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An up-to-date assessment of U.S. prostate cancer incidence rates by stage and race: A novel approach combining multiple imputation with age- and delay-adjustment

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Abstract

Background: In the United States (U.S.), it is unknown whether metastatic prostate cancer incidence has continued to increase and whether racial differences have persisted.

Objective: Combining multiple imputation with age- and delay-adjustment, we provide an up-to-date, comprehensive assessment of U.S. prostate cancer incidence trends by stage and race.

Design, Setting and Participants: From SEER-18, 774,240 prostate cancer cases were diagnosed during 2004–2017.

Outcome Measurements and Statistical Analysis: Multiple imputation assigned prostate cancer stage to the 4.7% of cases with missing stage, which varied by year and race-ethnicity. SEER delay factors adjusted case counts to anticipated future data corrections. Twenty datasets were imputed and Rubin's rules were used for summary estimation. Overall and stage-specific rates were estimated and stratified by race and age-group. Joinpoint software identified significant temporal changes and estimated annual percentage changes. We compared these estimates without multiple imputation and delay-adjustment.

Results and Limitation: Metastatic prostate cancer incidence increased during 2011–2017 with an annual percentage change of 5.5. This was followed by increases in localized and regional disease since 2014. Non-Hispanic Black men continued to have the highest incidence, especially for metastatic disease. The increasing rate of metastatic prostate cancer in non-Hispanic white men aged 50–74 years recently accelerated, and incidence was 56% higher in 2017 compared with 2004. Rates without multiple imputation and delay adjustment were quantitatively and qualitatively different. This observational study is unable to assign causes to observed changes in prostate cancer incidence.

Conclusions: Multiple imputation and delay adjustment are essential to accurately portray stage- and race-specific prostate cancer incidence as clinical practices evolve.

Patient Summary:

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In the United States, diagnosis of prostate cancer that has spread to distant sites (metastatic disease) continues to increase. Black men continue to have higher risks of being diagnosed with metastatic prostate cancer relative to other race-ethnicities.

Keywords

Prostatic Neoplasms; Incidence; United States; SEER Program; Epidemiology

Introduction

Metastatic prostate cancer incidence has recently increased in the United States (U.S.) and exhibits stark racial differences [1, 2], yet it is unknown whether such trends have stabilized, attenuated, or exacerbated. Moreover, recent trends in localized and regional prostate cancer incidence have not been described, which may provide additional insights for evolving clinical practices and screening guidelines.

Prior studies that assessed prostate cancer incidence trends either excluded cases with unknown stage at diagnosis or combined them with metastatic disease, neither of which is optimal. In U.S. cancer registry data, there are typically as many prostate cancer cases with missing stage as there are metastatic cases in any given year [3]. Prior studies have also typically not adjusted rates for reporting delays—although SEER has an in-built 22-month period between the most recent calendar year of a dataset and its curation deadline, reporting delays (and corrections) extend beyond this leading to underestimated cancer incidence that predominantly affects the most recent calendar years. SEER explicitly models reporting delays and corrections in order to estimate delay-adjustment factors that enhance the accuracy of cancer trends [4, 5].

We conducted a study that combines multiple imputation with age- and delay-adjustment to provide a comprehensive assessment of U.S. prostate cancer incidence trends by race and stage for the period 2004–2017.

Material and Methods

We used a Surveillance Epidemiology and End Results (SEER)-18 [3] case-listing session to extract all incident malignant prostate cancer cases during 2004–2017 (database released April 15, 2020). Cases with unknown age, autopsy only or death certificate only were excluded, providing an equivalent population to that used for delay-adjustment factors (see below).

Prostate cancer stage (SEER Combined Summary Stage) at diagnosis was missing for 4.7% (n=36,574) of the total prostate cancer case population, with proportions of missingness varying by calendar year and race-ethnicity. The missingness pattern was not monotone. Therefore, we used multiple imputation with chained equations which fills in missing values in multiple variables iteratively using a sequence of univariate imputation models with fully conditional specification of prediction equations. The multiple imputation model for the primary purpose of imputing stage at diagnosis (SEER Combined Summary

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Stage: localized/regional/distant [metastatic], 4.7% missing, ordinal) also included age at diagnosis (19 groups, 5-year intervals and 85+), race-ethnicity (delay-race categorization), calendar year of diagnosis (single years), Gleason score (2–6/7/8/9–10, 47.1% missing, ordinal), surgery (none/local/radical prostatectomy, 1.3% missing, ordinal), prostate-specific antigen (ng/ml, 16.3% missing, predictive mean matching to nearest neighbor), survival (months), vital status, and prostate cancer death. Delay-race is a SEER variable that is included in SEER's estimation of delay-adjustment factors; by using the same race-ethnicity categorization as delay-race we ensured appropriate use of the extracted delay-adjustment factors in our analysis. Missing at random (MAR) was assumed (i.e., the probability of data being missing does not depend on the unobserved data, conditional on the observed data). MAR cannot be statistically verified but has substantive reasonableness [6], particularly with regards to this study. We imputed 20 datasets using 10 iterations for burn-in periods, with the latter evidenced to be sufficient from extended trace plots.

Male denominator populations and prostate cancer-specific composite (across registry) delay-adjustment factors [4, 5] were extracted from SEER-18 [7], stratified by age (19 groups), race-ethnicity (delay-race), and calendar year. Delay adjustment factors adjust case counts to anticipated future corrections to the data. Delay-adjustment factors are specific to each cancer site, registry, age-group, race and ethnicity ("delay race"), and calendar year. Composite delay factors across any of these variables, either alone or in combination, are readily provided in SEER*Stat using a case-weighted average approach.

