

Estimation of the burden of cancer mortality in Greece: years of life lost and productivity cost

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Background

• **Cancer remains a major global public health problem, with an estimated 20 million new cases and 9.7 million deaths in 2022¹.**

• In Greece, an estimated 63,176 new cancer cases were diagnosed in 2022. When compared to the EU average, the estimated number of new cancer cases per 100,000 inhabitants **was slightly lower in Greece in comparison with the EU average (Cancer cases per 100,000: 604 (GR) vs. 614 (EU-27); -1.6%)².**

• However, with regard to the death rate, the estimate of 100,000 was significantly higher than the EU average. **(Cancer deaths per 100,000: 308 (GR) vs. 289 (EU-27); +6.5%)².**

• The high cancer related mortality and its consequent productivity losses due premature mortality **represents a significant human and a capital loss to society with high impact for Greece.**

• The Greek epidemiological and economic impact of cancer-related premature mortality in 2022 has not been comprehensively studied before.

• The aim of this study is **to describe the mortality burden and to estimate the economic costs associated with productivity losses due to premature cancer-related deaths in Greece.**

Methods

Inputs and assumptions

• A previously published model was adapted to reflect the epidemiological and economic burden of premature mortality in Greece, by calculating the productivity losses due to premature deaths using the human capital approach^{3,4}.

• The primary outcomes of the model were years of life lost (YLL), years of productive life lost (YPLL), and the present value of future lost productivity (PVFLP).

• Data on cancer-related deaths and years of life lost were obtained from the Institute for Health Metrics and Evaluation (IHME)⁵.

• Greek inputs regarding age-specific mortality rates, age of retirement and Greece's gross domestic product (GDP) were used.

Estimating the humanistic burden

YLL was calculated using the age at death compared to life expectancy

$$YLL = \text{number of deaths} \times \text{expected life years}$$

YPLL estimated the average number of years a person would have been engaged in productive employment had they not died prematurely from cancer. It was assumed that the population would retain full economic activity until retirement age (unemployment accounted for by labor force participation rates). At retirement age, all economic activity ceases.

$$YPLL = YLL \times (\text{expected productive life years remaining} / \text{expected life years remaining}) \times \text{labor force participation}$$

Methods (cont’)

Estimating the economic burden

PVFLP was estimated by first calculating the PVFLP per person, multiplying YPLL by annual wages specific to each age group, and sex. This value was then multiplied by age-specific mortality data to determine the overall PVFLP for the country.

PVFLP incorporated country-specific labor force participation rates to accurately represent labor force characteristics. Finally, annual earnings were discounted at a rate of 3% per year to calculate their present value.

Results

• According to IHME data, the number of cancer-related deaths in Greece in 2022 **was 34,730. This figure equates to more than 95 deaths from cancer every day in Greece. A comparison of the sexes reveals a higher mortality rate among males** (Table 1).

• **In 2022, Greece experienced a total of 647,372 years of premature mortality, with males accounting for 60% of this figure (Table 1). The average YLL per death was estimated at 19 years.**

