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INTRODUCTION

Lung cancer (LC) remains a global health concern, requiring updates on patterns over time. The burden of LC varies globally, with Asia reporting the highest rates. Kazakhstan is a Central Asian country with notably high estimates both regionally and globally. This study evaluated the burden of LC in Kazakhstan, where data are notably sparse.

METHODS

Design: Using the National Cancer Registry data from 2014 to 2023, we evaluated age-standardized incidence, all-cause mortality, and prevalence rates, as well as rates for early-stage LC detection, and calculated the average annual percent change (AAPC) for all measures. We employed restricted mean survival time (RMST) models to evaluate the impact of clinical and demographic factors on survival during the one month through the fifth year following LC diagnosis. We also benchmarked our estimates against the Global Burden Study (GBD).

DISCUSSION AND CONCLUSION

Our study found an upward trend in the LC burden in Kazakhstan and large discrepancies when compared with the GBD. In our study, the share of cases diagnosed at advanced stages remains concerning, implying that preventive measures are either not broadly used or their benefits remain low. Moreover, we did not observe any changes in the diagnosis patterns over the decade. Improved detection might increase the estimates of LC, resulting in larger discrepancies between national statistics and GBD estimates. Most cases are consistently diagnosed at fairly advanced stages, making preventive measures and early detection the targets for controlling the LC burden.

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RESULTS

This study included 39,071 patients. The AAPC for incidence, mortality, and prevalence rates were -2.27% (95% CI, -3.28% to -1.23%), 3.51% (95% CI, -0.76% to 7.97%), and 12.69% (95% CI, 7.53% to 18.09%), respectively. LC was diagnosed at advanced stages, with 73.09% classified as stage III and IV, with an AAPC for early-stage detection rates of 0.27% (95% CI, -0.81% to 1.31%). The median follow-up time was 1,930 days (reverse Kaplan–Meier method). The 1 month and 5-year survival rates were 83.79% and 20.20%, respectively. The RMST identified that survival was primarily affected by the late stage and older age, where the difference in survival time increased from one day at baseline to several years by the fifth-year post-diagnosis. The GBD estimates were consistently half of those found in this study, underestimating the burden of LC.