Age- and delay-adjusted prostate cancer incidence rates were estimated in each imputed dataset and combined using Rubin's rules [8]. Overall and stage-specific rates were also estimated by race (non-Hispanic white, non-Hispanic Black, Hispanic, Asian/Pacific Islander) and age-group (50–74, 75+ years). For comparison of our approach, we also estimated age- and delay-adjusted and age-adjusted-only prostate cancer incidence rates without multiple imputation by excluding cases with missing stage.

All cancer incidence rates estimated in this study were age-adjusted to the 2000 U.S. Standard Population (19 age groups – Census P25–1130). Stata v15.1 (StataCorp LLC, College Station, TX) *-mi-* commands were used for multiple imputation, and user written programs estimated age- and delay-adjusted rates. Joinpoint Regression Program v4.8.0.1 (U.S. National Cancer Institute, Rockville, MD)[9] was used for linear regression modelling of log-linear trends, identification of joinpoints (maximum 2), and estimation of annual percentage changes (APCs).

Results

There were 774,240 incident prostate cancers during 2004–2017. Stage was missing for 4.7% (36,574), which increased with calendar year from 3.1% in 2004 to 9.2% in 2017. Moreover, missing stage varied by race-ethnicity, ranging from 5.5% for non-Hispanic whites to 13.1% for Hispanics for 2017. Delay-adjustment factors also varied by race-ethnicity, as illustrated by a range of 6.5% for Hispanics to 10.7% for Asian/Pacific Islanders in age-group 65–69 years in 2017.

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Multiply imputed age- and delay-adjusted prostate cancer incidence rates slowly decreased from 158.8 per 100,000 man-years to 148.2 during 2004–2009 (APC=−0.4) before a more rapid decrease to 100.8 in 2014 (APC=−8.1). Rates then increased to 114.7 in 2017 (APC=4.0) (Table and Figure 1). The incidence rate nadir varied by stage, being earliest for metastatic disease (2011, 7.8 per 100,000) and more recent for localized (2014, 78.8) and regional (2014, 13.1). Metastatic disease subsequently increased with an APC of 5.5 for the period 2011–2017, ending with an incidence of 10.7 per 100,000. The recent increases in localized and regional disease were estimated to have APCs of 3.7 and 5.6, respectively.

By race-ethnicity, overall prostate cancer incidence in 2017 was highest in non-Hispanic Blacks (189.4 per 100,000) followed by non-Hispanic whites (114.0), Hispanics (87.8), and Asian/Pacific Islanders (63.1) (Table). This order was repeated for localized, regional, and metastatic disease, with metastatic disease exhibiting the largest relative racial-ethnic differences despite a decrease in the non-Hispanic Black to non-Hispanic white incidence rate ratio from 2.64 to 1.91 over the study period.

Trends of overall prostate cancer incidence were generally similar across race-ethnicities, except for a lower increase in Hispanics during 2014–2017 (APC=1.0) compared with other groups (APCs:3.3–5.7) (Figure 2). Racial-ethnic trends for metastatic disease were similar (Figure 3), although the start of the recent increase was 2011 for non-Hispanic whites and Asian/Pacific Islanders, 2012 for non-Hispanic Blacks, and 2014 for Hispanics. Trends for localized and regional disease showed a similar pattern to metastatic but appeared to be 2–3 years behind, with Hispanics yet to show any notable increase (Supplemental Figures 1 & 2).

Age-group-specific trends were generally similar across racial-ethnic groups (Supplemental Table 1, Supplemental Figure 3). A notable observation from the race-stratified trends was that declining incidence during the initial and middle study periods started earlier and was more prolonged in men aged ≥75 years, compared with 50–74 years, greatly reducing absolute and relative age-group differences, which led to a convergence of these rates in non-Hispanic Black men. This precipitous decline in all older men (from 813.6 per 100,000 in 2004 to 506.6 in 2017) was predominantly driven by localized prostate cancer, with incidence having halved during 2004–2014.

Metastatic disease patterns were mostly similar by age and race when visualized and modelled, although metastatic disease in non-Hispanic white men aged 50–74 years recently accelerated (APC 2008–2013=3.1; APC 2013–2017=8.5) and is now 57% higher than it was at the beginning of the study period (21.0 vs 13.4 per 100,000; Supplemental Table 1, Supplemental Figure 4).

Without multiple imputation, 2017 incidence rates were 11% lower for localized disease, 6% lower for regional disease, and 5% lower for metastatic disease (Supplemental Table 2). This was exacerbated when delay-adjustment was also omitted, with respective estimates being 14%, 10%, and 8% lower than multiply imputed age- and delay-adjusted incidence rates. These discrepancies were observed across the racial-ethnic groups assessed in this study and were even more pronounced in certain instances (Supplemental Table 3).

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In addition to absolute rates, trends were also misrepresented by failing to account for missing stage and delay-adjustment (Supplemental Figures 5–19). For example, recent increases in localized prostate cancer for total, non-Hispanic white, and non-Hispanic Black populations were not detected (Supplemental Figures 5, 8, 11); and recent increases in regional disease for the total and each racial-ethnic-specific population were underestimated or undetected (Supplemental Figures 6, 9, 12, 15, 18). Trends of metastatic prostate cancer were largely similar between the three methods, except for Hispanics in which lack of multiple imputation and delay-adjustment obscured the stable rates during 2006–2014 and the dramatic increase thereafter (Supplemental Figure 16).

