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Original Research

Burden of soft tissue and other extraosseous sarcomas in Albania compared to Southeastern Europe, 1990-2023

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Abstract

Aim: The aim of this analysis was to assess mortality rates and disease burden attributable to soft tissue and other extraosseous sarcomas in Albania compared with South-Eastern Europe (SEE) and broader European regions between 1990 and 2023.
Methods: A retrospective analysis was conducted using Global Burden of Disease (GBD) Study data. Crude and age-standardized mortality rates (deaths per 100,000) and disability-adjusted life years (DALYs per 100,000) were extracted for Albania, six SEE countries (Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia, Serbia, and Slovenia), and aggregated European regions (Eastern, Central, and Western Europe). Trends were described over time, and regional comparisons were made for 1990 and 2023.
Results: In Albania, crude mortality increased from 0.44 in 1990 to 0.88 in 2023 (deaths per 100,000 population), whereas age-standardized mortality remained stable at 0.56 (deaths per 100,000 population). During 1990-2023, crude DALYs (per 100,000) increased modestly from 21.6 to 23.4, whereas age-standardized DALYs (per 100,000) declined from 22.4 to 18.0. Across SEE, Albania, Bosnia and Herzegovina, Montenegro, and Slovenia exhibited declining burden, whereas Croatia and North Macedonia experienced modest increases. Compared with broader Europe, Albania's stability contrasted with rising mortality and DALYs in Central Europe and especially Western Europe.
Conclusion: Albania demonstrated stable age-standardized mortality and declining burden of sarcomas, distinguishing it from several SEE countries and Western Europe. Nevertheless, these findings should be interpreted with caution considering the possibility of underreporting or misclassification of sarcoma cases in Albania.

Keywords*: Albania, other extraosseous sarcomas, sarcoma, soft tissue sarcomas, Southeastern Europe.*

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Introduction

Soft tissue and other extraosseous sarcomas are rare malignancies originating from mesenchymal tissues, accounting for a heterogeneous group of cancers with complex management needs and substantial impact on survival and quality of life (1,2).

Despite their relatively low incidence compared to other malignancies, they contribute disproportionately to cancer burden due to their aggressiveness and the disability they impose, as reflected in mortality and disability-adjusted life years (DALYs) (1,2). Soft tissue sarcomas constitute less than 1% of all solid tumors among adults, but about 7-8% of all young individuals (aged ≤20 years) (2-4).

Globally, outcomes for sarcoma patients have been shaped by advances in diagnostic imaging, surgical techniques, and systemic therapies (5). However, progress has been uneven, with anthracycline-based chemotherapy remaining the backbone of treatment for decades, and only recent strides in targeted therapies and multidisciplinary care beginning to improve survival (5).

Regional variations in sarcoma levels persist, reflecting differences in healthcare infrastructure, access to specialized oncology services, and demographic transitions across Europe (6).

Population aging has emerged as a critical determinant of cancer burden, influencing crude mortality and burden of disease estimates (6,7). Age-standardized measures are therefore essential to disentangle true changes in disease risk from demographic effects (7).

South-Eastern Europe (SEE) provides a unique context for examining these dynamics, considering its shared historical and healthcare challenges (8), but heterogeneous cancer outcomes (7). Albania, in particular, has undergone rapid demographic and health system transitions (9), including the establishment of national cancer control programs in the past decade, aimed at improving prevention, early detection, and treatment capacity (10).

In this context, the aim of this study was to analyze mortality rates and DALYs attributable to soft tissue and other extraosseous sarcomas in Albania from 1990 to 2023, situating these findings within the SEE region and contrasting them also with Central, Eastern, and Western Europe.

Distinguishing between crude and age-standardized estimates of mortality and disease burden provides a nuanced assessment of whether observed changes reflect true shifts in disease risk or demographic effects (7). Such insights are critical for understanding the epidemiology of soft tissue sarcomas, guide resource allocation, strengthen oncology services, and ultimately inform cancer control policies in Albania and in the other SEE countries (1,7).

