International Journal of Scientific Reports
AbuSheha A. Int J Sci Rep. 2026 Sep;12(9):295-300
https://www.sci-rep.com
pISSN 2454-2156 | eISSN 2454-2164
DOI: https://dx.doi.org/10.18203/issn.2454-2156.IntJSciRep20262819

Original Research Article

Analysis of cancer in Palestine: epidemiological trends, system-level constraints and regional disparities

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Received: 31 May 2026
Accepted: 18 July 2026

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ABSTRACT

Background: Cancer represents an increasingly significant public health concern in Palestine. Few comprehensive studies address the rising mortality rates, emerging incidence trends, and limitations within the health system.
Methods: Data from the Palestinian Ministry of Health were utilized to examine temporal cancer patterns. The analysis included new cases and mortality in both the West Bank and Gaza Strip. Trends from 2014 to 2024 were assessed using descriptive and comparative statistics, including the compound annual growth rate (CAGR) to quantify average annual increases.
Results: In 2024, the cancer incidence rate was 130.8 per 100,000 population, with an age-standardized incidence rate (ASIR) of 201.4. Breast cancer was the most prevalent, followed by colorectal and lung cancers. Lung cancer accounted for the highest number of cancer-related deaths. Incidence rates were higher in the West Bank compared to Gaza Strip. CAGR analysis indicated consistent increases in both new cases and mortality.
Conclusions: Cancer mortality rates continue to rise in Palestine, with marked regional disparities. Reducing future risks requires enhanced surveillance, improved early detection, and equitable access to care.

Keywords: Cancer epidemiology, Palestine, Incidence trends, Health disparities

INTRODUCTION

Nowadays, cancer is a major cause of disease and death worldwide. It significantly increases the impact of non-communicable diseases (NCDs, which are diseases not caused by infections, such as heart disease and diabetes). Recent data show both new cases and deaths are rising, especially in low-and middle-income nations. In these places, aging populations, urban growth, and changing lifestyles are shifting disease patterns faster than health systems can keep up.[1-5] These rapid changes strain resources for diagnosis and treatment in many developing countries.[6,7] This highlights the importance of understanding local cancer trends.

Cancer patterns in the Middle East and North Africa (MENA) have greatly changed. Colorectal, lung, and breast cancers remain the most common, mainly due to risk factors such as tobacco use, eating more processed and fatty foods, obesity, less physical activity, and exposure to harmful substances. Longer life expectancy and better detection also added to these trends. However, there are significant differences across countries, largely due to variations in how they collect cancer data, run prevention programs and organize medical systems.[8]

Cancer is one of the main causes of death in Palestine. The Palestinian data show that more people are being diagnosed and that age-standardized rates are rising, which means the disease burden is growing beyond just changes in the population. Despite some progress, there are still ongoing problems with early detection, getting treatment, and having enough cancer care services. These ongoing issues are highlighted by the small improvements seen in death rates.[9]

Palestine, like other countries in the region, faces its own cancer challenges. For example, lung cancer causes the most cancer deaths, breast cancer is the most common among women, and colorectal cancer is becoming more

frequent. These trends are linked to local factors such as changes in diet and tobacco use, as well as global influences, demonstrating that both local and global factors shape cancer patterns.[10-12]

Significant differences between regions in Palestine make interpreting cancer data challenging. For example, the West Bank and Gaza Strip have different levels of cancer care, diagnostic tools and healthcare facilities, resulting in inconsistencies. Many cancer cases in Gaza may go undiagnosed or unreported, which hides the real extent of cancer there. Ongoing health system problems, insufficient cancer drugs and insufficient access to services further worsen these issues.[13]

Age-standardized incidence rates (ASIRs) help compare cancer rates across populations by adjusting for differences in age distribution. They adjust for age differences, making sure the rates are comparable. This is particularly important for younger populations, such as those in Palestine. Applying standard or trend-based methods gives a clearer picture. Relying on crude rates, which do not adjust for age, could underestimate the real impact of cancer.

Cancer surveillance in Palestine has improved in recent years. However, comprehensive and integrated studies are still very rare. Most research is illustrative and does not closely examine what structural or conflict-related factors affect cancer patterns.[14]

This study aims to provide a comprehensive and up-to-date overview of cancer in Palestine. It examines patterns in new cases, differences by age and gender, and trends over time. It also explores regional differences and focuses on how the health system constraints shape these patterns.