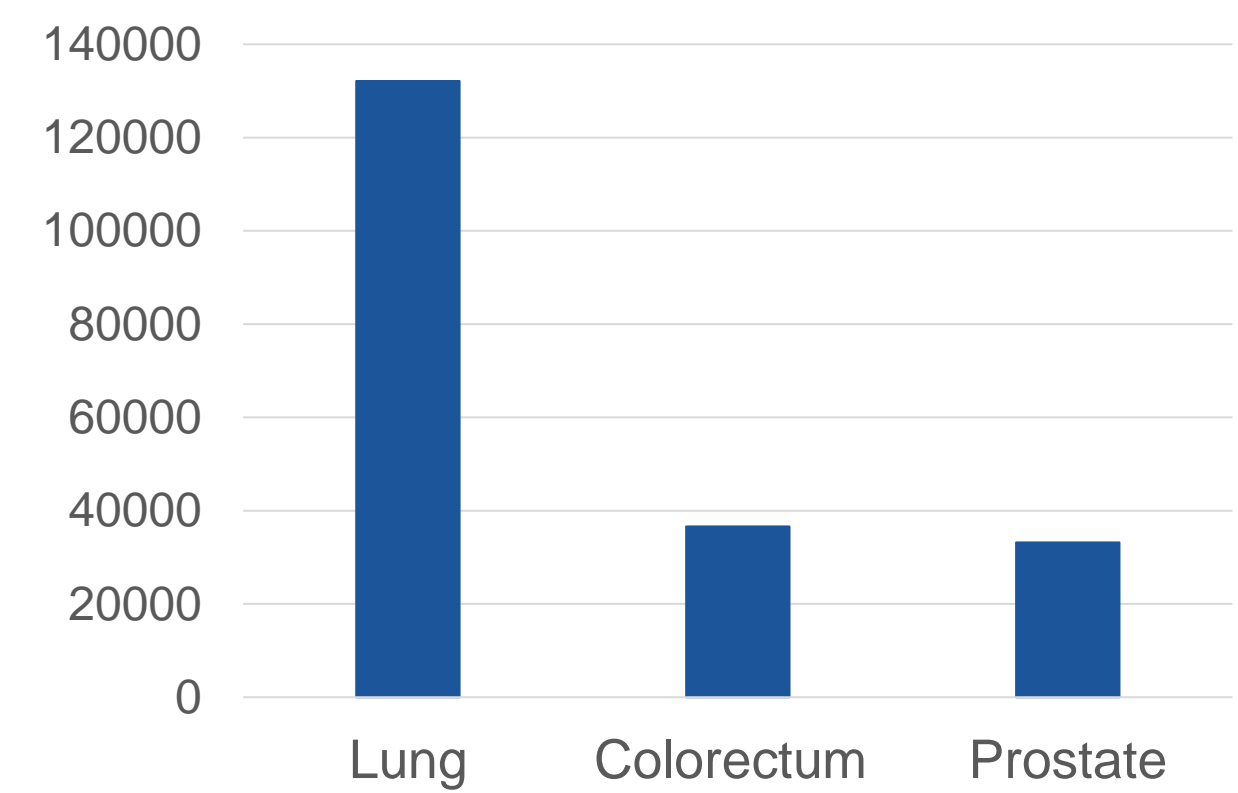
• **Almost 40,000 productive years were lost due to premature mortality in Greece in 2022**

Table 1: Description of cancer related mortality in Greece in 2022

	Male (%)	Female (%)	Total
Number of deaths	20,500 (59.0%)	14,229 (41.0%)	34,729
Crude mortality	0.40%	0.27%	0.33%
YLL	388,606 (60.0%)	258,766 (40.0%)	647,372
YPLL	22,419 (56,5%)	17,235 (43.5%)	39,654

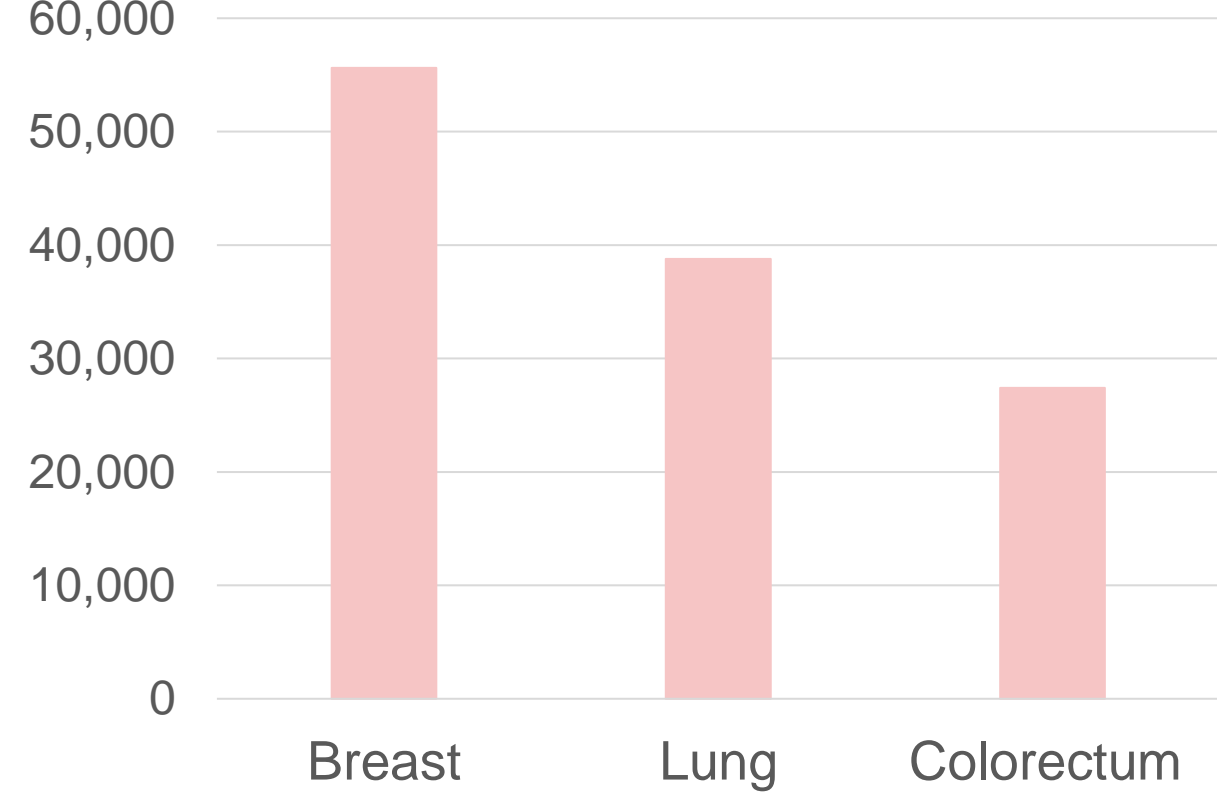
The top 3 cancers that resulted in the greatest number of YLL among male were **lung, colorectal, and prostate cancers, with a cumulative total of 201,949 years. Collectively, these three cancers constituted 52% of all YLL experienced by the male population.**