Discussion

This study shows that metastatic prostate cancer incidence has continued to increase from 2011 through 2017 and that, more recently, localized and regional disease have each followed a similar trend. These patterns may argue against adverse (“reverse”) stage migration [10] or could reflect a combination of evolving recommendations and clinical practices with variable lead-time effects by stage. However, attempts to deduce the underlying causes of these trends are fraught with complexity [10–13]. United States Preventive Services Task Force (USPSTF) recommendations have undoubtedly played a role in overall and stage-specific prostate cancer incidence trends, but other factors including increased use of more sensitive diagnostic and staging technologies, enhanced risk triaging before and after biopsy, increased use of active surveillance, and real changes in disease incidence have also likely played a role.

Metastatic prostate cancer incidence remained at least 1.9-times higher in non-Hispanic Black men compared with any other race-ethnicity, echoing recent studies that assessed incidence of prostate cancer that was ultimately fatal [14, 15]. It is important not to conflate findings from other prior studies of racial similarities in prostate cancer survival (once adjusted for healthcare access and utilization) [16, 17] with the stark, unexplained racial differences in prostate cancer incidence [1]. PSA testing likely contributes to the racial differences in metastatic prostate cancer rates, given a higher prevalence of testing in non-Hispanic whites than non-Hispanic Blacks [1, 18], but is therefore not a conceivable major contributor to the racial differences in earlier stage disease. Moreover, racial differences in prostate cancer incidence long preceded the PSA era [19]. Non-mutually exclusive social and biological determinants of prostate cancer incidence and progression [20, 21] should continue to be investigated to help elucidate prostate cancer etiology and racial inequities of this disease.[16, 17]

The age-groups we considered in this study were aligned with pre-2018 USPSTF guidance for PSA testing for prostate cancer screening. Converging prostate cancer incidence rates by age group, driven by a precipitous decrease of localized disease in men aged ≥75 years, may be partly attributable to the increased clinical awareness of the heightened harms of prostate cancer screening in older men; a recently published study using data from the US Cancer Statistics Public Use Research Database reported similar declines for incidence of localized disease in both age groups [22], following the 2008 USPSTF recommendation. Though most U.S. medical organizations guidelines already had a 10-year life expectancy requirement

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[23] prior to the USPSTF 2008 “D” (against screening) recommendation for men aged ≥75 years [23], evidence for a decrease in PSA testing amongst older men is equivocal for this time period [1, 24].

With regards to age- and race-specific trends, a concerning observation was the recent acceleration in metastatic prostate cancer in younger non-Hispanic white men. Ascribing underlying reasons for such an increase is complex, as previously discussed. Continued monitoring of this trend and whether it is subsequently observed in other race-ethnicities will be essential.

The percentage of prostate cancer cases with missing stage varied by calendar year and race-ethnicity. In addition, the total number of cases with missing stage (36,574) was largely equivalent to the total number of metastatic cases (42,308) and was even predominant in certain calendar years, including the most recent year of 2017 with 5,185 cases with missing stage compared with 4,473 metastatic cases. These observations highlight the problem of excluding cases with missing stage, assessing them as an independent group, or combining them with metastatic disease. Moreover, the comparison of multiply imputed age- and delay-adjusted rates with age- and delay adjustment or age-adjustment only underscores the importance of the presented approach, particularly in assessing recent trends of stage-specific disease for total and racial-ethnic-specific populations.

Strengths of this study include the use of the recently released (April 15, 2020) U.S. SEER-18 cancer registry data, which is a high-quality database that covers approximately 27.8% of the U.S. population; and the novel combined use of multiple imputation and delay adjustment, which likely provides the most accurate representation of stage-specific prostate cancer trends, given it enables use of the full dataset with informed assignment of stage (where missing) and incorporation of the best estimates of delay adjustment and anticipated future data corrections. Limitations include use of prostate cancer incidence delay-adjustment factors that are not stage-specific (given that such are not available or readily estimable), and the observational nature of this study which precludes assigning causes to observed changes in prostate cancer incidence.

Conclusions

This study demonstrates the importance of incorporating multiple imputation and delay adjustment in assessing contemporary, stage-specific prostate cancer incidence trends. The increasing incidence of localized, regional, and metastatic prostate cancer should not cause a reflexive reaction towards more screening—the underlying causes of the stage-specific increases are complex and likely to be somewhat variable [25]. Rather, the findings of this study underscore the need for more nuanced prostate cancer screening [26, 27], more accurate prognostic algorithms based on quality and length of life [28], and a greater understanding of the causes underlying these increases in stage-specific prostate cancer incidence and the persisting racial inequities.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Take home message:

In the United States, metastatic prostate cancer incidence rates have continued to increase through 2017, and local and regional disease rates have also increased since 2014. Racial differences persist with non-Hispanic Black men at highest risk.

