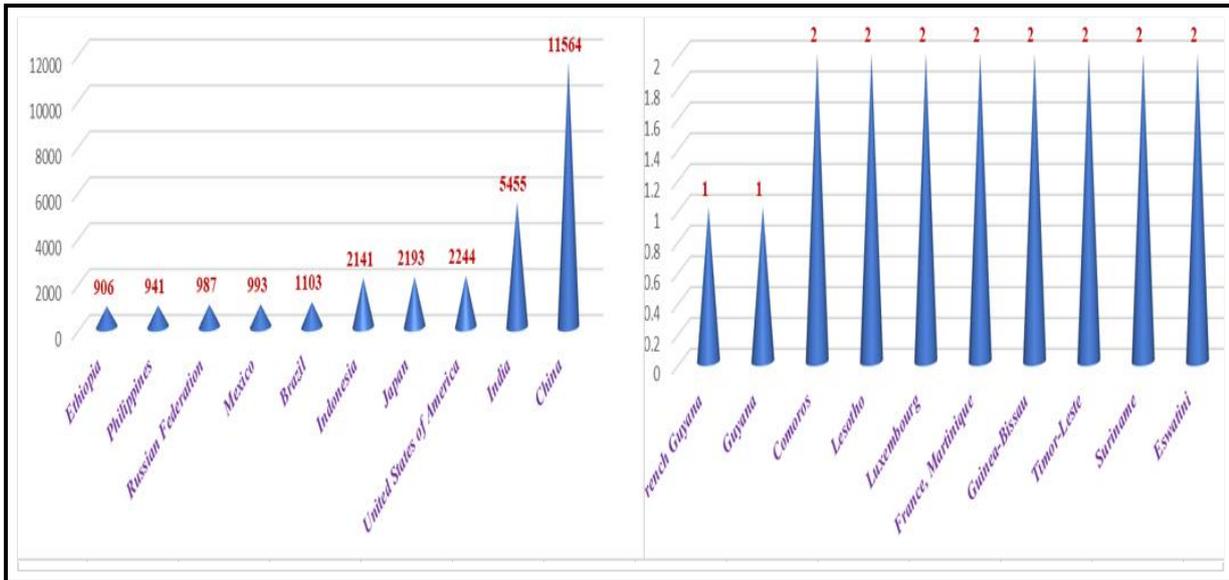
FIGURE 7. - Highest & lowest mortality countries

Survival rates across UN regions. Females consistently demonstrated higher incidence rates than males in all regions. Mortality-to-incidence ratios (MIR) were lowest in high-income regions such as Northern America, Western Europe, and Australia–New Zealand, reflecting better diagnostic capacity and access to effective treatment. In contrast, African regions exhibited higher MIR values and lower survival rates, indicating disparities in healthcare infrastructure and early detection. Survival rates were highest in North America and Europe (>90%) and lowest in parts of Africa (<70%). Regions with zero reported cases were excluded from survival estimation.

4. CONCLUSION

Although the precise etiology of thyroid cancer remains unclear, exposure to ionizing radiation is a well-established risk factor, particularly in individuals who have received radiation therapy to the head, neck, or chest regions. The observed variations in incidence, mortality, ASR, crude rates, cumulative risk, and survival rates across continents are influenced by population density, health awareness, socioeconomic status, and access to advanced healthcare services. Mortality outcomes are closely associated with national income levels, healthcare infrastructure, technological advancement, and the timely implementation of appropriate treatment strategies. Continuous patient follow-up and comprehensive healthcare services are essential to prevent disease progression and improve long-term outcomes.

ACKNOWLEDGEMENT

Acknowledgements and Reference heading should be left justified, bold, with the first letter capitalized but have no numbers. Text below continues as normal.

CONFLICTS OF INTEREST

The authors declare no conflict of interest

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