Trends and Disparities in Prostate Cancer Incidence, Prevalence, and Survival: A SEER Analysis (2000–2022)

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Background & Objective

- Prostate cancer remains the 2nd most frequently diagnosed malignancy among men globally and the 5th leading cause of cancer-related mortality.[1] Its epidemiological landscape has changed significantly over the past two decades, driven by evolving screening practices, advances in diagnostic technologies, and demographic transitions. Despite these shifts, understandings of the impact age, race, and disease stage have on incidence, prevalence and survival remain limited.
- Deeper understanding of these patterns can enhance the precision to identify the populations and regions that require prioritized resources, research attention, and targeted interventions.
- The primary objective of this analysis is to utilize the SEER (Surveillance, Epidemiology, and End Results) database (2000 to 2022) to generate a detailed temporal map of prostate cancer burden, with a particular focus on identifying disparities that may guide targeted public health interventions in the US.

Methods

- As SEER covers approximately 28% of the US population, the incidence, prevalence and survival data were extracted using SEER*Stat version 8.4 software.[2]
- Descriptive trend analyses were used to identify patterns and irregularities across different subgroups based on:
  - Age
  - Race
  - Disease stage
- Age-adjusted incidence rates were systematically analysed using both 10-year and 5-year intervals to account for shifts in the age structure of the US population over time and enable accurate, equitable comparisons.

Results

- The highest incidence of prostate cancer was observed among men aged 70-79 years, followed by those aged 60-69 years and 80-89 years, respectively (Figure 1).
- A focused analysis was performed for patients aged 50-90+ years using 5-year intervals to explore age-related trends in prostate cancer incidence. The highest incidence of prostate cancer was identified in the 70-74 years age group, followed by 65-69 years and 75-79 years age groups (Figure 2).
- The highest prevalence was observed in the 65-69 years age group, while the prevalence for patients under 50 years was very low (<0.02%).