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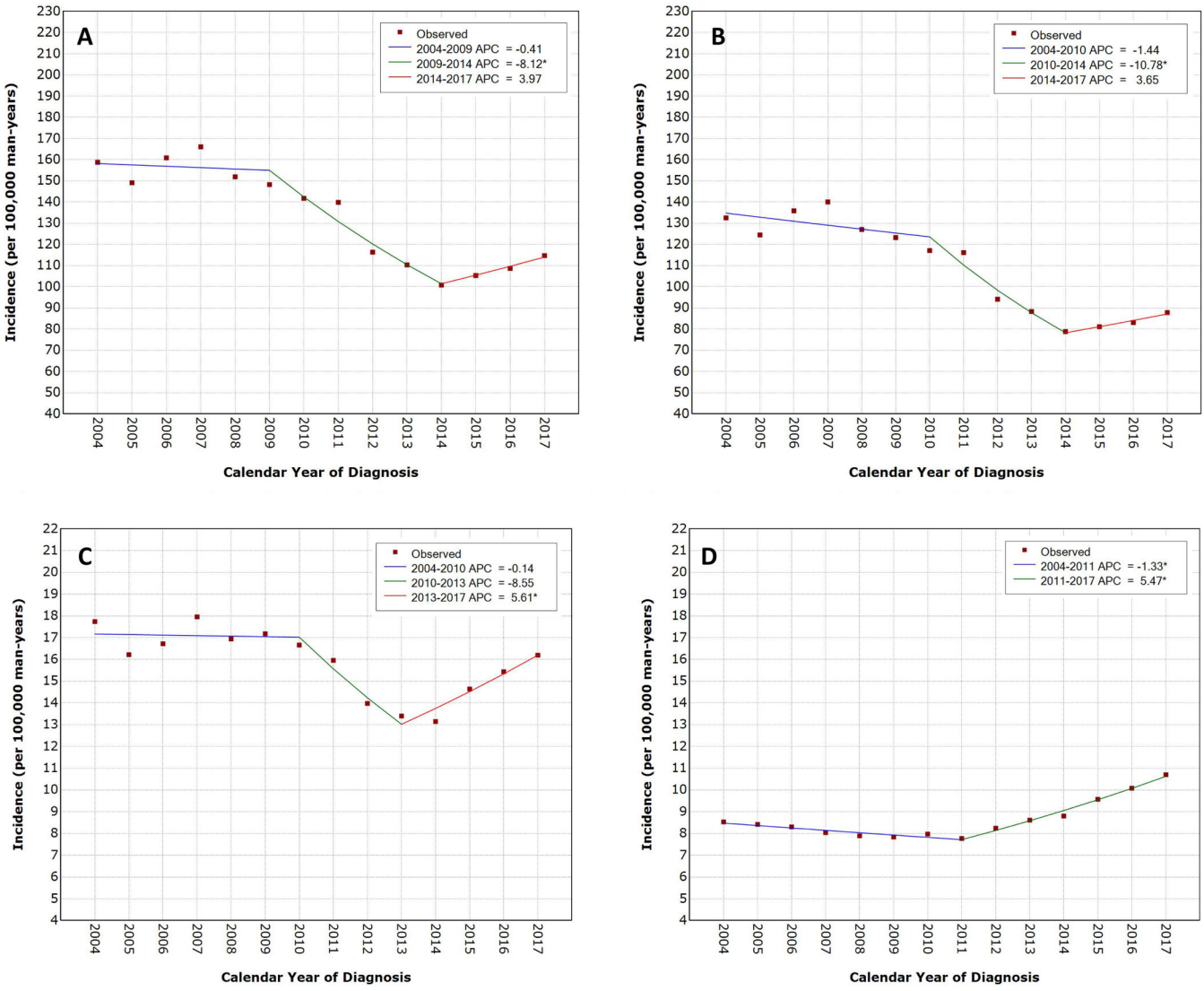

Figure 1: Multiply imputed age- and delay-adjusted prostate cancer incidence rates overall and by stage, SEER-18, 2004–2017.

The figure shows multiply imputed, age- and delay-adjusted prostate cancer incidence rates per 100,000 man-years by individual calendar year for (A) overall, (B) local stage, (C) regional stage, and (D) metastatic stage. The continuous line represents the simplest joinpoint regression model that the data permit, with a maximum of 2 joinpoints allowed. Asterisk indicates that the annual percentage change (APC) is significantly ($p<0.05$) different from zero.