Methods

This was a retrospective analysis of mortality and disease burden attributable to soft tissue and other extraosseous sarcomas in Albania and other SEE countries between 1990 and 2023.

Data for this analysis were extracted from the Global Burden of Disease (GBD) Study, which provides standardized estimates of cause-specific mortality and DALYs across countries and regions (11).

The GBD framework integrates multiple data sources, including vital registration systems, cancer registries, hospital records, and epidemiological studies, applying statistical modeling to generate consistent estimates across time and geography (11,12).

In the current analysis, two primary outcomes were assessed:

- *Mortality rates:* expressed as deaths from soft tissue and other extraosseous sarcomas per 100,000 population. Both crude and age-standardized rates were extracted from the GBD Study (11).
- *Burden of disease:* expressed as DALYs of soft tissue and other extraosseous sarcomas per 100,000, incorporating both years of life lost (YLLs) due to premature mortality and years lived with disability (YLDs) (11,12).

Besides crude estimates for Albania, age-standardized estimates for all SEE countries (including Albania) were extracted to allow comparability across countries and over time, minimizing the confounding effects of demographic changes such as population aging.

The analysis focused on Albania and the following six neighboring SEE countries: Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia, Serbia, and Slovenia. For contextual comparison, aggregated estimates for Eastern Europe, Central Europe, and Western Europe were also examined.

Trends in crude and age-standardized mortality and DALYs were described for Albania from 1990 to 2023. Regional comparisons were made using age-standardized estimates for SEE countries and broader European regions at baseline (year: 1990) and the most recent available estimates from the GBD Study (year: 2023). Confidence intervals (95% CI) provided by the GBD Study were reported to reflect statistical uncertainty (11).

Results

Figure 1 presents the crude and age-standardized mortality rates from soft tissue and other extraosseous sarcomas in Albania for the period 1990-2023. Overall, crude mortality rate increased from 0.44 in 1990 to 0.88 in 2023 (deaths per 100,000 population), potentially reflecting the impact of demographic changes (population aging) in Albania in the past three decades.

Conversely, the age-standardized mortality rate remained relatively stable across the period, fluctuating only slightly over the study period (in both 1990 and 2023 it was 0.56 deaths per 100,000 population), indicating that the mortality risk from these sarcomas has not significantly changed in Albania in the past three decades.

Figure 2 presents the crude and age-standardized mortality burden of soft tissue and other extraosseous sarcomas in Albania during 1990-2023. Crude DALYs remained fairly stable from 1990 to 2000, dipped slightly in 2010, then rose sharply by 2020 before declining modestly in 2023. Essentially, the burden of soft tissue and other extraosseous sarcomas measured in crude DALYs exhibited a gradual increase over time (from 21.6 DALYs per 100,000 in 1990 to 23.4 DALYs per 100,000 in 2023), reflecting the effect of population aging in Albania, like the crude mortality rate.

On the other hand, the age-standardized burden of soft tissue and other extraosseous sarcomas in Albania displayed a steady decline during the study period, dropping from more than 22

DALYs per 100,000 in 1990 to 18 DALYs per 100,000 in 2023, indicating that the overall risk and burden of sarcomas have decreased over time in the Albanian population.

Figure 1. Crude and age-standardized mortality rates (number of deaths per 100,000 population) from soft tissue and other extraosseous sarcomas in Albania, 1990-2023 (11)