METHODS

Study design

This retrospective population analysis used data from the Palestinian Ministry of Health annual health report 2024.[11] It reviewed cancer trends in Palestine, focusing on temporal patterns and regional differences between the West Bank and Gaza Strip. Aggregate data included cancer incidence, mortality, screening, referrals, and health system capacity. The Palestinian demographic data provided supplementary context.[11]

Study population

All cancer cases and cancer-related deaths reported in the Palestinian health system during 2024 were included. Trend data from 2014 to 2024 were also analyzed. Data were stratified by sex, cancer type, and location (West Bank or Gaza Strip). Secondary variables included sex distribution, cancer type, and screening coverage. Health system capacity measures, such as referrals and diagnostic availability, were also assessed.

Standard oncological classifications identified cancer types. Rates were given per 100000 people. ASIR accounted for population age structure and enabled cross-regional comparisons.[15]

Statistical and trend analysis

The compound annual growth rate (CAGR) is the average annual rate of growth over a period. Time-series trend analysis evaluates data points collected at specific times. Both methods were used to estimate average annual variance in cancer incidence and mortality from 2014 to 2024.[15,16]

CAGR was calculated using the following formula, where R_{final}=final reported rate (2024), $R_{initial}$=initial reported rate (2014), and n=number of years (10).

$$CAGR = [(R_{final}/R_{initial})^{(1/n)} - 1] \times 100$$

To compare cancer burden, analyses were done across sexes and regions. The differences between the West Bank and the Gaza Strip were measured using rate ratios.[3]

Health system and burden analysis

Data on cancer service capacity (screening coverage, referrals, diagnostic availability, and treatment access) were obtained from the Palestinian Ministry of Health report. The report's indicators, including mammography uptake, abnormal screening rates, and external referral costs, served as proxies for health system performance and care access.[11]

Data visualization

Tables and summary trend comparisons showed the results. Geographical and sex-based disparities were assessed using comparative epidemiology tables. These tables improve interpretability. Temporal trends were examined using structured tabulation of yearly rates.[11]

RESULTS

Overall, cancer incidence in Palestine

According to the Palestinian Ministry of Health's annual health report 2024, cancer rates in Palestine have been steadily increasing, especially in the West Bank. This shift marks a high-burden profile for non-communicable illnesses. In 2024, there were 3,926 newly diagnosed cancer cases. The crude incidence rate was 130.8 per 100000 people, and the ASIR was 201.4 per 100000 (Table 1). The big difference between crude incidence and ASIR shows that, after adjusting for population age, the true cancer burden is even greater.

A total of 3,770 cases with an ASIR of 192.3 per 100000 remained after excluding non-melanoma skin cancer

(NMSC) (Table 1). This suggests that a wider increase in all major cancer types, not just low-mortality skin cancers, is responsible for the rise in cancer burden. The number of cases rose from 3,590 to 3,926 compared to 2023-an increase of approximately 9.4% per year. This further supports an ongoing epidemiological expansion of the cancer burden.

Table 1: Overall cancer incidence in the West Bank, 2024.

Cancer category	Number of cases	Crude incidence rate/100,000	ASIR*/ 100,000
All cancers	3,926	130.8	201.4
Cancer excluding NMSC**	3,770	125.6	192.3

*ASIR: Age-standardized incidence rate, **NMSC: non-melanoma skin cancer; source: The Palestinian Ministry of Health's annual health report 2024, June 2025.

Sex-specific cancer distribution

Males accounted for 50.2% of all reported cancer cases, while females accounted for 49.8%. The overall distribution of cancer cases between the sexes was about equal (Table 2). Even though females had a slightly higher crude incidence rate, age-adjusted analysis revealed that males had higher ASIR values (213.2 per 100000) than females (193.1 per 100000). After removing NMSC, a similar trend remained, with males showing similar crude frequencies but higher age-standardized incidence rates (Table 2).

Table 2: Sex-specific cancer incidence in the West Bank, 2024.

Variables	Males	Females
Indicator		
Total cancer cases	1,969	1,957
Percentage	50.2	49.8
Crude incidence rate	128.9	132.8
ASIR	213.2	193.1
Cancer excluding NMSC		
Cases	1,875	1,895
Percentage	49.7%	50.3%
Crude incidence rate	122.7	128.6
ASIR	201.7	186.1

Source: The Palestinian Ministry of Health's annual health report 2024, June 2025

Temporal trends in cancer incidence and mortality

Over the years 2014-2024, longitudinal trend analysis showed a consistent rise in cancer incidence and death (Table 3). Between 2014 and 2024, incidence rates rose by almost 59.1%, from 82.2 to 130.8 per 100,000 people. Mortality rates rose by almost 44.8% within the same time period, from 37.7 to 54.6 per 100,000 people. The results show that the cancer has been rising over the past ten years, but more quickly after 2017 (Table 3).