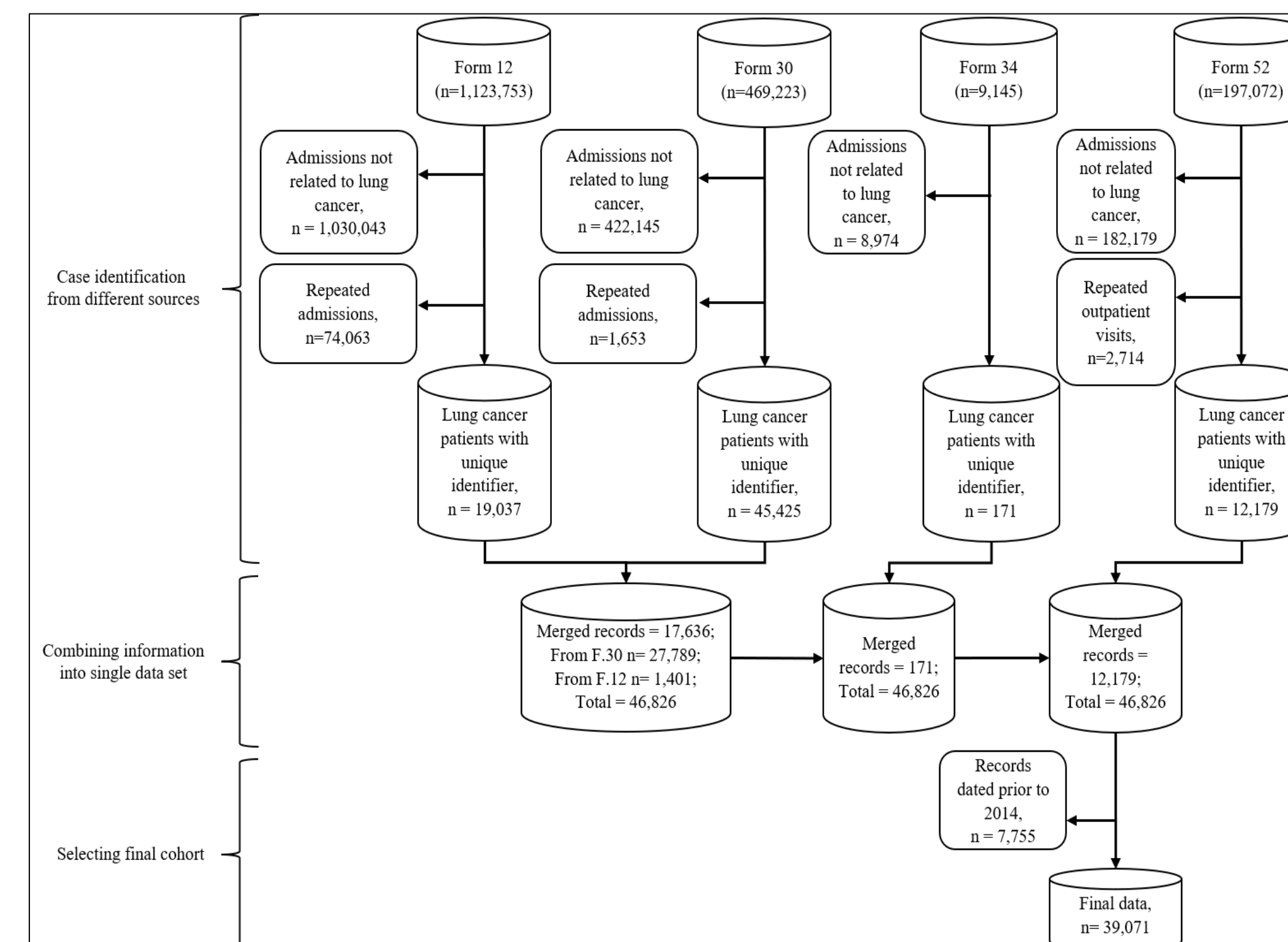


Figure 1: Flow chart of the study population.