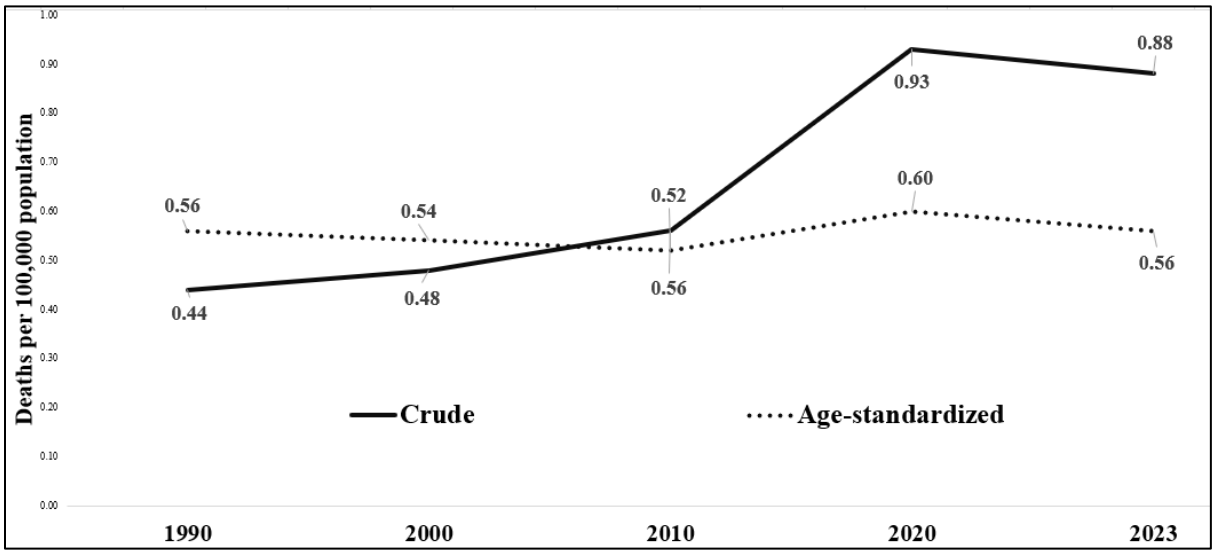


Figure 2. Crude and age-standardized burden (DALYs per 100,000) of soft tissue and other extraosseous sarcomas in Albania, 1990-2023 (11)

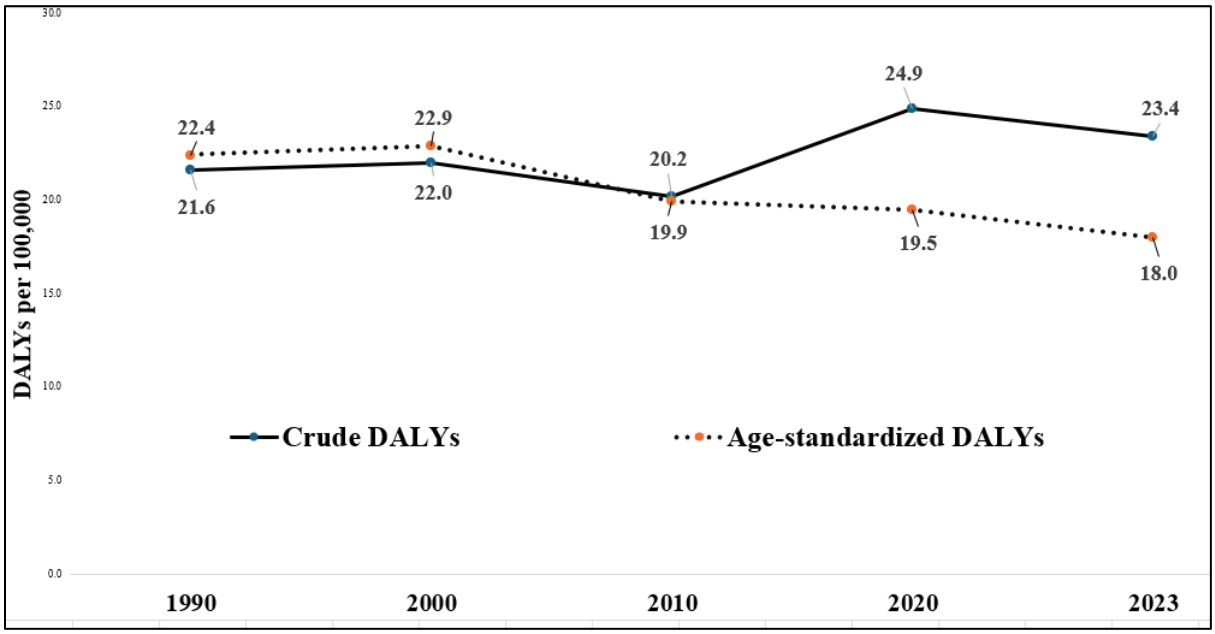


Table 1 presents the estimates of mortality rates and burden of soft tissue and other extraosseous sarcomas in SEE countries including Albania during 1990-2023.