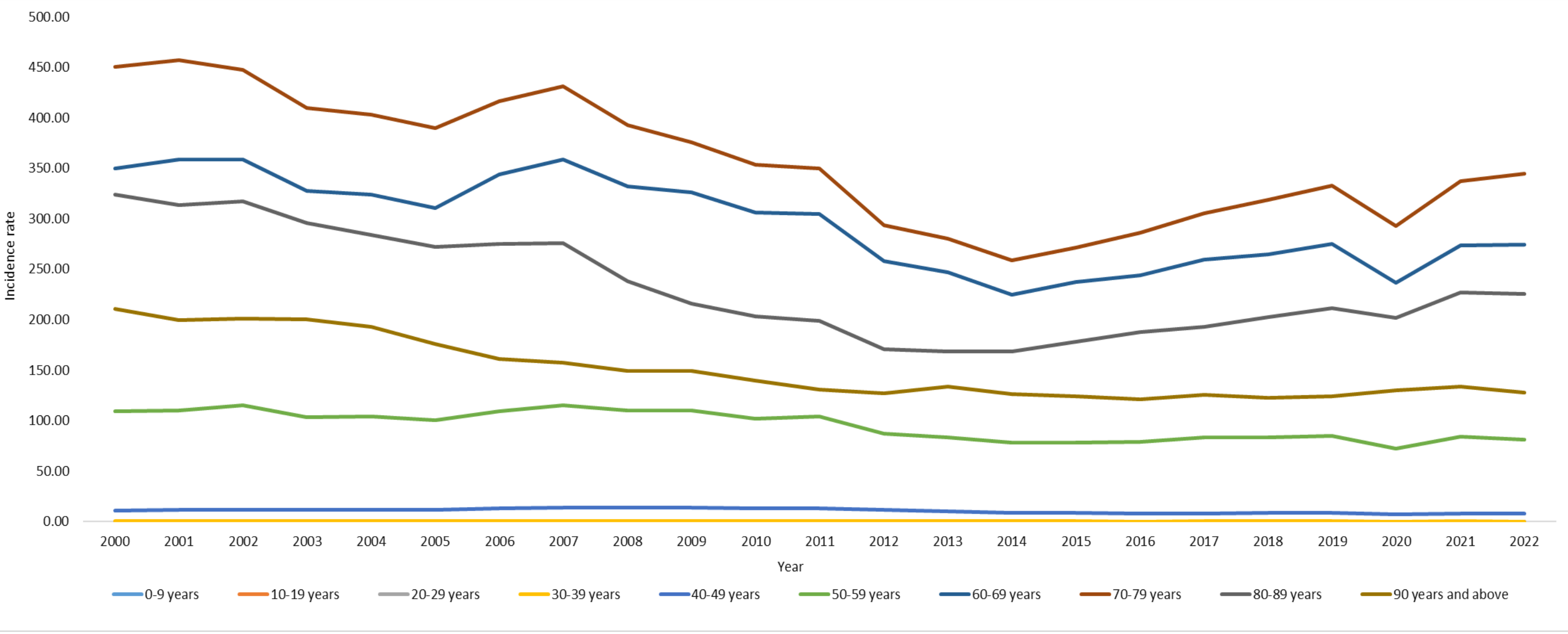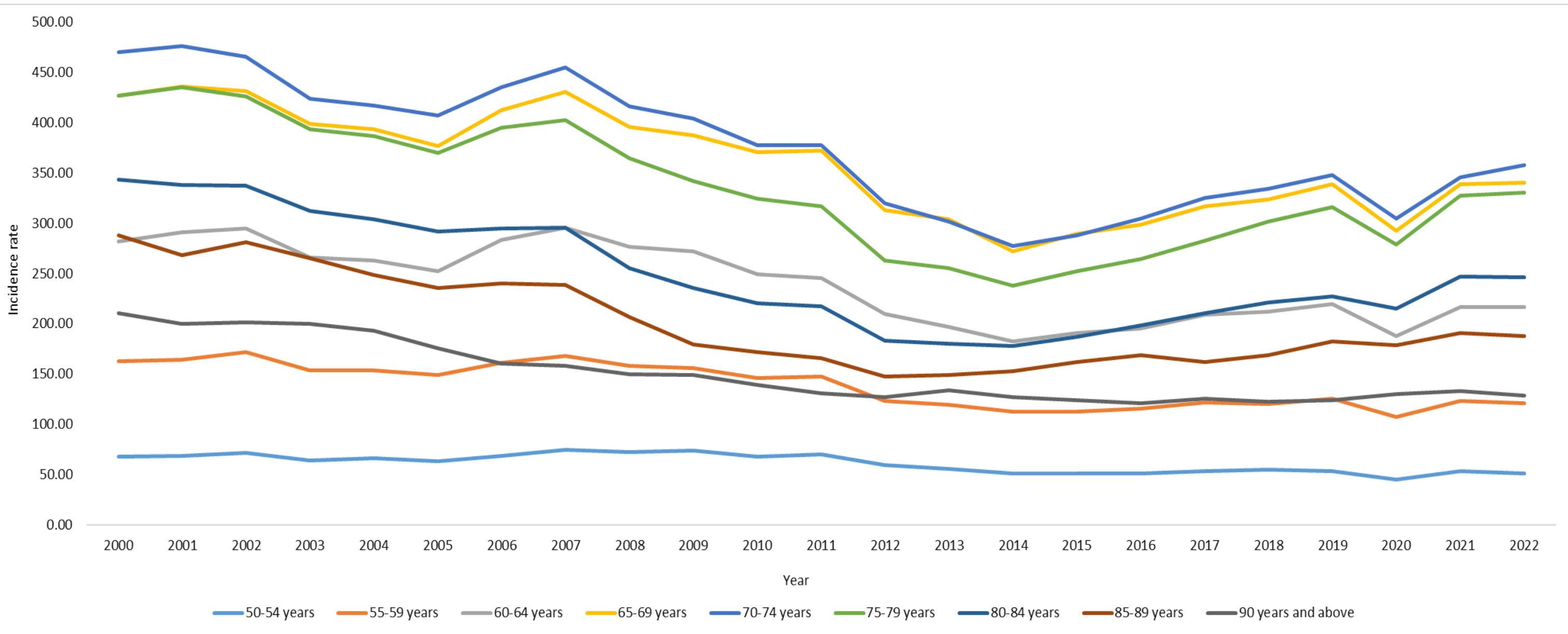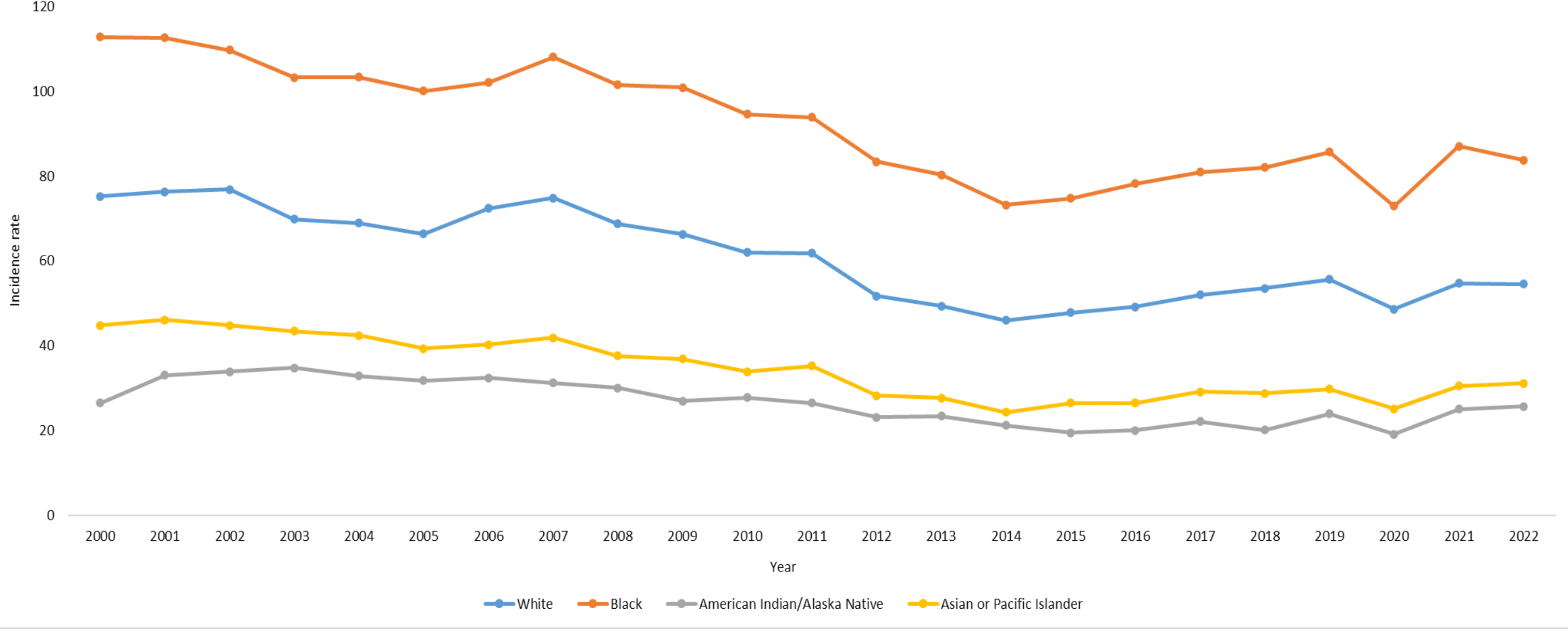Figure 1: Age-Specific Subgroup Analysis of Incidence from 2000 to 2022 (10-Year Interval)