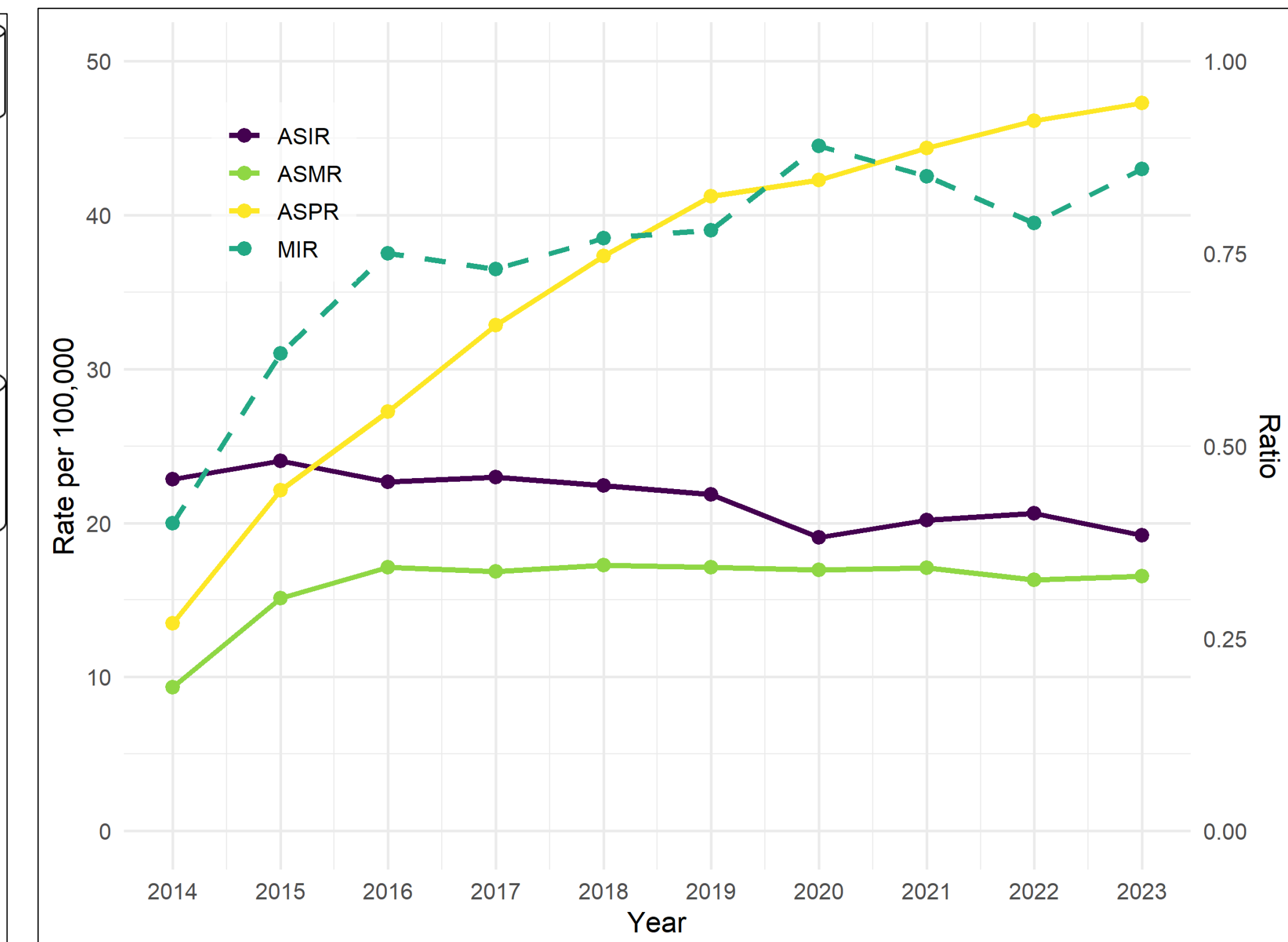


Figure 2: Age-standardized estimates for lung cancer from 2014 to 2023. Age-standardized incidence rate, ASIR; Age-standardized mortality rate, ASMR; Age-standardized prevalence rate, ASPR; Mortality to Incidence Ratio, MIR.