Across the SEE region, mortality rates from soft tissue and other extraosseous sarcomas between 1990 and 2023 remained relatively low but showed heterogeneous trends (upper panel). Albania exhibited remarkable stability, with rates consistently around 0.52-0.56 (deaths per 100,000 population) across the period. Bosnia and Herzegovina, Montenegro, and Slovenia also demonstrated stable patterns, with only minor fluctuations. In contrast, Croatia and North Macedonia showed modest increases, with Croatia rising from 0.62 in 1990 to 0.73 in 2023 (deaths per 100,000 population), and North Macedonia from 0.49 to 0.60 (deaths per 100,000 population). Serbia displayed a decline from 0.73 in 1990 to 0.61 in 2000, followed by a rebound to 0.72 in 2023 (deaths per 100,000 population, respectively). Overall, Serbia and Croatia exhibited the highest levels, whereas Montenegro consistently reported the lowest mortality rates in the SEE region.

Table 1. Mortality rates and burden of soft tissue and other extraosseous sarcomas in SEE countries, 1990-2023 (11)

Upper panel: Mortality rates (deaths per 100,000 population)				
COUNTRY	**Year: 1990**	**Year: 2000**	**Year: 2010**	**Year: 2023**
Albania	0.56 (0.38-0.81)*	0.54 (0.40-0.78)	0.52 (0.37-0.75)	0.56 (0.36-0.85)
Bosnia and Herzegovina	0.49 (0.32-0.78)	0.50 (0.31-0.74)	0.47 (0.31-0.66)	0.51 (0.33-0.69)
Croatia	0.62 (0.54-0.70)	0.53 (0.47-0.61)	0.64 (0.56-0.72)	0.73 (0.65-0.83)
Montenegro	0.38 (0.27-0.54)	0.37 (0.26-0.50)	0.38 (0.25-0.49)	0.43 (0.25-0.57)
North Macedonia	0.49 (0.37-0.67)	0.50 (0.38-0.70)	0.55 (0.41-0.70)	0.60 (0.42-0.77)
Serbia	0.73 (0.49-1.05)	0.61 (0.43-0.84)	0.62 (0.47-0.80)	0.72 (0.47-0.95)
Slovenia	0.65 (0.57-0.74)	0.56 (0.50-0.65)	0.60 (0.51-0.69)	0.66 (0.57-0.75)
Lower panel: Burden of disease (DALYs 100,000)				
COUNTRY	**Year: 1990**	**Year: 2000**	**Year: 2010**	**Year: 2023**
Albania	22.4 (15.6-33.0)†	22.9 (16.8-31.7)	19.9 (13.9-27.8)	18.0 (11.8-27.0)
Bosnia and Herzegovina	17.2 (10.9-28.5)	17.3 (10.7-26.2)	15.8 (10.4-22.3)	16.6 (11.0-22.3)
Croatia	22.0 (19.0-25.0)	18.5 (16.4-21.3)	20.8 (18.3-23.8)	23.1 (20.6-26.0)
Montenegro	15.2 (10.6-22.4)	14.2 (10.2-19.5)	13.2 (8.9-17.2)	14.3 (8.5-19.3)
North Macedonia	19.1 (14.4-26.3)	18.4 (13.9-25.5)	19.0 (14.1-24.3)	20.1 (13.7-25.7)
Serbia	28.0 (18.9-40.7)	20.7 (14.7-28.9)	20.1 (14.8-26.1)	22.4 (14.6-29.4)
Slovenia	23.0 (20.1-25.9)	19.4 (17.1-22.0)	19.2 (16.6-22.3)	19.8 (17.3-22.8)

* Age-standardized mortality rates (number of deaths per 100,000 population) and their respective 95% confidence intervals (in parentheses).

