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Original Article – Editor's choice

Recent Patterns and Trends in Global Prostate Cancer Incidence and Mortality: An Update

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Abstract

Background and objective: Our aim was to examine worldwide patterns and trends for prostate cancer (PC) incidence and mortality using high-quality, up-to-date, population-based data.
Methods: We analyzed age-standardized PC incidence and mortality rates by country and region from the 2022 GLOBOCAN estimates and temporal trends in incidence (50 countries/territories) and mortality (59 countries/territories) rates using data from the *Cancer Incidence in Five Continents* series and the World Health Organization mortality database.
Key findings and limitations: Estimated PC rates across regions in 2022 varied 13-fold for incidence and 9.5-fold for mortality. The highest incidence rates were in Australia/New Zealand, North America, Northern Europe, and Latin America/Caribbean. The highest mortality rates were in sub-Saharan Africa and Latin America/Caribbean. During the most recent 5-yr period, incidence rates increased in 11 of the 50 countries included in the study and mortality rates increased in nine of 59 countries, mostly located in Africa, Asia, Latin America/Caribbean, and Central and Eastern Europe. Mortality rates decreased in 38 countries, largely located in Europe, Oceania, and Latin America/Caribbean. Limitations include the lack of data for low- and middle-income countries.
Conclusions and clinical implications: The increase in PC incidence and mortality rates in many countries in Africa, Asia, and Latin America/Caribbean may be because of increases in detection (incidence) and limited access to and availability of treatments (mortality only). The findings reinforce the importance of improving the health care infrastructure in these countries to mitigate the rising burden of PC.

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ADVANCING PRACTICE

What does this study add?

This study provides the most recent 2022 GLOBOCAN estimates of prostate cancer incidence and mortality rates for 185 countries or territories, and temporal trends for incidence (50 countries/territories) and mortality (59 countries/territories) rates on the basis of high-quality, population-based data. Prostate cancer incidence rates increased in 11 countries and mortality rates increased in nine countries, located in Africa, Asia, and Latin America/Caribbean, reinforcing the need to expand access to care in these countries.

Clinical Relevance

This article highlights the significant global disparities in prostate cancer incidence and mortality, emphasizing the role of healthcare access, genetic factors, and screening practices in shaping these outcomes. Regions like Northern Europe, North America, and Australia report the highest incidence rates, largely due to the widespread use of PSA-based testing for early detection. In contrast, mortality rates are most severe in Sub-Saharan Africa, Latin America, and the Caribbean, where individuals of African ancestry, genetically more predisposed to prostate cancer, face limited access to timely diagnosis and treatment. Over the past five years, a troubling increase in incidence and mortality has been observed in countries across Africa, Asia, Latin America, and Europe, highlighting the urgent need for region-specific healthcare interventions. These findings strongly advocate for improving access to early detection and treatment in low- and middle-income countries, where healthcare inequities remain a major barrier to reducing prostate cancer burden. Equally important is addressing gaps in data availability and quality, particularly in regions like Africa and Asia, where underreporting limits our understanding and ability to address these disparities. Additionally, the article notes the lack of analysis on the impact of the COVID-19 pandemic on prostate cancer outcomes, leaving a critical area unexplored. By prioritizing better data collection and investing in equitable healthcare infrastructure, we can reduce these disparities and make early detection and treatment universally accessible, not just a privilege. Associate Editor: Gianluca Giannarini, MD.

Patient Summary

We examined worldwide patterns and trends for prostate cancer incidence (50 countries) and mortality (59 countries) rates using up-to-date population-based data. Prostate cancer incidence rates increased in 11 countries and mortality rates increased in nine countries, located in Africa, Asia, and Latin America/Caribbean. The results highlight the need to expand access to care in these countries.

1. Introduction

Prostate cancer (PC) is the second most commonly diagnosed cancer and the fifth leading cause of cancer death among men worldwide, with more than 1 460 000 estimated cases and 396 000 deaths in 2022 [1]. It is predicted that by 2040, the PC burden will have increased to approximately 2.4 million cases and 712 000 deaths solely because of the aging and growing global population [2]. This increase in mortality translates to approximately 7.5 million life-years lost, with Africa, Asia, and Latin America/Caribbean experiencing the steepest increase in predicted life-years lost [3].

Previous studies of trends in international PC incidence and mortality rates [4,5] are based on data up to 2016. There have been recent changes in early detection recommendations in many countries [6,7], as well as improvements in treatment [8] and an increase in the number of countries covered by high-quality population-based cancer registries [9]. Here we examine global patterns and time trends for PC incidence and mortality using incidence data from population-based cancer registries worldwide up to 2021, and national mortality data from vital registration systems up to 2022.

2. Materials and methods

2.1. Data sources

The International Agency for Research on Cancer (IARC) GLOBOCAN 2022 estimates were obtained from the Global Cancer Observatory (https://gco.iarc.who.int/today/en) and used to describe PC incidence and mortality (International Classification of Disease-10 code C61) estimated for 185 countries or territories, covering approximately 98% of the global population. The country-specific methods for estimation depend on the coverage, timeliness, and accuracy of the incidence and mortality data recorded in each country [10].

PC incidence data for 50 countries/territories with at least 10 yr of data available between 1980 and 2021 were obtained from the IARC Cancer Incidence in Five Continents Plus (CI5plus) database, a quinquennial series of high-quality population-based cancer registry data at the national or subnational level that covers approximately 5% of the global population [9,11]. Inclusion in CI5 volumes is based on the data quality of each registry over time, which is assessed in terms of the comparability, completeness, and validity of the data submitted. Incidence data for the USA were supplemented with more recent data from the

Surveillance, Epidemiology and End Results 8 (SEER-8) registry database, representing approximately 8% of the US population, to examine incidence rates for Black and White men separately because of known racial disparities [12]. Cancer mortality data between 1980 and 2022 for 59 countries/territories were obtained from the World Health Organization (WHO) mortality database as compiled by IARC, representing approximately 22% of the global population. The quality of these data, which is measured according to coverage and completeness, varies across countries [13].