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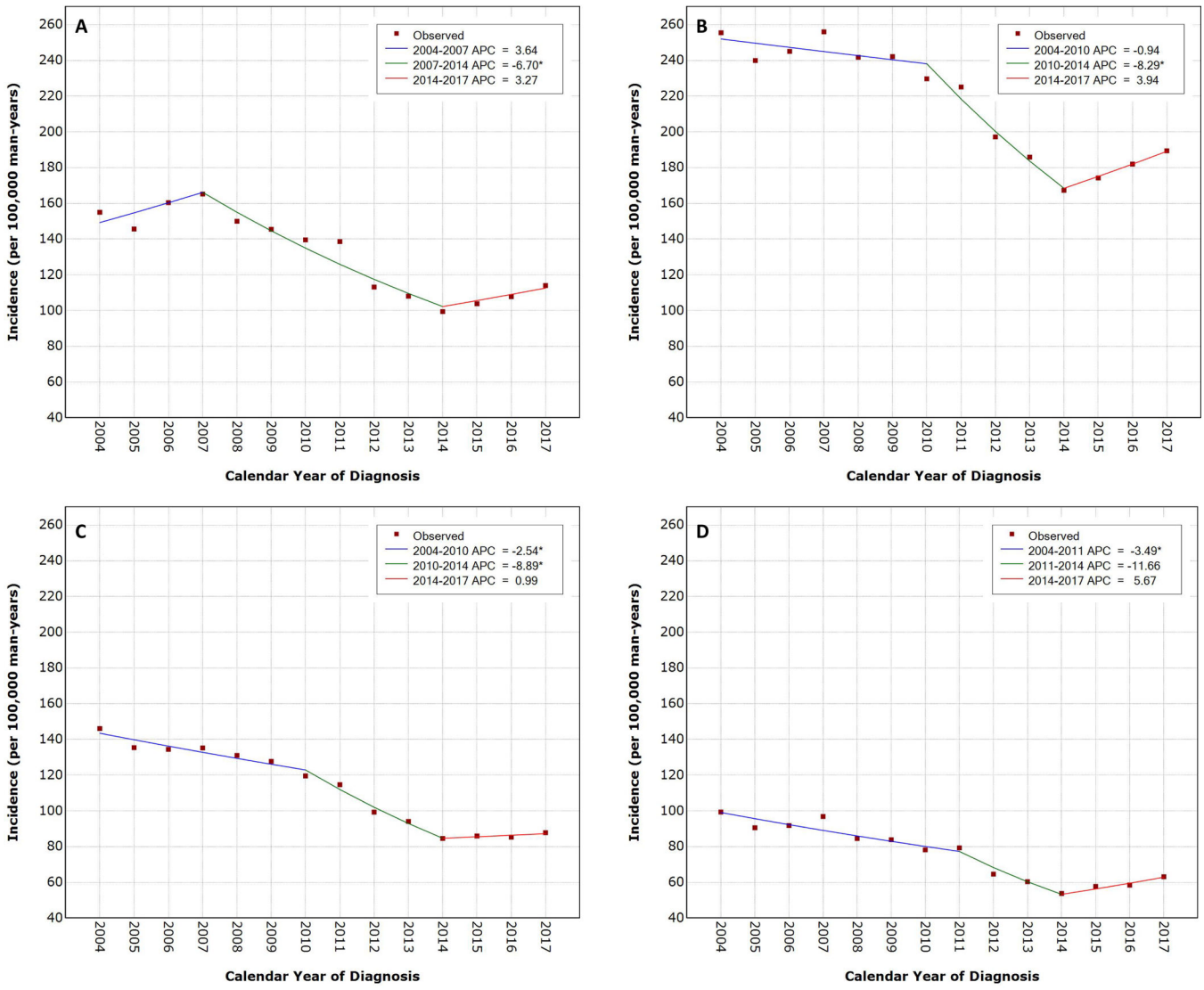

Figure 2. Multiply imputed age- and delay-adjusted prostate cancer incidence rates by race-ethnicity, SEER-18, 2004–2017.

The figure shows multiply imputed, age- and delay-adjusted prostate cancer incidence rates per 100,000 man-years by individual calendar year for (A) non-Hispanic whites, (B) non-Hispanic Blacks, (C) Hispanics, and (D) Asian/Pacific Islanders. The continuous line represents the simplest joinpoint regression model that the data permit, with a maximum of 2 joinpoints allowed. Asterisk indicates that the annual percentage change (APC) is significantly ($p<0.05$) different from zero.

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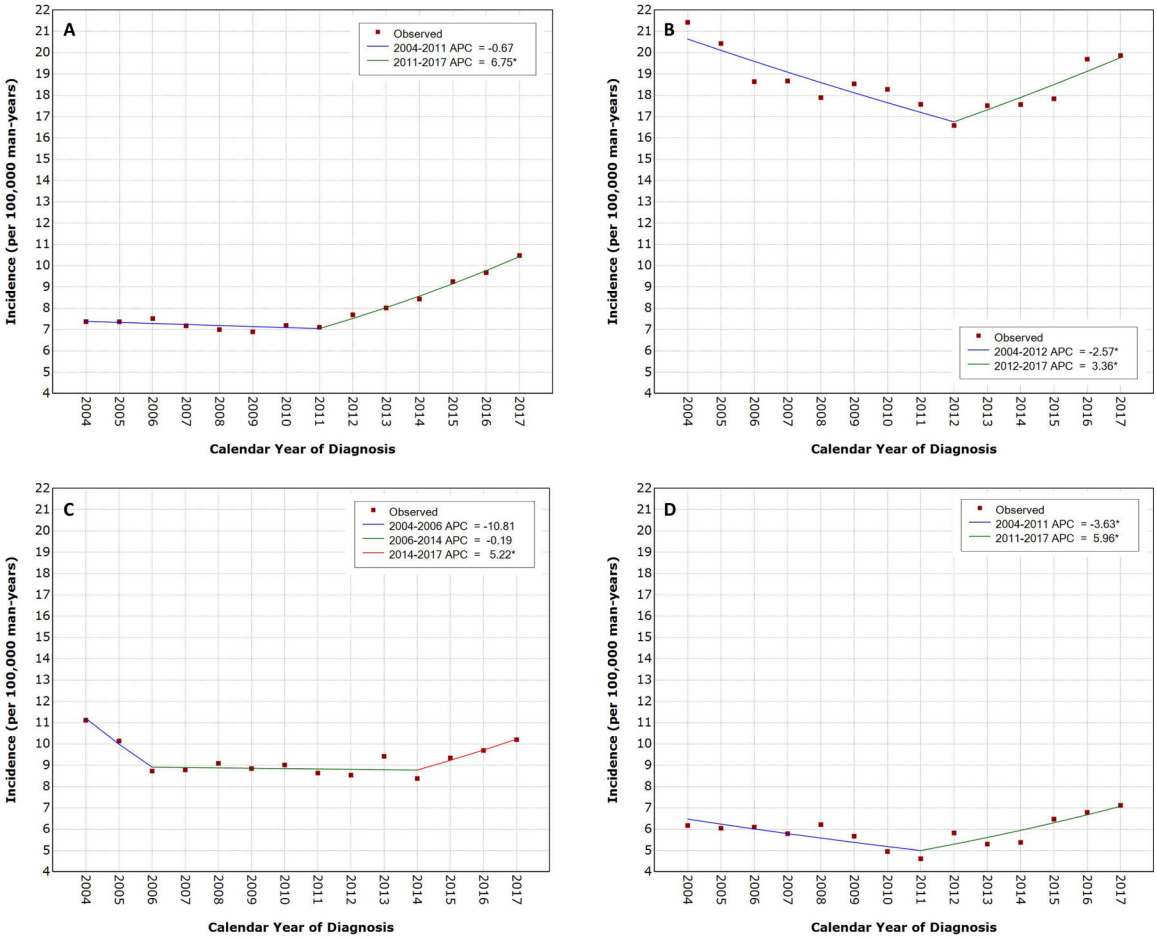