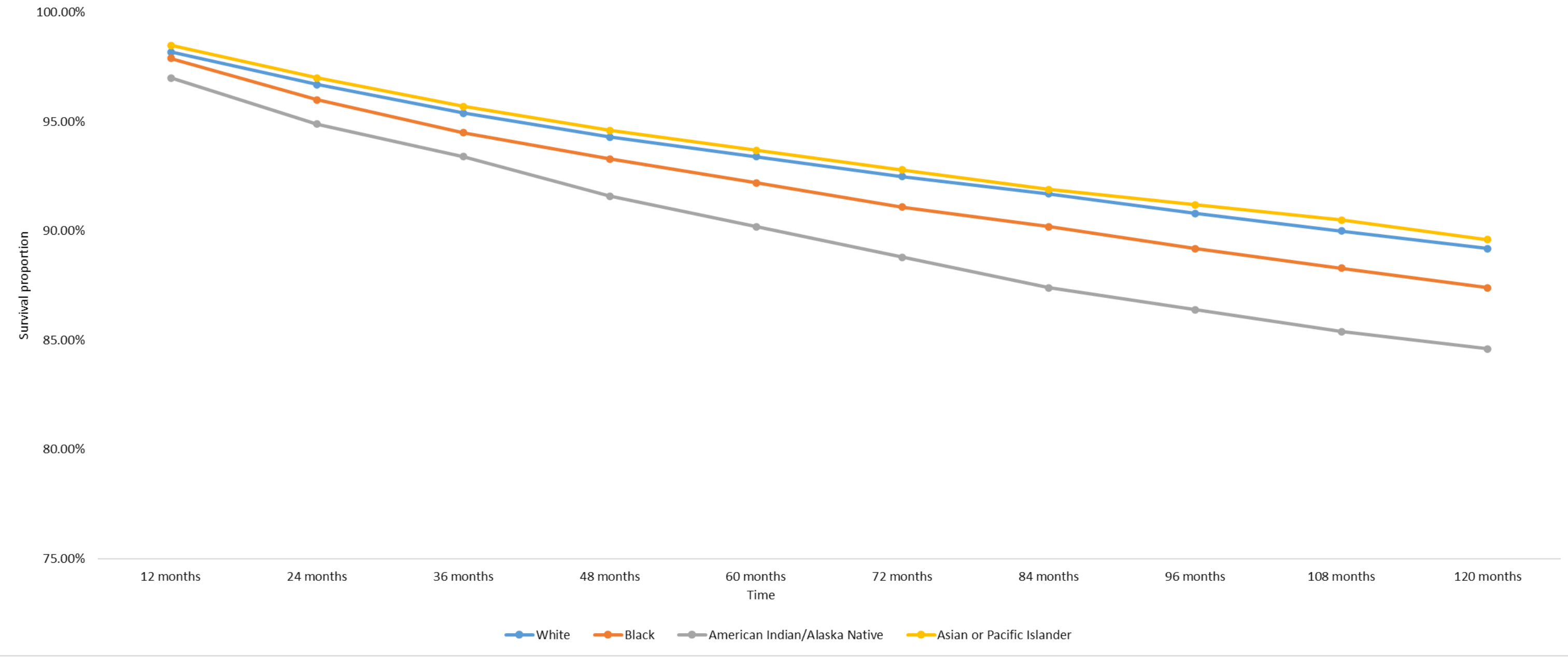Figure 2: Age-Specific Subgroup Analysis of Incidence from 2000 to 2022 (5-Year Interval)