Long-term PC incidence trends are presented for 50 countries/territories, and long-term PC mortality trends for 59 countries/territories. However, the recorded rates include White and Black men in the USA, yielding 52 populations for incidence and 61 populations for mortality.

2.2. Statistical analysis

All incidence and mortality rates were age-standardized to the 1966 Segi-Doll world standard population using the direct method [14,15]. Secular trends in age-standardized rates were visualized and quantified using Joinpoint regression by estimating the annual percentage change (APC), allowing a maximum of four joinpoints. A weighted average of the APC (AAPC) was also calculated for the most recent 5-yr period, with weights based on the length of each APC interval. Trends were described as increasing or decreasing when the APC or AAPC was statistically significant according to a two-sided p value <0.05, or otherwise as stable. Analyses were performed with R v4.3.3, Rcan v1.3.82, and Joinpoint v3.53.

3. Results

3.1. Estimated PC incidence and mortality rates for 2022 across 21 world regions and 185 countries

In 2022, PC incidence and mortality rates varied approximately 13-fold and 9.5-fold, respectively, across world areas (Table 1). Northern Europe had the highest estimated incidence rate (82.8 per 100 000 men) and Southern Africa had the highest mortality rate (29.7 per 100 000 men). South-Central Asia had the lowest rates for both incidence (6.4 per 100 000 men) and mortality (3.1 per 100 000 men). At the country level, the highest incidence rates were found in Australia, New Zealand, the USA, Brazil, and several countries in the Caribbean and Northern Europe (Fig. 1). By contrast, mortality rates were highest in many sub-Saharan African and Caribbean countries, such as Barbados, Jamaica, and Chad, and were lowest across Asia (Fig. 1).

3.2. Patterns in recorded incidence and mortality rates for the last 5 yr of available data

Figures 2 and 3 illustrate PC incidence and mortality rates recorded during the most recent 5-yr period with data available from 52 and 61 populations, respectively. Incidence rates per 100 000 men varied approximately 22-fold across countries, from 7.6 in Thailand to 168.0 in Martinique. Mortality rates per 100 000 men varied approximately ninefold, ranging from 2.9 in Malaysia to more than 24.0 in Cuba and Venezuela. In general, countries in Asia had the lowest incidence and mortality rates, while countries with a higher proportion of men of African ancestry (sub-Saharan Africa and the Caribbean) and some Eastern European countries (eg, Lithuania and Estonia) had the highest incidence and mortality rates.

3.3. Trends in incidence and mortality rates

Figure 4 shows long-term trends for PC incidence and mortality rates, with the observed rates overlaid by linear segments from Joinpoint models for selected countries. APCs for each segment identified by the model and AAPCs for the latest 5-yr are presented in Supplementary Table 1 for incidence and in Supplementary Table 2 for mortality. In most countries, incidence rates generally increased at the beginning of the study period and then stabilized or decreased around the late 2000s (Supplementary Table 1). By contrast, five countries in Europe and North America (Austria, France, Iceland, Canada, and the USA) experienced increasing or stable incidence rates from the mid-2010s following declines. Trends in 5-yr AAPC significantly increased in 11 of the 50 countries examined, with increases ranging from 0.7% per year in Scotland (2013–2017) to 10.0% per year in Poland (2013–2017). By contrast, incidence rates decreased in 15 countries, with decreases ranging from 0.7% per year in New Zealand (2013–2017) to 6.2% per year in Israel (2013–2017). Incidence rates were stable in the remaining 24 countries.

Long-term trends in mortality rates generally decreased or stabilized during the 1990s in many countries following increasing trends (Fig. 4 and Supplementary Table 2). However, the pace of the decline slowed or the trend stabilized in 12 of these countries (Australia, Austria, Canada, Colombia, France, Greece, Italy, Israel, Mexico, the Netherlands, Poland, and the USA) since the early 2010s, except in Mexico and the Netherlands, where rates stabilized in 2019. During the most recent 5-yr period, mortality rates decreased in 38 of the 59 countries, with the decrease ranging from 0.6% per year in Hungary (2018–2022) to 7.8% per year in Estonia (2018–2022). Mortality rates increased in nine countries, with the increase ranging from 0.5% per year in the Philippines (2015–2019) to 7.9% per year in Guatemala (2017–2021), and were stable in the remaining 12 countries.

Figure 5 shows recent trends in PC incidence and mortality rates for the 34 countries for which both incidence and mortality data were available. Rates decreased for both incidence and mortality in 12 countries. By contrast, incidence rates increased while mortality rates remained stable (Austria, Latvia, Poland, and the USA) or decreased (Croatia and Scotland) in six countries. Below we describe the trends in incidence and mortality rates by region and country.

3.3.1. Africa

The incidence rate in Uganda was 53.0 per 100 000 men, and rates have been increasing by 2.3% per year since 1993 (Fig. 2 and Supplementary Table 1). South Africa had the fourth highest mortality rate among all countries included in the study at 20.3 per 100 000 men, and rates have been increasing by 1.6% per year since 1996 (Fig. 3 and Supplementary Table 2).