Figure 3. Multiply imputed age- and delay-adjusted metastatic prostate cancer incidence rates by race-ethnicity, SEER-18, 2004–2017.

The figure shows multiply imputed, age- and delay-adjusted metastatic prostate cancer incidence rates per 100,000 man-years by individual calendar year for (A) non-Hispanic whites, (B) non-Hispanic Blacks, (C) Hispanics, and (D) Asian/Pacific Islanders. The continuous line represents the simplest joinpoint regression model that the data permit, with a maximum of 2 joinpoints allowed. Asterisk indicates that the annual percentage change (APC) is significantly ($p<0.05$) different from zero.

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Table.

Multiply imputed age- and delay-adjusted prostate cancer incidence rates by race-ethnicity and stage, SEER-18, 2004–2017

Cancer Stage at Diagnosis	Year	All Race/Ethnicities		Non-Hispanic Whites		Non-Hispanic Blacks		Hispanics		Asian/Pacific Islanders	
		Count	Incidence Rate (95%CI)	Count	Incidence Rate (95%CI)	Count	Incidence Rate (95%CI)	Count	Incidence Rate (95%CI)	Count	Incidence Rate (95%CI)
All	**2004**	54,887	158.8 (157.4, 160.1)	39,566	155.0 (153.5, 156.6)	7,517	255.5 (249.4, 261.6)	4,584	146.1 (141.6, 150.6)	2,563	99.3 (95.4, 103.3)
	2005	52,768	149.1 (147.8, 150.4)	37,721	145.7 (144.2, 147.2)	7,326	239.9 (234.1, 245.7)	4,526	135.4 (131.2, 139.6)	2,447	90.6 (86.9, 94.3)
	2006	58,519	160.9 (159.6, 162.2)	42,345	160.4 (158.9, 162.0)	7,841	245.1 (239.3, 250.8)	4,748	134.5 (130.4, 138.5)	2,592	91.8 (88.2, 95.4)
	2007	62,393	166.1 (164.7, 167.4)	44,753	165.2 (163.6, 166.7)	8,509	256.0 (250.2, 261.8)	5,079	135.2 (131.3, 139.2)	2,904	96.9 (93.3, 100.5)
	2008	59,192	151.9 (150.6, 153.1)	41,812	150.0 (148.5, 151.4)	8,408	241.8 (236.2, 247.3)	5,179	131.0 (127.2, 134.8)	2,698	84.5 (81.3, 87.8)
	2009	59,887	148.2 (147.0, 149.5)	41,717	145.5 (144.1, 146.9)	8,835	242.2 (236.7, 247.6)	5,442	127.7 (124.1, 131.3)	2,801	83.9 (80.7, 87.1)
	2010	58,986	141.8 (140.6, 142.9)	40,906	139.6 (138.2, 140.9)	8,726	229.7 (224.5, 234.9)	5,350	119.6 (116.1, 123.0)	2,772	78.2 (75.2, 81.2)
	2011	60,046	139.9 (138.7, 141.0)	41,582	138.6 (137.2, 140.0)	8,939	225.1 (220.1, 230.2)	5,472	114.7 (111.4, 117.9)	2,938	79.3 (76.3, 82.3)
	2012	51,706	116.3 (115.3, 117.4)	34,908	113.1 (111.9, 114.4)	8,126	197.2 (192.5, 201.8)	5,011	99.3 (96.3, 102.2)	2,548	64.6 (62.0, 67.2)
	2013	50,562	110.4 (109.4, 111.4)	34,125	108.0 (106.8, 109.2)	7,959	185.9 (181.5, 190.3)	4,956	94.1 (91.3, 97.0)	2,519	60.4 (57.9, 62.8)
	2014	47,560	100.8 (99.9, 101.7)	32,004	99.4 (98.3, 100.5)	7,498	167.3 (163.2, 171.4)	4,786	84.6 (82.0, 87.2)	2,357	53.8 (51.5, 56.1)
	2015	51,101	105.4 (104.4, 106.3)	34,087	103.8 (102.7, 105.0)	8,103	174.2 (170.1, 178.3)	5,163	86.0 (83.4, 88.5)	2,641	57.7 (55.4, 60.0)
	2016	54,166	108.7 (107.7, 109.6)	36,153	107.8 (106.6, 109.0)	8,701	182.0 (177.8, 186.2)	5,349	85.3 (82.8, 87.8)	2,808	58.5 (56.2, 60.8)
	2017	58,625	114.7 (113.8, 115.7)	38,894	114.0 (112.8, 115.2)	9,312	189.4 (185.2, 193.6)	5,792	87.8 (85.3, 90.3)	3,161	63.1 (60.8, 65.5)
Localized	**2004**	45,615	132.5 (131.3, 133.8)	33,019	129.8 (128.4, 131.2)	6,180	210.6 (205.0, 216.1)	3,707	118.8 (114.7, 122.8)	2,118	82.7 (79.1, 86.3)
	2005	43,897	124.5 (123.3, 125.7)	31,467	121.9 (120.6, 123.3)	6,096	199.6 (194.3, 204.9)	3,655	110.0 (106.2, 113.8)	2,003	74.4 (71.0, 77.7)