Despite increased diagnostic activity, the mortality rate is still rising, which suggests that early diagnosis and treatment have not advanced enough and that the oncology system's capacity is still limited.

Table 3: Trends in cancer incidence and mortality rates in the West Bank (2014-2024).

Year	Incidence rate	Mortality rate
2014	82.2	37.7
2015	83.8	41.9
2016	86.4	37.6
2017	113.7	41.3
2018	117.7	41.8
2019	117.8	42.9
2020	115.8	40.1
2021	119.2	44.0
2022	118.4	42.9
2023	122.1	47.8
2024	130.8	54.6

Rates expressed per 100000 population; source: The Palestinian Ministry of Health's annual health report 2024, June 2025

Cancer mortality patterns

In the West Bank, cancer was the second most common cause of death after cardiovascular illnesses, accounting for 1,639 fatalities in 2024 and 18.2% of all deaths (Table 4). The most common cause of cancer-related mortality was lung and bronchus cancer (16.2%), which was followed by colorectal cancer (14.7%) and breast cancer (11.1%). Tobacco smoking and the aggressive nature of thoracic cancers are the main causes of lung cancer mortality. The high death rate from colorectal cancer points to inadequate screening and a delayed diagnosis. Breast cancer continues to be a major cause of death for women despite the availability of screening, demonstrating gaps in early detection uptake and treatment access.[9]

Table 4: Leading causes of cancer mortality in the West Bank, 2024.

Cancer type	Percentage of cancer deaths
Lung and bronchus	16.2
Colorectal cancer	14.7
Breast cancer	11.1
Pancreatic cancer	5.6
Brain and nervous system	5.1
Stomach cancer	4.8
Bladder cancer	4.3
Leukemia	4.1
Prostate cancer	3.9
Non-hodgkin lymphoma	3.4

Source: The Palestinian Ministry of Health's annual health report 2024, June 2025

Sex-specific mortality patterns

The cancer mortality profiles clearly showed sex-based disparities. With 227 fatalities and an ASMR of 27.9 per 100000, lung cancer was the most common cause of cancer-related mortality among men. Prostate cancer came in third place, while colorectal cancer came in second.

With 179 fatalities and an ASMR of 19.4 per 100000, breast cancer was the leading cause of cancer mortality in females. The next two biggest contributors were uterine and colorectal malignancies (Table 5).

Table 5: Cancer mortality by sex and ten-year trends (2014-2024).

Sex	Cancer type	Deaths	Crude rate	ASMR
***Leading cancer mortality by sex (West Bank, 2024)**				
Male	Lung and bronchus	227	14.9	27.9
Male	Colorectal cancer	137	9.0	17.2
Male	Prostate cancer	64	4.2	10.5
Female	Breast cancer	179	12.1	19.4
Female	Colorectal cancer	104	7.1	12.1
Female	Uterine cancer	50	3.4	6.0
****Trends in cancer incidence and mortality (West Bank, 2014-2024)**				
Indicator	**2014 rate**	**2024 rate**	**Absolute change**	**Relative increase**	**CAGR**
Cancer incidence rate	82.2	130.8	+48.6	+59.1%	+4.8%
Cancer mortality rate	37.7	54.6	+16.9	+44.8%	+3.8%

Rates per 100000 population; source: Palestinian Ministry of Health, annual health report 2024, June 2025; ** source: calculated based on the Palestinian Ministry of Health's annual health report 2024, June 2025

The CAGR trend analysis

Using incidence and mortality rates from 2014 to 2024, a CAGR trend analysis was used to further assess temporal changes in the cancer burden. CAGR analysis, a standardized assessment of the average annual change in epidemiological variables over time, is frequently used to evaluate long-term disease patterns.

$$CAGR = [(R_{2024}/R_{2014})^{(1/10)} - 1] \times 100$$

According to the analysis, cancer incidence and mortality increased steadily during the course of the study. The incidence of cancer rose from 82.2 per 100000 people in 2014 to 130.8 per 100000 in 2024, representing an overall rise of almost 59.1% and a projected CAGR of 4.8%. The mortality rates rose from 37.7 to 54.6 per 100000 people, indicating a relative increase of roughly 44.8% with an estimated CAGR of 3.8% (Table 5).