Table 1 – Estimated number of new prostate cancer cases and deaths by world region for 2022 [a]

Area	Population size		Cases			Deaths		
	N	%	*N*	%	ASR	*N*	%	ASR
Africa	703 122 445		103 050		30.3	55 744		17.3
Eastern Africa	232 760 186	33.1	25 431	24.7	28.0	14 808	26.6	16.8
Middle Africa	95 067 662	13.5	16 011	15.5	44.2	9401	16.9	27.2
Northern Africa	128 138 567	18.2	16 686	16.2	16.1	6958	12.5	6.9
Southern Africa	34 025 573	4.8	13 691	13.3	59.9	5790	10.4	29.7
Western Africa	213 130 457	30.3	31 231	30.3	36.9	18 787	33.7	23.5
Asia	2 374 486 911		386 424		12.6	120 485		3.8
Eastern Asia	822 363 685	34.6	255 404	66.1	15.1	64 618	53.6	3.5
South-Central Asia	1 060 915 547	44.7	60 131	15.6	6.4	29 194	24.2	3.1
South-Eastern Asia	340 253 165	14.3	42 298	10.9	12.7	17 443	14.5	5.3
Western Asia	150 954 514	6.4	28 591	7.4	24.0	9230	7.7	7.9
Europe	361 242 024		473 011		59.9	115 182		11.2
Eastern Europe	137 314 603	38.0	122 189	25.8	48.8	36 407	31.6	13.5
Northern Europe	52 963 352	14.7	95 448	20.2	82.8	21 232	18.4	12.4
Southern Europe	74 143 121	20.5	96 952	20.5	54.4	22 182	19.3	8.1
Western Europe	96 820 948	26.8	158 422	33.5	65.7	35 361	30.7	10.2
Latin America/Caribbean	327 201 180		225 985		58.0	61 056		13.9
Caribbean	21 727 133	6.6	22 271	9.9	73.9	9695	15.9	26.4
Central America	90 053 341	27.5	35 982	15.9	39.8	10 311	16.9	10.2
South America	215 420 706	65.8	167 732	74.2	62.4	41 050	67.2	13.7
North America	184 781 027		255 782		73.5	39 605		8.3
Oceania	21 902 160		23 602		71.9	5358		11.5
Australia/New Zealand	15 386 803	70.3	21 982	93.1	78.1	4818	89.9	11.0
Melanesia	5 881 650	26.9	1286	5.4	34.3	431	8.0	14.4
Micronesia	282 593	1.3	117	0.5	43.3	37	0.7	15.4
Polynesia	351 114	1.6	217	0.9	58.9	72	1.3	19.7
World	3 972 735 747		1 467 854		29.4	397 430		7.3

ASR = age-standardized world rate per 100 000 men.
[a] Percentages shown for the population, cases, and deaths are within each region. Source: GLOBOCAN 2022.

3.3.2. *Asia*

Countries throughout Asia had some of the lowest incidence (7.6 to 41.7 per 100 000) and mortality (2.9 to 11.9 per 100 000) rates during the most recent 5-yr period (Figs. 2 and 3). Incidence rates during the latest 5-yr period continued to increase by approximately 4.0–5.0% per year in China, India, and Thailand, decreased by 2.2–6.2% per year in Turkey and Israel, and remained stable in Bahrain, Philippines, Republic of Korea, and Qatar (Supplementary Table 1). However, incidence rates recently stabilized in Japan and Kuwait after increasing up to the early 2010s. By contrast, mortality rates during the most recent 5-yr period increased by 0.5% per year in the Philippines, decreased by 1.5–5.2% per year in Japan, the Republic of Korea, and Armenia, and were stable in the remaining countries (Supplementary Table 2).

3.3.3. *Central and Eastern Europe*

Incidence rates in Central and Eastern Europe ranged from 50.4 to 71.8 per 100 000 men (Fig. 2), while mortality rates ranged from 10.3 to 14.2 per 100 000 (Fig. 3). During the most recent 5-yr period, incidence rates increased in Belarus (4.4% per year) and Poland (10.0% per year) and remained stable in Czechia (Fig. 4 and Supplementary Table 1). By contrast, mortality rates decreased by approximately 1.0–3.0% per year in Hungary, Czechia, and Slovakia, increased by approximately 1.0–5.0% per year in Romania, Bulgaria, and Moldova, and were stable in Poland (Supplementary Table 2).

3.3.4. *Northern Europe*

In Northern Europe, incidence rates varied twofold across the 13 countries included in the study, from 63.4 per 100 000 men in Scotland to 128.6 in Lithuania, the third highest rate among all countries (Fig. 2). Similarly, mortality rates varied approximately twofold across the 11 countries, with the highest rate in Latvia at 20.8 per 100 000 men, the third highest rate among all populations (Fig. 3). Incidence rates during the most recent 5-yr period continued to increase by 4.0% annually in Latvia and by 0.7% per year in Scotland, decreased by approximately 1.0–2.0% per year in five countries (Denmark, Finland, Ireland, Norway, and Sweden), and were stable in the remaining countries (Supplementary Table 1). By contrast, mortality rates during the most recent 5-yr period decreased by approximately 1.0–8.0% per year for all 11 Northern European countries except for Latvia, where the rate remained stable (Supplementary Table 2).

3.3.5. *Southern Europe*

Across Southern Europe, incidence rates per 100 000 men ranged from 47.3 in Malta to 79.5 in Slovenia, while mortality rates per 100 000 men ranged from 6.9 in Italy to 15.5 in Slovenia (Figs. 2 and 3). During the most recent 5-yr period, incidence rates increased by 9.2% per year in Croatia, decreased by 3.1% per year in Spain, and remained stable in Cyprus, Italy, Malta, and Slovenia. By contrast, mortality rates decreased by approximately 1.0–2.0% per year in all countries except North Macedonia, where the rate remained stable (Supplementary Table 2).