- Black patients exhibited the highest incidence and prevalence rates, followed by White, Asian or Pacific Islander, and American Indian patients (Figure 3).

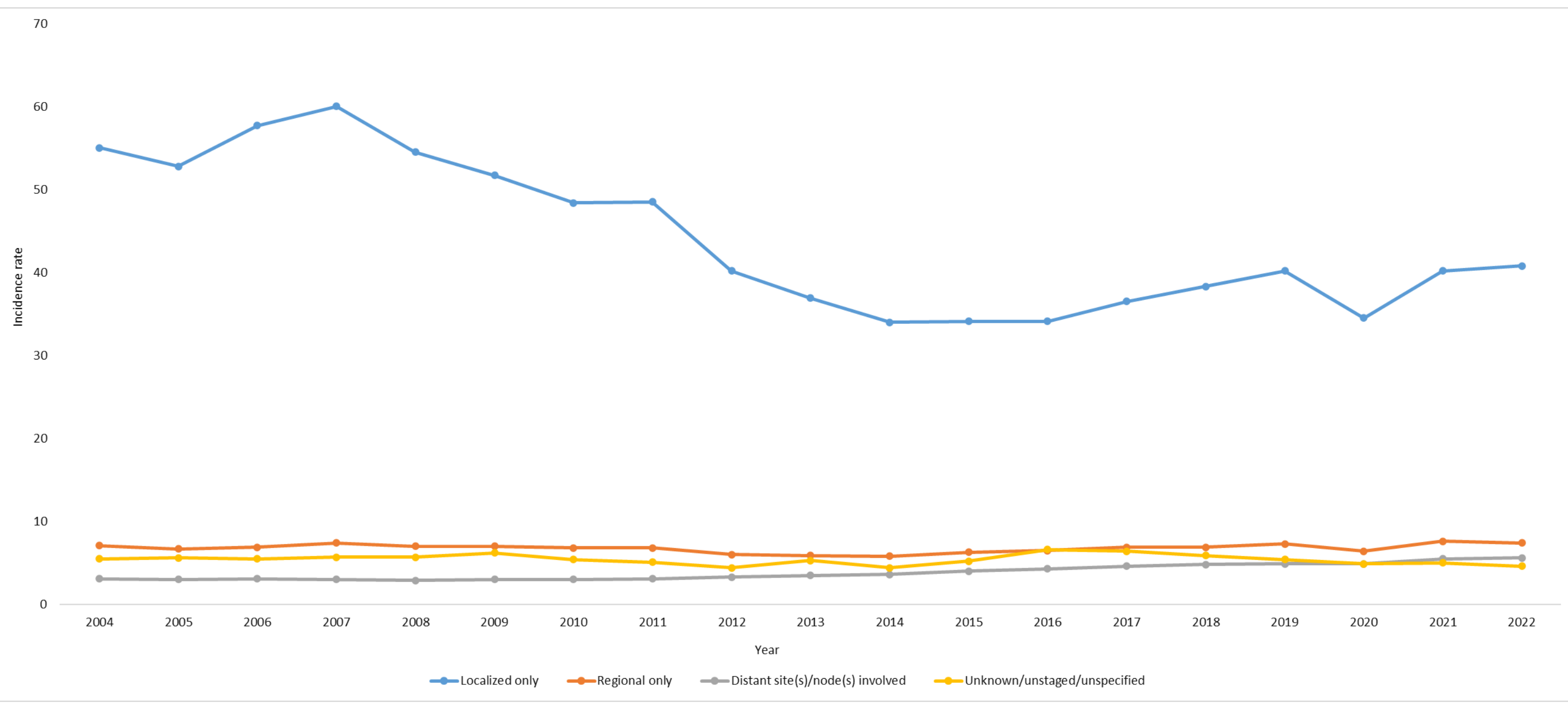Figure 3: Race-Specific Subgroup Analysis of Incidence from 2000 to 2022

- American Indian patients experienced the worst survival, followed by patients with Black ethnicity. White and Asian patients demonstrated comparatively better survival (Figure 4).