Enhanced cancer detection and improved registry completeness may explain the higher CAGR in incidence than mortality. However, the continued rise in mortality indicates that progress in early detection and treatment access continues to be inadequate to significantly reduce cancer-related deaths.

DISCUSSION

This research reveals a continuous upsurge in both mortality and incidence over the last ten years. Cancer has evidently developed as a significant burden of non-communicable diseases with the incidence reaching 130.8 per 100000 in 2024 and an age-standardized incidence rate (ASIR) of 201.4 per 100000, ranking it among the primary causes of death in the nation.[11] CAGR analysis reflects a consistent upward trend in both incidence and mortality, with a more pronounced increase in incidence. This trend probably indicates better case identification and registry efficiency in addition to an actual rise in disease prevalence. Nevertheless, the ongoing increase in death rates implies that progress in diagnosis has not been paralleled by comparable enhancements in survival, timely treatment, or cancer care. Similar patterns were observed in other developing health systems.[1,2]

The predominance of colorectal, lung, and breast cancers is in line with changes in global epidemiology.[1,6]

The West Bank and Gaza Strip were found to differ consistently, with the West Bank reporting a greater frequency of all major cancers. Research indicates that these variations have less to do with actual variance in cancer risk and more to do with health system performance. The higher recorded incidence is probably due to improved diagnostic capabilities, more comprehensive reporting systems, and increased registry coverage in the West Bank.[11] According to a world bank review of the Palestinian health system, socioeconomic disparities in health system capacity impact regional variations in cancer reporting.[17] The discrepancy between the West Bank and the Gaza Strip, where disparities in economic resources directly affect diagnostic and reporting capacities, is a prominent example of this worldwide trend. Oncology treatments in the Gaza Strip, on the other hand, are severely disrupted by a lack of diagnostic equipment, treatment facilities, and patient access. These restrictions certainly result in

underdiagnosis and underreporting, which means that the actual cancer burden in Gaza is most likely greater than what is shown in official statistics.[9]

The very low coverage of breast cancer screening suggests that organized screening initiatives are inadequately implemented. Consequently, most cases are likely identified based on symptoms rather than through early detection methods. In many low-resource settings with limited preventive oncology care, this results in late-stage diagnosis and persistently high mortality rates.[9,16,18]

Despite a substantial increase in incidence, mortality has not decreased proportionately. This suggests that advances in detection have not translated into significant improvements in survival. Constant challenges in timely diagnosis, access to treatment, and comprehensive cancer care are reflected in the stable mortality-to-incidence ratio.[6,9,15,19]

The Palestinian health system is heavily burdened by cancer care, especially because advanced oncology services are dependent on outside referrals. This reliance reflects inadequate local infrastructure and contributes to system vulnerability, higher costs, and delays in initiating treatment.[20,21] The trend and health system studies are advantageous to this investigation. However, the use of aggregated data restricts the interpretation at the patient level. Particularly in Gaza, incomplete reporting may understate the actual occurrence. Even when traditional epidemiological approaches are followed, certain indicators may create uncertainty since they are model-based.[15,22] The results highlight the essential need to improve cancer control in Palestine by investing in oncology infrastructure, expanding early detection programs and strengthening registry systems. Addressing regional inequalities, particularly in Gaza, is essential to reduce underdiagnosis and boost survival rates. Without structural interventions, the cancer burden is expected to continue to increase in the coming years.[2,11,13,23-25]

CONCLUSION

In Palestine, colorectal, lung and breast cancers are the most common types, with incidence rates rising and mortality remaining high. Age-standardized rates confirm a genuine increase in incidence beyond the effects of population ageing, while persistently high mortality indicates continuing challenges in early detection, timely treatment and effective cancer therapy. Geographic differences between the West Bank and the Gaza Strip likely reflect variations in healthcare infrastructure and the completeness of reporting rather than true variations in cancer risk. The actual cancer burden in Gaza is likely to be underestimated due to major health system disruptions. Low screening rates and reliance on external referrals emphasize systemic healthcare challenges that contribute to poor outcomes and late-stage diagnoses. Addressing the growing cancer burden in Palestine requires strengthening treatment capacity, expanding early detection services, improving cancer surveillance and reducing regional inequity in access to care. Lacking targeted system-level interventions, the cancer burden is expected to continue to increase.

ACKNOWLEDGEMENTS

The author would like to thank the Palestinian Ministry of Health and the Central Bureau of Statistics for providing access to publicly available data.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: AbuSheha A. Analysis of cancer in Palestine: epidemiological trends, system-level constraints, and regional disparities. Int J Sci Rep 2026;12(9):295-300.