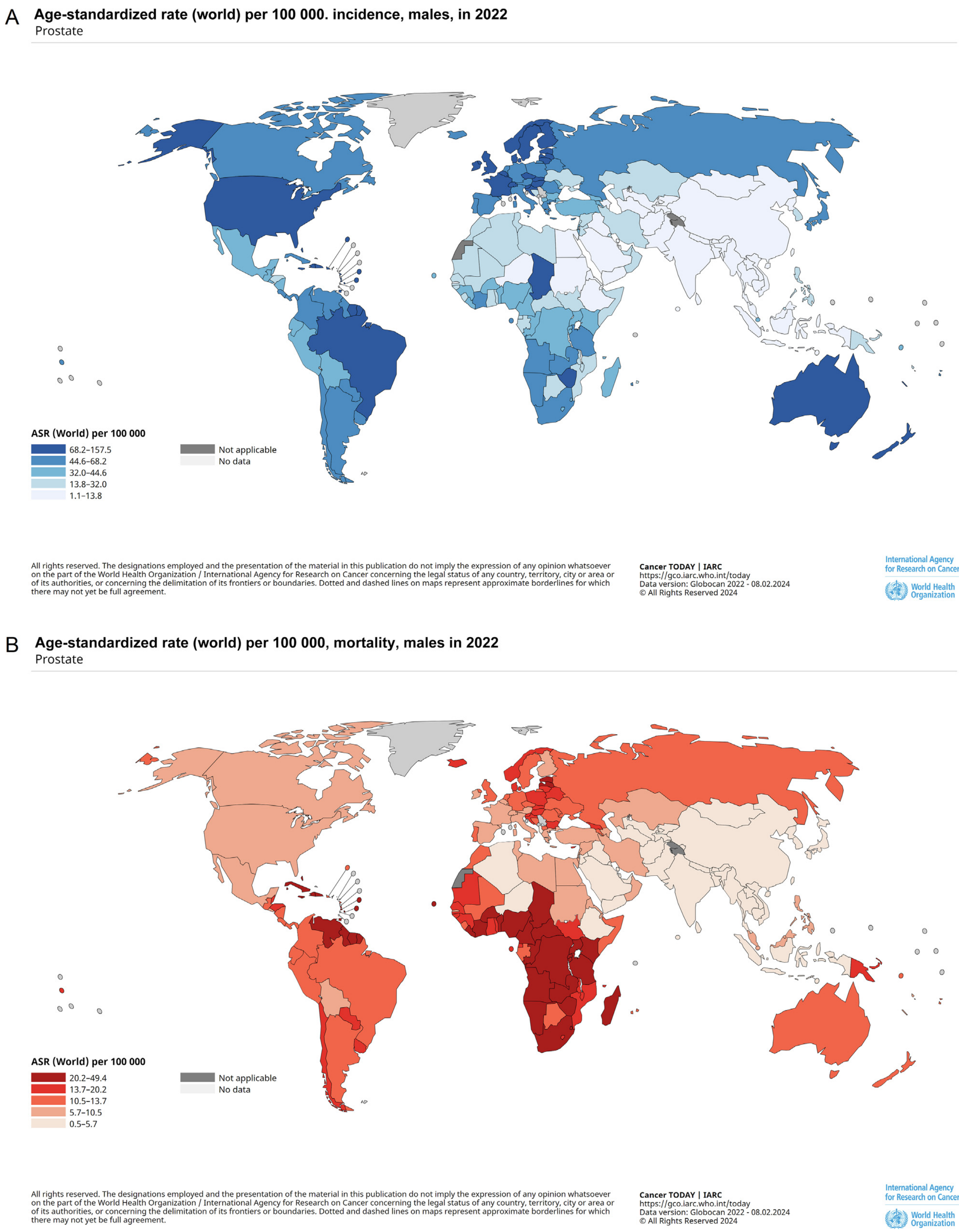

Fig. 1 – Estimated age-standardized (A) prostate cancer incidence and (B) prostate cancer mortality rates in 2022. ASR = age-standardized rate; IARC = International Agency for Research on Cancer. Source: GLOBOCAN 2022.

3.3.6. Western Europe

Incidence rates per 100 000 men ranged from 61.4 in Austria to 84.5 in France, while mortality rates per 100 000 men ranged from 8.7 in France to 11.2 in the Netherlands (Figs. 2 and 3). During the most recent 5-yr period, incidence rates decreased by approximately 2.0% per year