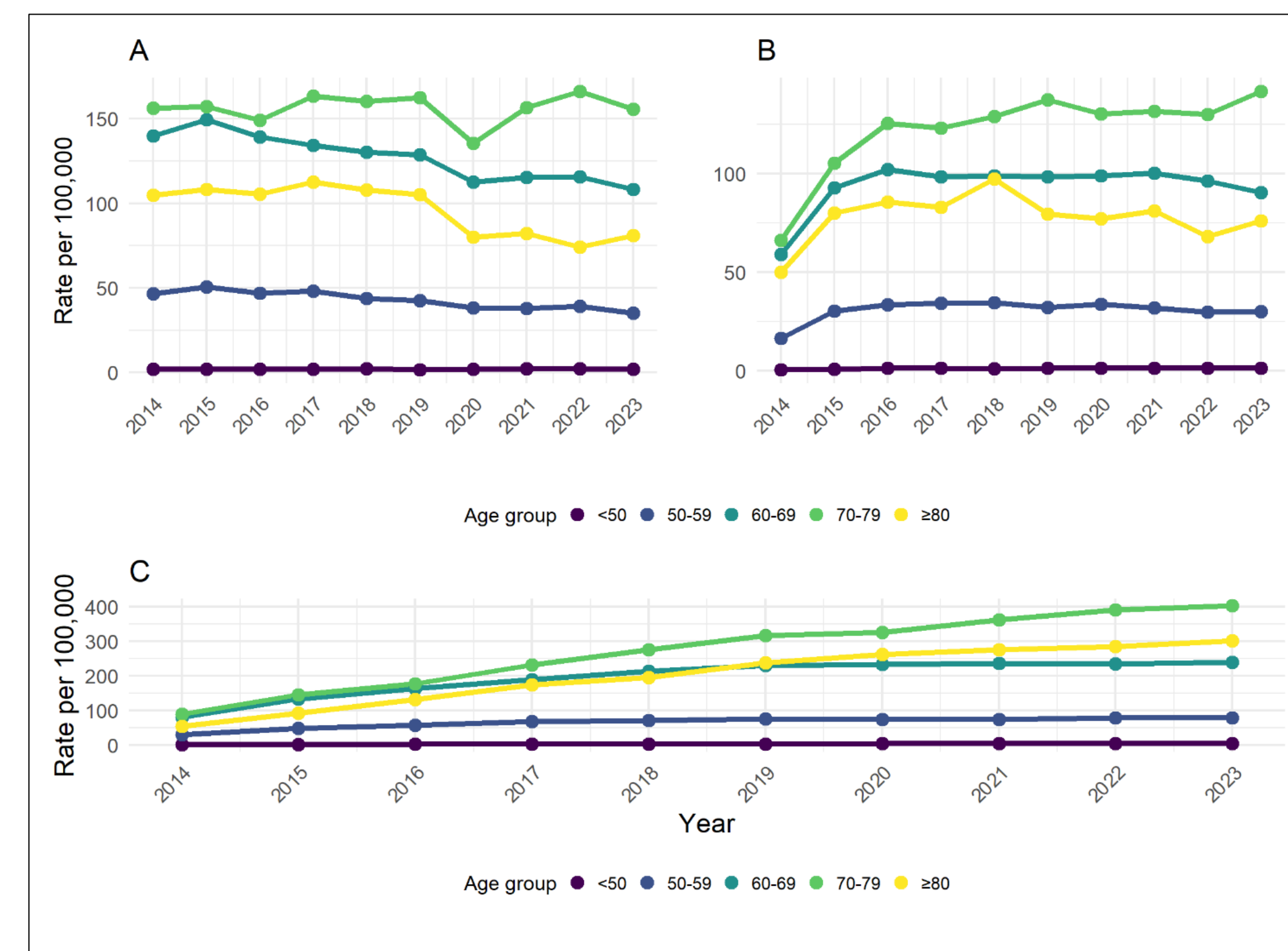


Figure 3: Age-specific estimates for lung cancer from 2014 to 2023.