Figure 1: Top 3 cancers with the highest YLL among males



The top 3 cancers that resulted in the greatest YLL number among females were **breast, lung, and colorectal cancers, accounting for a total of 121,828 years. Collectively, these three cancers accounted for 47% of all YLL in women.**

Figure 2: Top 3 cancer with the highest YLL among females



Results (cont’)

Table 2: Life years lost and present value of future lost productivity by cancer in Greece in 2022

Type	YLL	% males	PVFLP (€)	% males
Lung cancer	170,921	77.3%	185,894,408	77.4%
Colorectum cancer	64,015	57.2%	54,211,734	63.0%
Breast cancer	56,135	0.9%	78,805,927	0.8%
Pancreatic cancer	47,999	56.2%	49,261,407	69.2%
Brain/central nervous system cancer	35,333	58.7%	74,706,284	62.3%
Stomach cancer	33,935	62.9%	36,918,265	68.6%
Prostate cancer	33,212	100.0%	8,608,356	100.0%
Leukemia	28,793	58.5%	37,046,043	60.9%
Bladder cancer	26,554	82.5%	14,710,095	86.4%
Liver cancer	19,975	67.8%	27,004,838	75.6%
Ovarian cancer	15,751	0.0%	21,454,128	0.0%
Kidney cancer	14,958	69.2%	17,179,698	77.2%
Non-Hodgkin lymphoma	12,475	60.4%	15,391,820	70.8%
Other malignant neoplasms	11,570	51.8%	15,988,003	60.0%
Multiple myeloma	11,265	54.3%	8,391,019	65.9%
Esophageal cancer	8,042	76.9%	11,846,672	85.6%
Larynx cancer	7,919	90.1%	11,142,709	90.9%
Uterine cancer	7,306	0.0%	6,793,795	0.0%
Cervical cancer	7,222	0.0%	13,895,577	0.0%
Lip and oral cavity	6,391	66.5%	10,804,407	76.8%
Gallbladder and biliary tract cancer	6,097	53.9%	5,328,910	64.4%
Malignant skin melanoma	6,095	60.3%	11,678,346	62.6%
Non-melanoma skin cancer	3,829	60.3%	2,844,637	69.9%
Hodgkin lymphoma	3,568	61.7%	8,629,814	63.7%
Nasopharynx cancer	1,964	76.4%	4,352,413	80.7%
Thyroid cancer	1,843	50.9%	2,213,688	64.6%
Other pharynx cancer	1,460	76.6%	3,012,829	81.7%
Mesothelioma	1,365	78.7%	1,365,881	80.0%
Testicular cancer	866	100.0%	2,888,363	100.0%
Eye cancer	514	48.2%	747,575	54.9%
Total	647,372	60.0%	743,117,641	60.1%

• The cost of premature mortality in Greece is quite high, as it has been estimated at €743 Million.

• Lung and breast cancer are the most costly malignancies in terms of premature mortality.

• Brain cancer is a malignancy associated with elevated indirect costs that has a universal impact on both sexes.

• Males accounted for 60.1% of total indirect costs due to premature mortality.

Conclusions

• In 2022, the number of cancer-related deaths was 34,730, resulting in a loss of almost 650,000 life years.

• Three cancers account for almost 50% of all YLL in both female and male. Targeted interventions to prevent deaths these malignancies could have a high return on investment.

• The financial implications of premature mortality in Greece are significant, with an estimated cost of **€743 million.**

• Strategies aimed at prevention, screening, early detection and timely treatment initiation could reduce the mortality burden and mitigate the associated indirect economic costs in Greece.

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