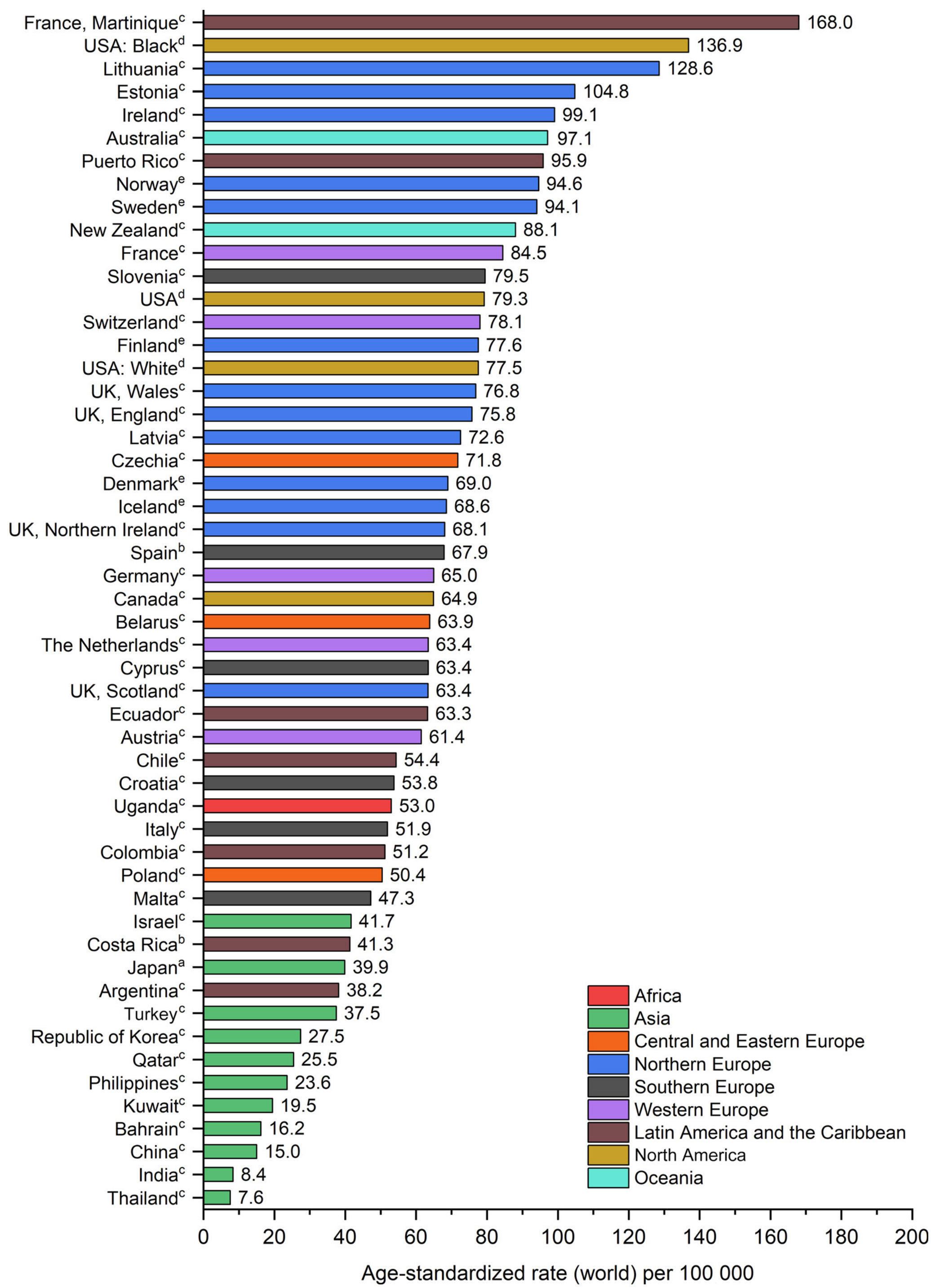

Fig. 2 – Prostate cancer incidence rates in selected countries. [a] Rates are from 2011–2015. [b] Rates are from 2012–2016. [c] Rates are from 2013–2017. [d] Rates are from 2015–2019. [e] Rates are from 2017–2021. Source: Cancer Incidence in Five Continents; Surveillance, Epidemiology and End Results (SEER) program.

in Germany and the Netherlands and remained stable in Switzerland. However, incidence rates increased by 3.6% per year in Austria and stabilized in France, a change from the previously declining trends (Supplementary Table 1). Mortality rates continued to decrease by approximately 1.0–3.0% per year in Belgium, Germany, Switzerland, and France, and stabilized in Austria and the Netherlands (Fig. 3 and Supplementary Table 2).

3.3.7. Latin America and the Caribbean

Incidence rates per 100 000 men varied more than fourfold across the seven countries located in Latin America and the Caribbean, ranging from 38.2 in Argentina to 168.0 in Martinique (Fig. 2). Mortality rates per 100 000 men ranged from 9.3 in Puerto Rico to 25.8 in Cuba (Fig. 3). The region encompasses four of the top ten populations with the highest mortality rates in the study (Cuba, Venezuela, Uruguay,