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Cancer Stage at Diagnosis	Year	All Race/Ethnicities		Non-Hispanic Whites		Non-Hispanic Blacks		Hispanics		Asian/Pacific Islanders	
		Count	Incidence Rate (95%CI)	Count	Incidence Rate (95%CI)	Count	Incidence Rate (95%CI)	Count	Incidence Rate (95%CI)	Count	Incidence Rate (95%CI)
	2006	49,229	135.9 (134.6, 137.1)	35,652	135.5 (134.1, 136.9)	6,628	207.5 (202.2, 212.8)	3,897	111.0 (107.3, 114.7)	2,145	76.4 (73.1, 79.8)
	2007	52,416	140.1 (138.9, 141.3)	37,672	139.6 (138.2, 141.0)	7,159	215.9 (210.5, 221.2)	4,160	111.3 (107.7, 114.9)	2,360	79.2 (75.9, 82.5)
	2008	49,353	127.1 (125.9, 128.2)	34,872	125.5 (124.2, 126.8)	7,131	204.3 (199.2, 209.4)	4,209	107.3 (103.8, 110.8)	2,135	67.3 (64.4, 70.3)
	2009	49,613	123.2 (122.1, 124.3)	34,580	121.0 (119.7, 122.3)	7,392	202.4 (197.5, 207.4)	4,394	103.8 (100.6, 107.1)	2,242	67.4 (64.5, 70.3)
	2010	48,621	117.1 (116.0, 118.2)	33,661	115.2 (113.9, 116.4)	7,225	189.8 (185.1, 194.5)	4,307	96.5 (93.4, 99.6)	2,243	63.5 (60.8, 66.3)
	2011	49,719	116.1 (115.1, 117.2)	34,356	114.9 (113.6, 116.1)	7,487	188.6 (184.0, 193.2)	4,432	93.1 (90.1, 96.0)	2,357	64.0 (61.3, 66.7)
	2012	41,865	94.1 (93.2, 95.1)	28,065	91.0 (89.9, 92.1)	6,708	162.4 (158.2, 166.6)	4,016	79.4 (76.8, 82.1)	1,965	49.6 (47.3, 51.9)
	2013	40,549	88.3 (87.5, 89.2)	27,226	86.1 (85.1, 87.2)	6,507	151.4 (147.4, 155.3)	3,867	73.2 (70.7, 75.7)	1,942	46.4 (44.2, 48.5)
	2014	37,309	78.8 (78.0, 79.7)	24,905	77.2 (76.2, 78.2)	6,008	133.1 (129.5, 136.7)	3,661	64.8 (62.5, 67.1)	1,787	40.8 (38.8, 42.8)
	2015	39,509	81.1 (80.3, 82.0)	26,083	79.2 (78.2, 80.2)	6,471	137.8 (134.2, 141.5)	3,868	64.0 (61.8, 66.2)	1,931	42.1 (40.1, 44.2)
	2016	41,598	83.2 (82.3, 84.0)	27,465	81.6 (80.6, 82.7)	6,827	141.4 (137.7, 145.0)	4,036	64.1 (61.9, 66.2)	2,008	41.7 (39.8, 43.7)
	2017	45,131	87.8 (87.0, 88.7)	29,516	86.1 (85.1, 87.2)	7,354	147.8 (144.0, 151.5)	4,344	65.2 (63.1, 67.4)	2,279	45.3 (43.3, 47.3)
Regional	**2004**	6,598	17.7 (17.3, 18.2)	4,803	17.8 (17.3, 18.4)	863	25.4 (23.6, 27.3)	588	16.2 (14.8, 17.6)	301	10.5 (9.2, 11.7)
	2005	6,157	16.2 (15.8, 16.6)	4,479	16.4 (15.9, 16.9)	752	21.7 (20.0, 23.4)	578	15.3 (13.9, 16.6)	296	10.1 (8.9, 11.4)
	2006	6,539	16.7 (16.3, 17.1)	4,849	17.4 (16.9, 17.9)	741	20.6 (19.0, 22.2)	589	14.7 (13.4, 16.1)	297	9.3 (8.2, 10.4)
	2007	7,251	18.0 (17.5, 18.4)	5,292	18.4 (17.9, 18.9)	879	23.2 (21.5, 24.8)	632	15.2 (13.9, 16.5)	386	11.9 (10.7, 13.1)
	2008	7,062	16.9 (16.5, 17.4)	5,144	17.5 (17.0, 18.0)	801	21.2 (19.5, 22.8)	663	14.6 (13.3, 15.9)	385	11.0 (9.8, 12.2)
	2009	7,429	17.2 (16.8, 17.6)	5,325	17.6 (17.1, 18.1)	932	22.7 (21.1, 24.4)	718	15.0 (13.7, 16.3)	392	10.8 (9.7, 12.0)
	2010	7,395	16.7 (16.3, 17.1)	5,312	17.2 (16.7, 17.7)	978	23.0 (21.5, 24.6)	706	14.1 (12.9, 15.2)	373	9.7 (8.7, 10.8)
	2011	7,322	16.0 (15.6, 16.3)	5,270	16.6 (16.2, 17.1)	910	20.2 (18.8, 21.7)	690	13.0 (11.9, 14.1)	425	10.6 (9.5, 11.7)