† Age-standardized DALYs per 100,000 and their respective 95% confidence intervals (in parentheses).

Patterns of disease burden, expressed as DALYs (lower panel), revealed more pronounced regional differences. Albania showed a clear decline, from 22.4 in 1990 to 18.0 in 2023 (DALYs per 100,000), suggesting improvements in disease management or demographic effects. Bosnia and Herzegovina and Montenegro also experienced reductions, with Bosnia decreasing from 17.2 to 16.6 (DALYs per 100,000) and Montenegro from 15.2 to 14.3 (DALYs

per 100,000). Slovenia demonstrated a modest decline from 23.0 to 19.8 (DALYs per 100,000). Conversely, Croatia and North Macedonia exhibited increases, with Croatia rising from 22.0 to 23.1 (DALYs per 100,000) and North Macedonia from 19.1 to 20.1 (DALYs per 100,000). Serbia showed a sharp decline from 28.0 in 1990 to 20.1 in 2010, followed by a partial rebound to 22.4 in 2023 (DALYs per 100,000).

Figure 3 presents the age-standardized mortality rates (deaths per 100,000 population) from soft tissue and other extraosseous sarcomas in Albania, Eastern Europe, Central Europe, and Western Europe for the years 1990 and 2023.
Unlike Albania where there was no change over time (0.56 deaths per 100,000 population both 1990 and in 2023), in Central European region there was evidence of a noticeable increase in mortality rate (from 0.65 deaths per 100,000 population in 1990 to 0.85 deaths per 100,000 in 2023). However, the Western European region exhibited the highest mortality rates among the regions, with a clear upward trend (from 0.85 deaths per 100,000 in 1990 to 0.98 deaths per 100,000 population in 2023). Conversely, Eastern European region displayed only a slight increase in mortality rate (from 0.66 to 0.69 deaths per 100,000 population in 1990 and in 2023, respectively), but appeared relatively stable compared to Central and Western Europe.

Figure 3. Age-standardized mortality rates from soft tissue and other extraosseous sarcomas in Albania compared to European regions in 1990 and in 2023 (11)