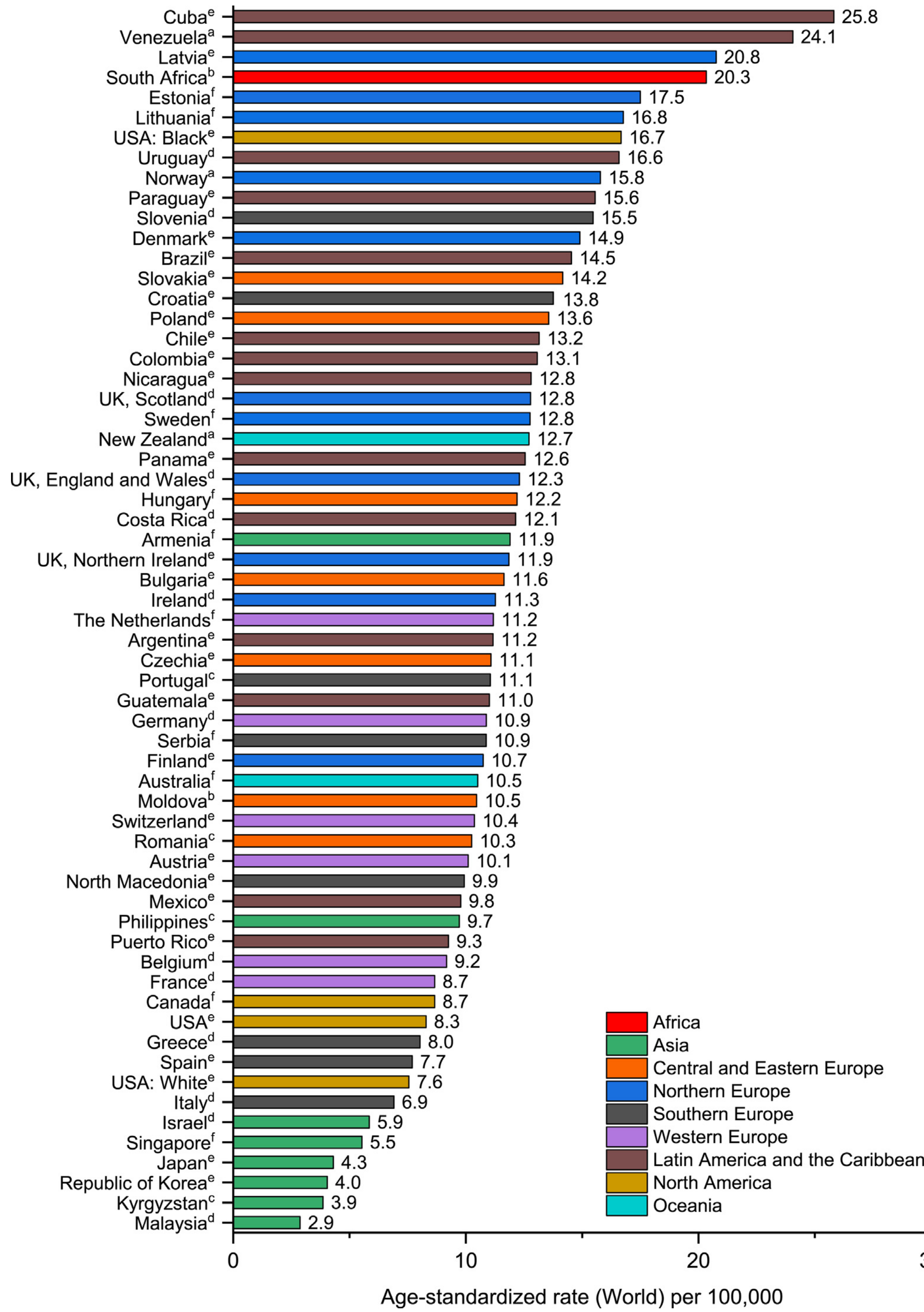

Fig. 3 – Prostate cancer mortality rates in selected countries. [a] **Rates are from 2012–2016.** [b] **Rates are from 2014–2018.** [c] **Rates are from 2015–2019.** [d] **Rates are from 2016–2020.** [e] **Rates are from 2017–2021.** [f] **Rates are from 2018–2022. Source: World Health Organization mortality database.**

and Paraguay). During the most recent 5-yr period, incidence rates continued to decrease by approximately 1.0% per year in Argentina, Colombia, and Puerto Rico, and were stable in the four remaining countries (Supplementary Table 1). Mortality rates during the most recent 5-yr period decreased by approximately 1.0–4.0% per year in eight of the 14 countries examined, increased by approximately 1.0–8.0% per year in Venezuela, Paraguay, Cuba, and Guatemala, and were stable in Mexico and Nicaragua (Supplementary Table 2).

3.3.8. North America

Incidence rates per 100 000 men were 79.3 in the USA and 64.9 in Canada. Mortality rates were relatively similar between Canada and the USA, at 8.7 and 8.3 per 100 000 men, respectively. Black men in the USA had the second highest incidence rate among all men included in the study at 136.9 per 100 000 men and had a 77% higher incidence rate and a 120% higher mortality rate in comparison to White men (Figs. 2 and 3). During the most recent 5-yr period, the incidence rate increased by 4.2% per year in

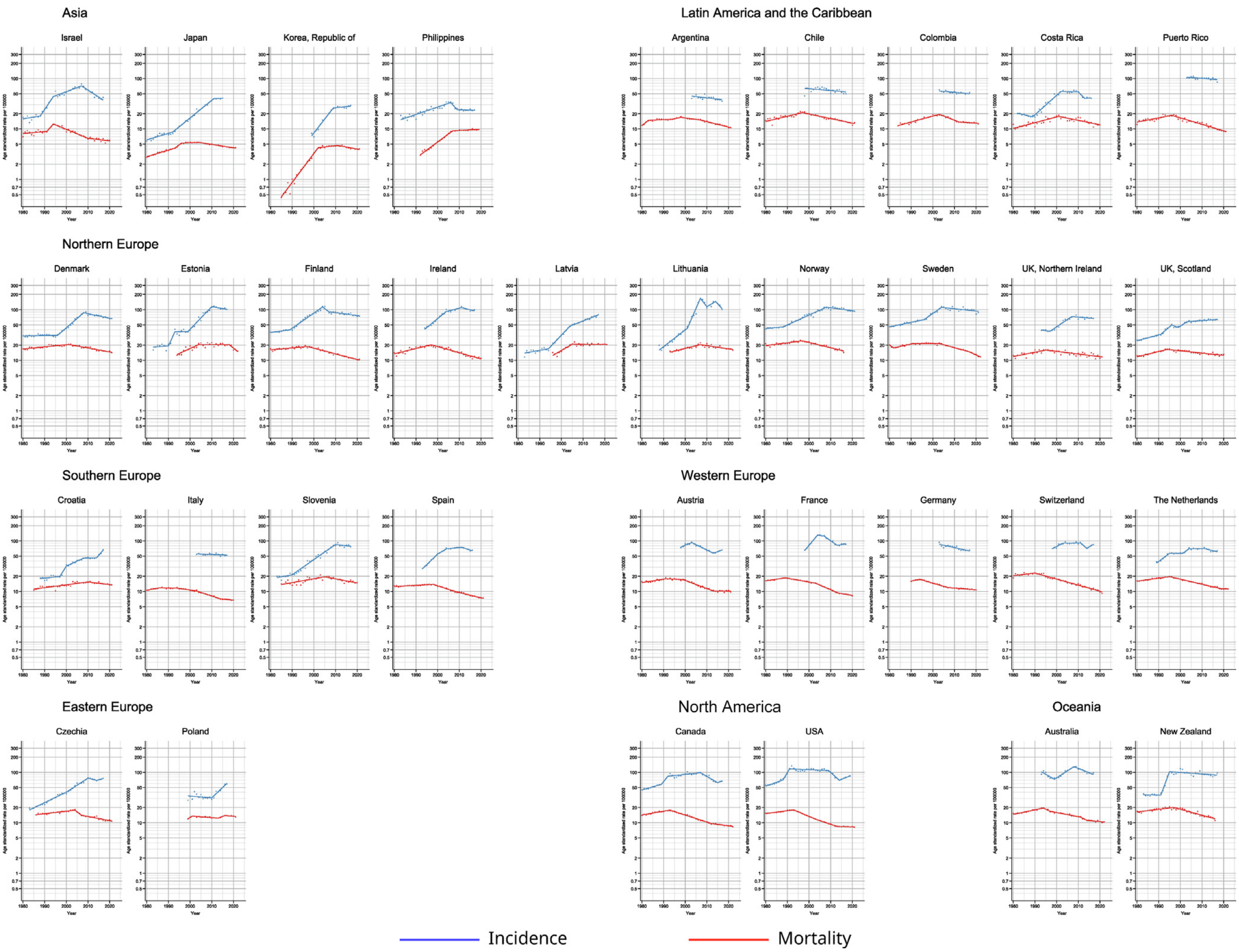

Fig. 4 – Trends in prostate cancer incidence and mortality rates for selected countries. Blue represents incidence and red represents mortality. Dots represent observed rates and lines represent fitted values based on joinpoint analyses. Source: Incidence: Cancer Incidence in Five Continents; Surveillance, Epidemiology, and End Results (SEER) Program. Mortality: World Health Organization mortality database.