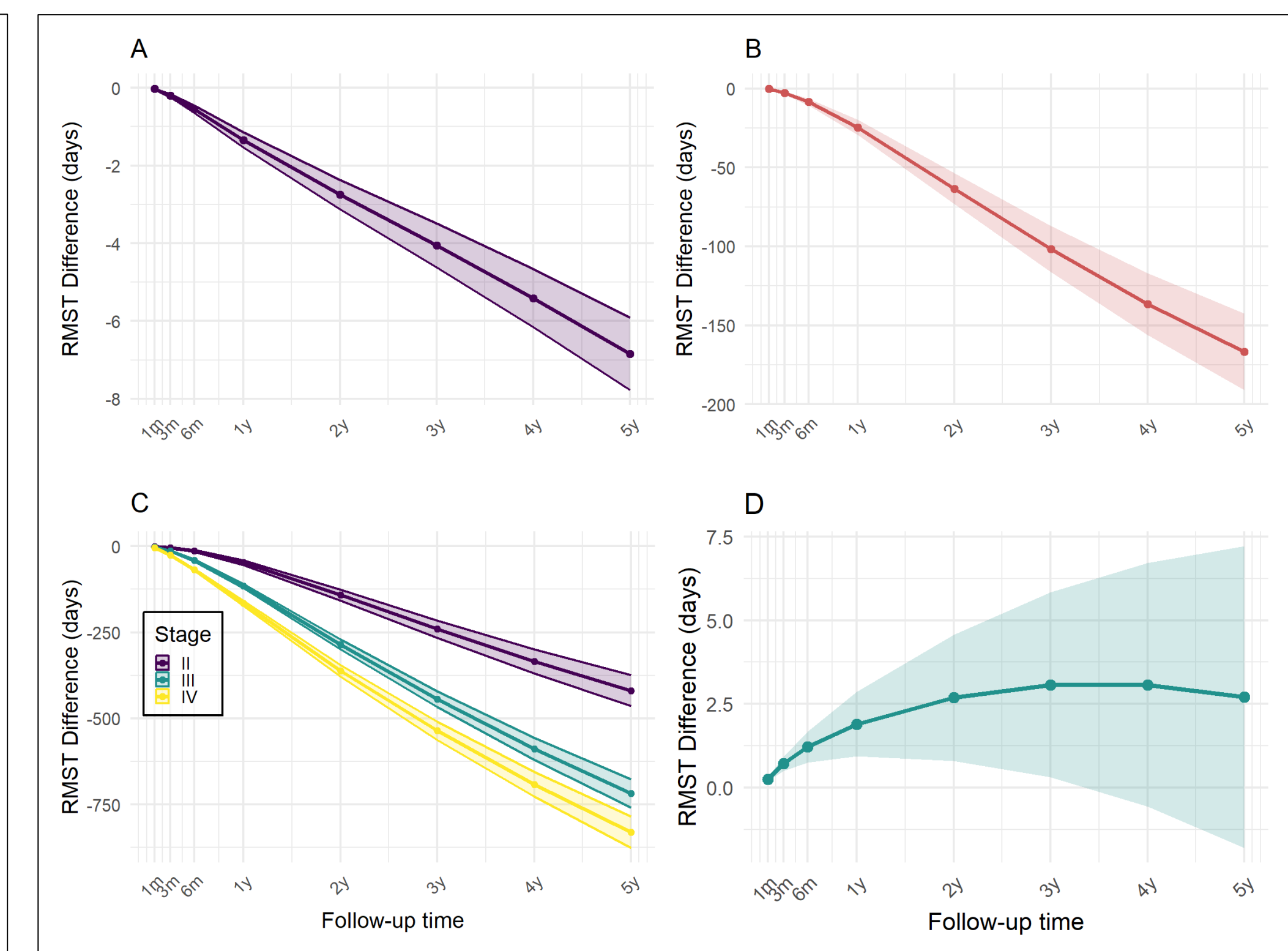


Figure 4: Difference in survival time from multivariable analyses using restricted mean survival time method.

Age group	Incidence			Case-fatality			Prevalence		
	Rate (per 100,000) 2014	Rate (per 100,000) 2023	AAPC, 2014-2023 (95% CI)	Rate (per 100,000) 2014	Rate (per 100,000) 2023	AAPC, 2014-2023 (95% CI)	Rate (per 100,000) 2014	Rate (per 100,000) 2023	AAPC, 2014-2023 (95% CI)
< 50	1.42	1.41	0.66* (-2.25 to 3.65)	0.66	1.35	5.66* (1.51 to 9.99)	1.16	4.32	15.04** (10.24 to 20.04)
50-59	46.57	35.20	-3.64* (-5.22 to -2.08)	16.37	30.08	3.04 (-2.43 to 8.82)	30.20	79.26	8.62* (3.75 to 13.72)
60-69	140.02	108.27	-3.32* (-4.21 to -2.44)	59.09	90.46	2.45 (-1.43 to 6.51)	80.92	238.98	10.30** (4.93 to 16.01)
70-79	156.18	155.82	0.03 (-1.54 to 1.67)	66.29	141.59	5.46* (1.20 to 9.91)	89.89	402.60	16.45** (11.35 to 21.77)
≥80	104.79	81.01	-4.31* (-6.55 to -2.00)	50.07	75.96	1.16 (-3.43 to 5.98)	54.72	302.28	18.72** (12.18 to 25.64)
ASIR	19.83	14.10	-2.27** (-3.28 to -1.23)	9.33	16.54	3.51 (-0.76 to 7.97)	13.50	47.38	12.69** (7.53 to 18.09)

Table 1. Age-specific & age-standardized estimates for incidence, case-fatality, and prevalence of lung cancer and the average percent change from 2014 to 2023. *p < 0.05, **p < 0.001; ASIR – age-standardized rate; AAPC – annual average percent change.