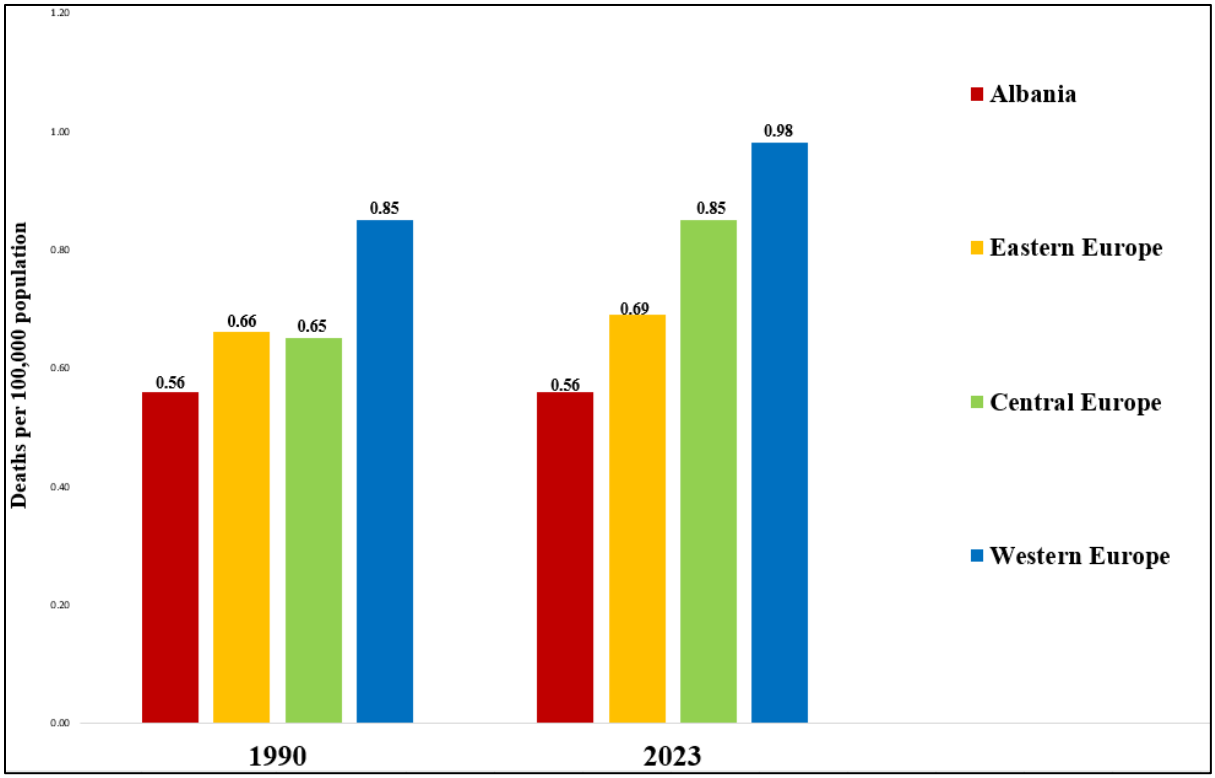
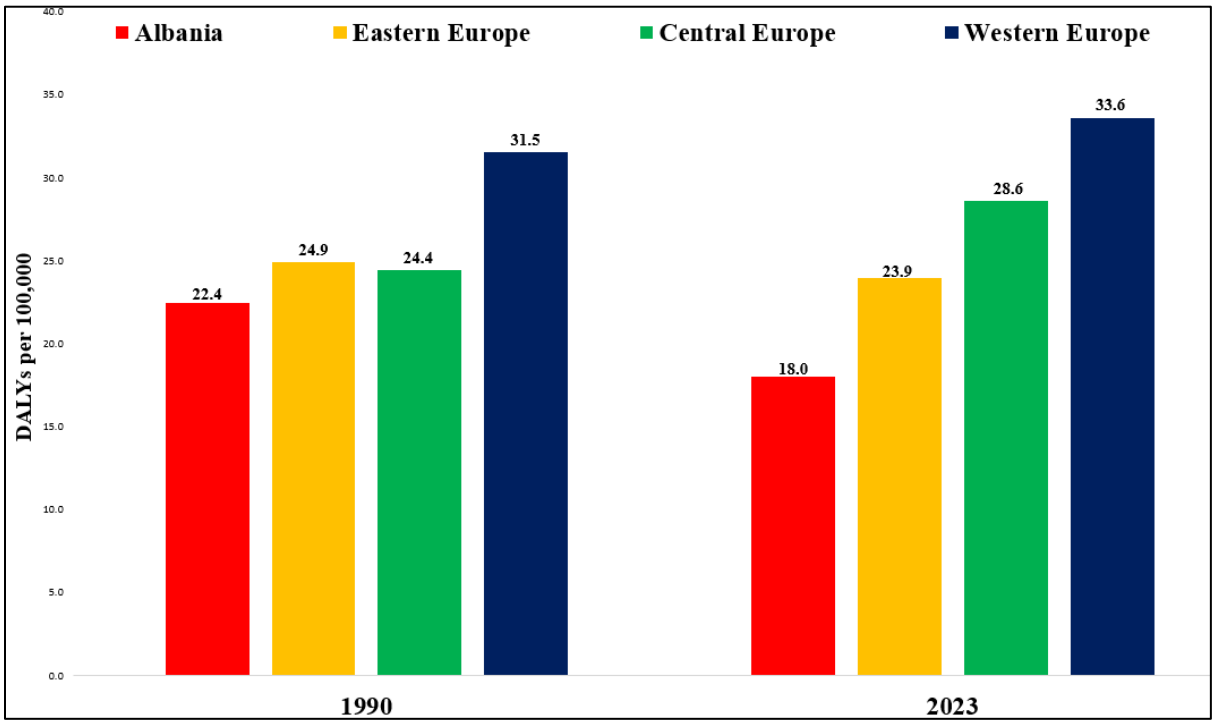