the USA and stabilized in Canada after rapidly declining in the previous decade (Supplementary Table 1). By contrast, the mortality rate during the most recent 5-yr period continued to decline in Canada, albeit at a slower pace, and stabilized in the USA following two decades of steady decline (Supplementary Table 2).

3.3.9. Oceania

Australia and New Zealand had the sixth (97.1 per 100 000 men) and tenth (88.1 per 100 000 men) highest incidence rates, respectively, among all men included in the study. The incidence rate decreased by 3.8% per year in Australia since 2008 and by 0.7% per year in New Zealand since 1995 (Fig. 2 and Supplementary Table 1). Similarly, the mortality rate has decreased by 1.0% per year in Australia since 2014 and by 2.7% per year in New Zealand since 1997(Fig. 3 and Supplementary Table 2).

4. Discussion

The estimated PC incidence rates in 2022 were highest in North America, Australia, New Zealand, Brazil, and in many Northern European countries, probably reflecting higher uptake of prostate-specific antigen (PSA)-based testing in these countries [8,16]. By contrast, mortality rates were highest in many parts of sub-Saharan Africa and Latin America/Caribbean, largely because of the higher proportion of individuals of African ancestry, who are genetically more susceptible to developing PC, and the limited availability of early detection and treatment services [17]. During the most recent 5-yr period, incidence rates increased in 11 countries and mortality rates increased in nine, largely confined to countries within Africa, parts of Asia, Latin America/Caribbean, and Europe. In most countries, however, incidence and mortality rates decreased or stabilized.

In general, trends in PC incidence in many high-income countries follow trends in PSA-based screening, with the incidence rate rising when PSA-based screening uptake increases and falling when it decreases [18,19]. For example, the decline in the PC incidence rate since 2008 in Australia coincided with the fall in PSA-based screening prevalence beginning in the same year among men aged 45–84 yr [18]. In addition to declines in PSA-based