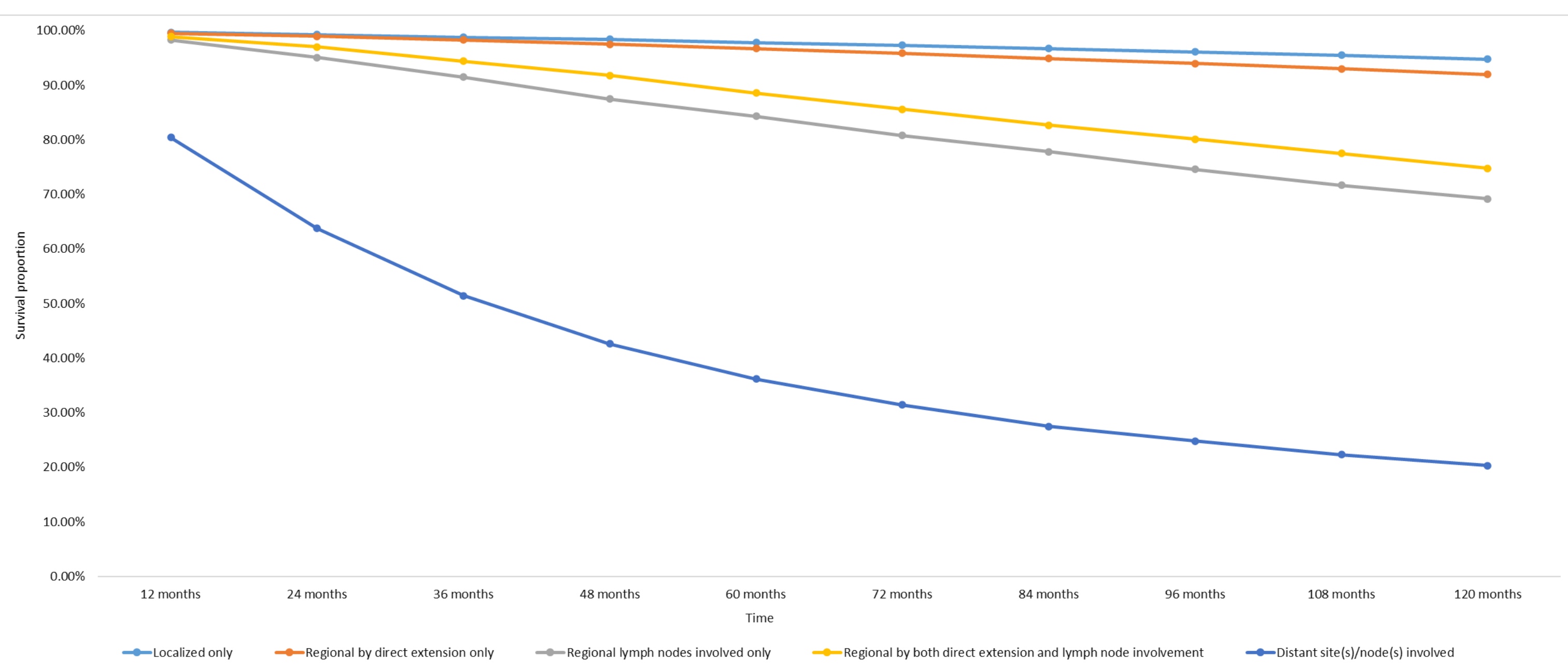Figure 4: Race-Specific Subgroup Analysis of Survival from 2000 to 2022

- Prostate cancer was predominantly diagnosed as localized disease, compared to more advanced forms.
- This pattern might reflect the widespread use of prostate-specific antigen (PSA) screening and improved access to diagnostic services in the United States.

Figure 5: Stage-Specific Subgroup Analysis of Incidence from 2000 to 2022

- The regional stage of the disease was further subdivided into three distinct categories: regional spread by direct extension, regional involvement of lymph nodes, and a combination of both direct extension and lymph node involvement. Further analysis revealed that patients diagnosed with distant metastatic disease exhibited substantially poorer survival outcomes compared to those with disease confined to the regional stage.

Figure 6: Stage-Specific Subgroup Analysis of Survival from 2000 to 2022

Conclusion

- The analysis shows that the prostate cancer burden is influenced by age, race and tumour stages. The sharp rise in prevalence among men aged 65-69 years calls for intensified screening and awareness at this stage.
- Persistent racial disparities, particularly among Black and American Indian men, may reflect systemic barriers to care and suggest a need for more equitable healthcare access.
- The steep decline in survival with advanced-stage disease further emphasizes the urgency of early detection. To reduce mortality and improve outcomes, targeted public health interventions must be prioritized among high-risk and underserved populations.
- Future research is needed to explore environmental, genetic, and health-system factors driving these disparities and inform more effective interventions.

References

1. Rawla P. Epidemiology of prostate cancer. World journal of oncology. 2019 Apr 20;10(2):63.
2. https://seer.cancer.gov/about/overview.html