Figure 4 compares age-standardized DALYs from soft tissue and other extraosseous sarcomas in Albania, Eastern Europe, Central Europe, and Western Europe for 1990 and 2023.
Unlike Albania where there was evidence of a decline in burden over time suggesting improvements in healthcare or disease management, in Central European region there was an increase in disease burden (from about 24 DALYs per 100,000 in 1990 to almost 29 DALYs per 100,000 in 2023), indicating worsening outcomes or demographic effects. Nonetheless, Western European region exhibited the highest burden among all regions, with a clear upward trend (from about 32 DALYs per 100,000 in 1990 to 34 DALYs per 100,000 in 2023). The Eastern European region had a slight increase in the burden of soft tissue and other extraosseous sarcomas (from about 25 DALYs per 100,000 in 1990 to 24 DALYs per 100,000 in 2023).

Figure 4. Age-standardized burden (DALYs per 100,000) of soft tissue and other extraosseous sarcomas in Albania compared to European regions in 1990 and 2023 (11)



Discussion

This analysis provides new insights into the epidemiology of soft tissue and other extraosseous sarcomas in Albania compared with the other SEE countries and broader European regions.
Crude mortality and DALYs increased in Albania between 1990 and 2023, largely reflecting population aging. However, age-standardized mortality remained stable, and age-standardized DALYs declined, suggesting that the underlying risk of sarcoma mortality and disability has not worsened (2). This divergence highlights the importance of age-standardization in cancer epidemiology, as crude measures may exaggerate disease burden in aging populations (13).

On the other hand, patterns in the epidemiology of soft tissue and other extraosseous sarcomas across SEE countries were somehow heterogeneous. Albania, Bosnia and Herzegovina, Montenegro, and Slovenia demonstrated declining or stable age-standardized DALYs, whereas Croatia and North Macedonia experienced slight increases. Serbia showed a decline followed by partial rebound. These differences may reflect variations in healthcare infrastructure, cancer registry quality, and national cancer control strategies (7).

Conversely, compared with Central and Western Europe, Albania's stability in mortality and decline in the burden of soft tissue and other extraosseous sarcomas is notable. Western Europe consistently exhibited the highest burden, despite advanced healthcare systems, likely due to demographic transitions and improved case ascertainment (7). In turn, Central Europe showed worsening outcomes, whereas Eastern Europe remained relatively stable. These findings highlight persistent regional disparities in cancer outcomes across Europe (7).

In any case, Albania's favorable trajectory should be interpreted with caution considering gaps in detection and reporting of cases of soft tissue and other extraosseous sarcomas, notwithstanding the recent health system reforms and the establishment of national cancer control program (2021-2031), which emphasizes prevention, early detection, and improved treatment capacity (10).

The main strength of this analysis consists of the use of GBD data which allowed standardized comparisons across countries and over time, minimizing methodological inconsistencies. However, limitations include reliance on modeled estimates (12), potential underreporting or misclassification of sarcoma cases especially for Albania, and the inability to capture subtype-specific outcomes or treatment effects. Future studies should integrate registry-based data and clinical cohorts to validate these findings and explore the impact of therapeutic advances such as targeted therapies and multidisciplinary care (6).

Conclusion

Soft tissue and other extraosseous sarcomas remain rare but important contributors to cancer burden in Albania and the other SEE countries. While crude mortality and DALYs have increased due to aging, age-standardized estimates revealed stable mortality and declining burden in Albania. Regional comparisons demonstrated heterogeneous trends, with Albania performing favorably relative to several SEE countries and Western Europe, but this may be likely due to underreporting of sarcoma cases in Albania. Indeed, a recent report has highlighted gaps in registry coverage, noting that these shortcomings may lead to an underestimation of cancer mortality and burden in Albania (14).