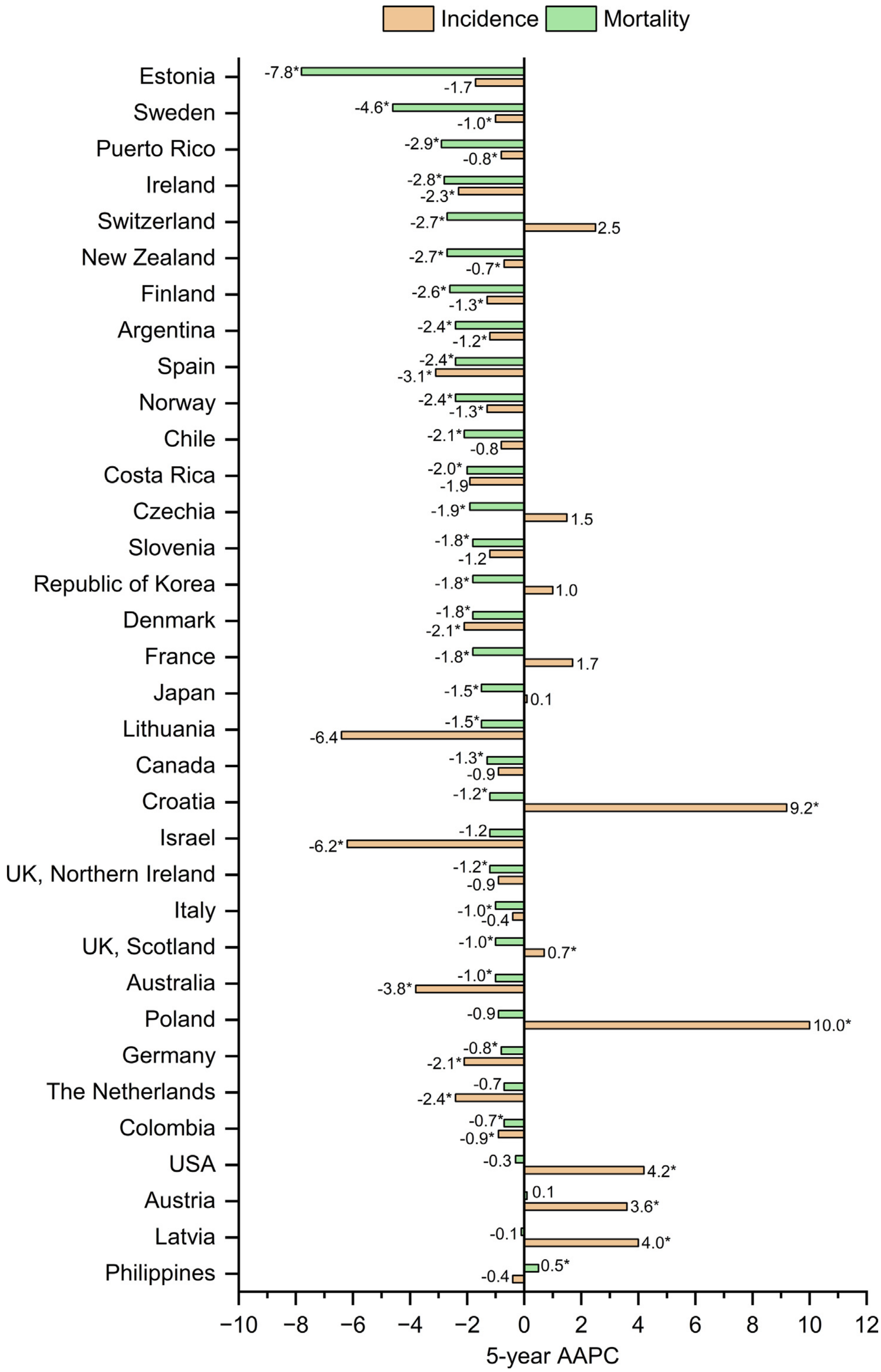

Fig. 5 – Average annual percent change in incidence and mortality rates for the last 5-yr of available data for selected countries. AAPC = average annual percent change. *The AAPC is statistically significantly different from zero. Source: Incidence: Cancer Incidence in Five Continents; Surveillance, Epidemiology, and End Results (SEER) Program. Mortality: World Health Organization.

screening uptake, increased use of multiparametric magnetic resonance imaging (mpMRI) to reduce overdiagnosis [20] may have contributed to the recent decrease in incidence rate in some countries. For example, in Sweden, where incidence rates are decreasing, the STHLM3-MRI trial found that incorporation of mpMRI in the diagnostic pathway reduced diagnosis of clinically insignificant tumors by 64% and benign findings on biopsy by 74% among men biopsied after a positive MRI test in comparison to men who underwent transrectal ultrasonography-guided prostate biopsy for elevated PSA [21]. Over the past few years, many national or regional organizations, including the European

Association of Urology [22] and the American Urological Association [23,24], updated their guidelines on early PC diagnosis to recommend mpMRI before prostate biopsy to decrease the number of clinically insignificant PC diagnoses at biopsy.

Incidence rates increased in 11 of the 50 countries examined, including Uganda, the USA, and several countries in Asia and Europe. Such trends may in part reflect increases in incidental detection of tumors via transurethral resection of the prostate (TURP) for lower urinary tract syndrome and benign prostatic hyperplasia [25–27], greater awareness of the disease [8,28], and opportunistic PSA testing [29,30]. A 2022 meta-analysis revealed that the prevalence of incidental PC following TURP was higher in Africa (22.0%) and Asia (9.0%) than in North America (1.0%) [31]. The rising prevalence of potential risk factors such as obesity, which is associated with advanced-stage disease [32], and a Western diet [32,33] may have also contributed to the rising incidence of PC. The increase in PC incidence rate since the mid-2010s in the USA, largely driven by advanced-stage disease, was not preceded by a marked increase in PSA-based screening practices [34]. Further studies are needed to elucidate reasons underlying this rising trend.

The declining trend for mortality rates in many countries throughout Europe, North America, Oceania, and Latin America/Caribbean are probably the result of improvements in early detection of advanced-stage cancer [8,35] and in treatments [8,36]. Previous model-based studies estimated that PSA-based screening accounted for 45–70% of the decline in the PC mortality rate in the USA [37], and improvements in treatments for 22–33% of the decline by 2005 [36]. A 2021 study in Lithuania, where a nationwide PSA-based PC screening program in 2006, found that among individuals diagnosed with PC, the PC-specific standardized mortality risk ratio was higher for who did not participate in the national screening program (20.95, 95% CI 20.00–21.94) than for those who did (8.99, 95% CI 8.63–9.37) [38].

In contrast to the declining or stabilizing mortality trends in the majority of the 59 countries included in the study, rates increased in nine countries, including South Africa, the Philippines, Cuba, Moldova, Bulgaria, and Guatemala. These increasing mortality trends may reflect increasing incidence as well as limited availability of high-quality early detection and treatment services [39]. For example, according to WHO, there are fewer than three radiotherapy machines per million population in South Africa and Cuba, compared to more than 10 machines per million population in the USA, Germany, and Sweden [40–42]. Only 28% of PC patients survive for 5 yr in South Africa, compared to more than 90% in high-income countries such as the USA (97.0%) [41], France (93.1%) [43], and Australia (94.5%) [44], where early detection and treatment services are more accessible.

The strengths of this study include the use of high-quality, up-to-date, population-based data to comprehensively examine geographic patterns in PC incidence and mortality rates across five continents [9]. The study limitations include subnational coverage in 23 of 50 countries examined for incidence and three of the 59 countries examined for mortality, limiting the degree of national representativeness of the trends, with underrepresentation of countries in both incidence and mortality data, particularly in Africa and Asia. Furthermore, we could not examine the impact of the COVID-19 pandemic on PC rates and trends owing to the lack of post-COVID-19 data. Future studies should examine the impact of delays in cancer diagnosis and treatment during the COIVD-19 pandemic on PC incidence, survival, and mortality across countries.

5. Conclusions

Our analysis of high-quality population-based data across the five continents revealed that PC incidence and mortality rates decreased or were stable in the majority of countries examined. However, increasing trends were found in a few countries located in Africa, Asia, Latin America/Caribbean, and Central and Eastern Europe, possibly because of an increase in detection (incidence) and limited access to and the availability of treatments (mortality only). These findings reinforce the need for improvements in access to early detection and treatment services to mitigate the undue high burden of the disease in these countries. Furthermore, improvements in data availability and quality, particularly in low- and middle- income countries in Asia and Africa, will enhance our understanding of current disparities and prioritization of early detection and treatment approaches.

Author contributions: Elizabeth J. Schafer had full access to the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Jemal, Schafer.
Acquisition of data: Laversanne.
Analysis and interpretation of data: Laversanne, Jemal, Schafer.
Drafting of the manuscript: Schafer, Jemal
Critical review of the manuscript for important intellectual content: All authors.
Statistical analysis: Laversanne.
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Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.eururo.2024.11.013.

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