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Cancer Stage at Diagnosis	Year	All Race/Ethnicities		Non-Hispanic Whites		Non-Hispanic Blacks		Hispanics		Asian/Pacific Islanders	
		Count	Incidence Rate (95%CI)	Count	Incidence Rate (95%CI)	Count	Incidence Rate (95%CI)	Count	Incidence Rate (95%CI)	Count	Incidence Rate (95%CI)
Distant	**2012**	6,572	14.0 (13.6, 14.3)	4,688	14.5 (14.0, 14.9)	878	19.2 (17.8, 20.6)	617	11.3 (10.3, 12.4)	381	9.2 (8.2, 10.1)
	2013	6,490	13.4 (13.1, 13.7)	4,609	13.9 (13.5, 14.3)	841	18.0 (16.6, 19.3)	656	11.5 (10.5, 12.5)	380	8.7 (7.8, 9.7)
	2014	6,528	13.1 (12.8, 13.5)	4,624	13.8 (13.4, 14.2)	857	17.5 (16.2, 18.8)	704	11.4 (10.5, 12.4)	353	7.6 (6.7, 8.5)
	2015	7,475	14.6 (14.3, 15.0)	5,263	15.3 (14.9, 15.8)	967	19.2 (17.9, 20.5)	821	12.6 (11.6, 13.6)	439	9.1 (8.2, 10.0)
	2016	8,064	15.4 (15.1, 15.8)	5,746	16.5 (16.0, 16.9)	1,087	21.4 (19.9, 22.8)	789	11.5 (10.6, 12.5)	502	9.9 (9.0, 10.9)
	2017	8,594	16.2 (15.8, 16.6)	6,119	17.4 (16.9, 17.9)	1,134	21.6 (20.2, 23.0)	876	12.4 (11.4, 13.3)	557	10.7 (9.7, 11.7)
	2004	2,674	8.5 (8.2, 8.9)	1,744	7.4 (7.0, 7.7)	474	19.5 (17.5, 21.4)	289	11.1 (9.7, 12.5)	143	6.2 (5.1, 7.2)
	2005	2,714	8.4 (8.1, 8.8)	1,775	7.4 (7.0, 7.7)	478	18.6 (16.8, 20.4)	294	10.1 (8.9, 11.4)	148	6.0 (5.0, 7.1)
	2006	2,751	8.3 (8.0, 8.6)	1,844	7.5 (7.2, 7.9)	472	16.9 (15.2, 18.6)	263	8.7 (7.5, 10.0)	150	6.1 (5.1, 7.1)
	2007	2,727	8.0 (7.7, 8.4)	1,789	7.2 (6.8, 7.5)	471	17.0 (15.3, 18.7)	287	8.8 (7.6, 9.9)	158	5.8 (4.8, 6.8)
	2008	2,777	7.9 (7.6, 8.2)	1,796	7.0 (6.7, 7.3)	476	16.3 (14.6, 17.9)	307	9.1 (7.9, 10.2)	178	6.2 (5.2, 7.2)
	2009	2,845	7.8 (7.5, 8.1)	1,812	6.9 (6.6, 7.2)	511	17.0 (15.3, 18.6)	330	8.8 (7.8, 9.9)	167	5.7 (4.8, 6.6)
	2010	2,971	8.0 (7.7, 8.3)	1,933	7.2 (6.9, 7.5)	523	16.9 (15.2, 18.5)	337	9.0 (7.9, 10.1)	156	5.0 (4.1, 5.8)
	2011	3,005	7.8 (7.5, 8.1)	1,955	7.1 (6.8, 7.4)	542	16.3 (14.7, 17.9)	350	8.6 (7.6, 9.6)	156	4.6 (3.8, 5.4)
	2012	3,269	8.2 (8.0, 8.5)	2,156	7.7 (7.4, 8.0)	541	15.5 (14.0, 17.0)	377	8.5 (7.6, 9.5)	202	5.8 (5.0, 6.7)
	2013	3,522	8.6 (8.3, 8.9)	2,289	8.0 (7.7, 8.4)	610	16.5 (15.1, 18.0)	433	9.4 (8.4, 10.4)	197	5.3 (4.5, 6.1)
	2014	3,722	8.8 (8.5, 9.1)	2,474	8.4 (8.1, 8.8)	633	16.7 (15.3, 18.2)	421	8.4 (7.5, 9.3)	216	5.4 (4.6, 6.2)
	2015	4,117	9.6 (9.3, 9.9)	2,740	9.3 (8.9, 9.6)	665	17.1 (15.7, 18.6)	474	9.3 (8.4, 10.3)	270	6.5 (5.6, 7.3)
	2016	4,504	10.1 (9.8, 10.4)	2,942	9.7 (9.3, 10.0)	787	19.3 (17.8, 20.8)	524	9.7 (8.8, 10.6)	298	6.8 (6.0, 7.6)
	2017	4,900	10.7 (10.4, 11.0)	3,258	10.5 (10.1, 10.9)	824	20.1 (18.5, 21.6)	571	10.2 (9.3, 11.1)	326	7.1 (6.3, 8.0)