Nonetheless, findings of this analysis emphasize the importance of age-standardized measures in cancer epidemiology and highlight the role of demographic transitions, healthcare improvements, and cancer control programs in shaping sarcoma outcomes.

References

1. Yuan X, He J, Li R. Global, regional, and national burden of soft tissue and other extraosseous sarcomas, 1990–2021: A Systematic analysis for the global burden of disease study 2021. PLoS One 2026;21(3):e0342986. doi: 10.1371/journal.pone.0342986.

2. Zhou J, Xu S, Long Y, He R, Cai J, Ding N, Su Y. Global burden of soft tissue sarcomas in 204 countries and territories from 1990 to 2021: data from the global burden of disease study 2021. BMC Public Health 2025;25(1):1519. doi: 10.1186/s12889-025-22782-5.

3. Miwa S, Yamamoto N, Hayashi K, Takeuchi A, Igarashi K, Tsuchiya H. Therapeutic targets for bone and Soft-Tissue sarcomas. Int J Mol Sci 2019;20(1):170.

4. Papworth KE, Arroyo VM, Styring E, Zaikova O, Melin BS, Lupo PJ. Soft-tissue sarcoma in adolescents and young adults compared with older adults: A report among 5000 patients from the Scandinavian sarcoma group central register. Cancer 2019;125(20):3595-602.

5. Spalato-Ceruso M, Ghazzi NE, Italiano A. New strategies in soft tissue sarcoma treatment. J Hematol Oncol 2024;17:76. https://doi.org/10.1186/s13045-024-01580-3

6. ESMO Guidelines Committee, EURACAN and GENTURIS, et al. Soft tissue and visceral sarcomas: ESMO–EURACAN–GENTURIS Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol 2021;32(11)1348-1365. doi: 10.1016/j.annonc.2021.07.006.

7. Elmadani M, Mokaya PO, Omer AAA. et al. Cancer burden in Europe: a systematic analysis of the GLOBOCAN database (2022). BMC Cancer 2025;25(1):447. doi: 10.1186/s12885-025-13862-1.

8. Burazeri G, Laaser U. Mortality, disease burden, and exposure to main risk factors in Southeastern Europe. JGPOH 2026. doi: 10.61034/JGPOH-2026-01.

9. Czabanowski W, Mone I, Burazeri G. Health status in selected post-communist European countries: a comparative study between Poland and Albania. Cent Eur J Public Health 2024;32(1):63-67. doi: 10.21101/cejph.a7804.

10. United Nations Albania. WHO Albania in support of Albania's new National Cancer Control Programme for 2021-2031. Press release; 04 February 2022. https://albania.un.org/en/174226-who-albania-support-albania%E2%80%99s-new-national-cancer-control-programme-2021-2031 (accessed: 23 March 2026)

11. Institute for Health Metrics and Evaluation (IHME). Global Burden of Disease estimates. https://vizhub.healthdata.org/gbd-results/ (accessed: 23 March 2026).

12. Institute for Health Metrics and Evaluation (IHME). Global Health Data Exchange. https://ghdx.healthdata.org/ihme_data (accessed: 23 March 2026).

13. Chen X, Zhang Z, Xiang J, Xiong R, Zhou X. Analysis of global, regional and national trends in the burden of soft tissue and other extraosseous sarcomas from 1990 to 2021: A systematic analysis of the global burden of disease study 2021. PLoS One 2025;20(9):e0332796. doi: 10.1371/journal.pone.0332796.

14. Prifti J, Pozzo C, Najtellari E, Piccaluga PP. Cancer Epidemiology in Albania: Insights, Challenges, and Future Directions. J Cancer Biomol Ther 2025;2:1-8. doi:10.62382/jcbt.v2i3.65.