International Journal of Women's Health

Dovepress
Taylor & Francis Group

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ORIGINAL RESEARCH

Global, Regional, and National Burden and Trends of Female Cancers Among the Elderly Women (≥60 Years Old): An Analysis Based on the 2021 Global Burden of Disease Study

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Background: This study aims to provide a comprehensive assessment of the global cancer burden among women aged 60 and older from 1990 to 2021, focusing specifically on breast cancer (BC), cervical cancer (CC), ovarian cancer (OC), and uterine cancer (UC).
Methods: Utilizing the 2021 Global Burden of Disease (GBD) data, the study analyzes the incidence, prevalence, mortality, and disability-adjusted life years (DALYs) associated with these cancers. Joinpoint regression is employed for trend analysis and to calculate the average annual percentage change (AAPC), while the age-period-cohort (APC) model is used to explore the effects of age, period, and birth cohort on disease indicators.
Results: In 2021, an estimated 721,111 deaths from female cancers were reported globally among the elderly women, with BC remaining the malignant tumor linked to the highest mortality rate. Nations characterized by a high Socio-Demographic Index (SDI) generally displayed increased Age-Standardized Incidence Rates (ASIR) and Age-Standardized Prevalence Rates (ASPR). Conversely, the Age-Standardized Rates (ASR) of DALYs and Age-Standardized Death Rates (ASDR) revealed opposite trends. In addition, Both ASIR and ASPR for BC and UC have demonstrated a rising trajectory, while the ASR pertaining to DALYs and mortality associated with the four cancers has shown a declining pattern.
Conclusion: The disease burden of female cancers among elderly women remains substantial and is anticipated to escalate, revealing significant disparities across various regions and populations. This study underscores the necessity for more effective and targeted interventions to tackle this evolving health challenge.
Keywords: female cancers, elder women, global burden of disease, sociodemographic index, average annual percent change

Introduction

Female cancers, including breast cancer (BC), cervical cancer (CC), ovarian cancer (OC), and uterine cancer (UC), pose a significant threat to women's health and present a major challenge in health management because of their increasing incidence and mortality rates.[1] According to cancer epidemiology statistics from 2022, female cancers account for 38.3% of all cancer cases among women. BC is the most prevalent malignant tumor among women, accounting for 25% of all cancer cases in females. In 2022, there were 2.3 million new cases reported globally. Projections suggest that the incidence rate of BC will increase by 38% compared to the figures from 2022, while the mortality rate is expected to rise by 68%. CC ranks as the fourth leading cause of cancer-related morbidity and mortality among females, with approximately 661,021 new cases reported in 2022, resulting in an estimated 348,189 deaths worldwide. UC and OC

Received: 27 July 2025
Accepted: 4 November 2025
Published: 20 November 2025

are the sixth and eighth most common cancers in women, respectively.[2–4] Although their incidence rates are relatively low, the impact of these cancers on the health of the female reproductive system cannot be overlooked.

With the aging of the global population, concerns regarding the health of older adults have become increasingly significant. Cancers among older adults, typically defined as individuals diagnosed at the ages of 60 or 65 years and older, constitute over 50% of all cancer cases. This proportion is anticipated to increase as the population continues to age.[5,6] Older women exhibit distinct characteristics regarding cancer occurrence, diagnosis, treatment, and prognosis compared to their younger counterparts. Firstly, the gradual decline in physiological state and immune function in older women often results in different clinical symptoms when faced with tumors; early symptoms are frequently subtle, complicating early diagnosis. Furthermore, aging is often accompanied by various chronic underlying conditions such as hypertension, diabetes mellitus, cardiovascular diseases), which can influence treatment choices and efficacy, as well as increase the risks and complications associated with treatment. Secondly, older women with cancer frequently encounter more complex treatment decisions. Due to diminished physical tolerance and immune function, older patients may not tolerate traditional treatments such as chemotherapy and radiotherapy as effectively, necessitating more individualized treatment plans. During the treatment process, it is crucial to consider not only the type and stage of the tumor but also the patient's overall health, functional status, and quality of life. Moreover, the side effects of treatments, combined with the unique physiological characteristics of older patients, underscore the importance of balancing tumor control with the enhancement of quality of life.[7–11] Consequently, conducting epidemiological studies of older female cancer patients globally is of paramount significance.

This research intends to investigate the global trends in female cancers—specifically BC, CC, OC and UC—among older women over the last three decades. In order to enhance the formulation of national health policies, we calculated the global incidence, prevalence, and years lived with disability (YLD) linked to these cancers, using information from the Global Burden of Disease (GBD) 2021 study. We employed the Age-Period-Cohort (APC) model to examine the incidence trends of female cancers across 204 countries and regions from 1990 to 2021. Furthermore, we investigated the correlation between cancer incidence or mortality and sociodemographic indices (SDI), which will aid in the formulation of effective prevention and management strategies for cancer among older women.

Method

Study Population and Data Collection

The primary data for our research was sourced from the GBD Study 2021 (https://ghdx.healthdata.org/gbd2021/sources). This openly available epidemiological resource offers assessments of incidence, prevalence, years of life lost (YLL), YLD, disability-adjusted life years (DALYs), and healthy life expectancy (HALE) across multiple dimensions, such as time, geographical area, gender, age category, and SDI. These assessments support the analysis of health losses resulting from 371 diseases and injuries across 204 countries and regions, covering 811 locations from 1990 to 2021.[12] We analyzed the disease burden of female cancers (BC, CC, OC, and UC) across eight age groups (60–64, 65–69, 70–74, 75–79, 80–84, 85–89, 90–94, and 95+years) in 204 countries and territories from 1990 to 2021. Data on incidences, prevalence, DALYs, mortality rates, age-standardized incidence rates (ASIR), age-standardized prevalence rates (ASPR), age-standardized rates of DALYs, Age-Standardized Rates(ASR), and age-standardized death rates (ASDR) were obtained from the GBD database. We examined this data to evaluate the burden of disease across multiple factors, such as age, year of occurrence, type of cancer, and geographical location. The incidence rates were estimated using the Bayesian meta-regression model version 2.1 (DisMod-MR 2.1), which is a commonly applied tool for meta-regression within the GBD framework. The calculation of DALYs includes both years lived with disabilities and years lost due to premature death.[13] The 95% uncertainty interval (UI) for every indicator was established by identifying the 2.5th and 97.5th percentiles, which relate to the arranged 1,000 values derived from the posterior distribution.[14]

Additionally, the GBD 2021 calculated the SDI for each country, a parameter that reflects the social and economic conditions influencing health outcomes. The SDI is assessed as a composite measure of income per capita, average years of education, and the birth rate among women under the age of 25. The 204 nations and regions were classified into five tiers according to their SDI: high, upper middle, middle, lower middle, and low SDI. SDI scores vary between 0 and 100, with 0 indicating the lowest income, fewest years of schooling, and highest fertility, while a score of 100 indicates the highest income, most years of schooling, and lowest fertility.[15]

Statistical Analysis

Joinpoint regression analysis was employed to evaluate trends in ASIR, ASPR, and ASDR. This analytical method identifies points at which significant changes in trends occur, thereby segmenting the overall trend accordingly. The model assessed average annual percent change (AAPC) for the incidence, prevalence, and DALYs of BC, CC, OC, and UC, providing a comprehensive measure of overall changes over time. If the estimation of the AAPC and its lower limit of the 95% confidence interval were both above zero, an upward trend was recognized in that timeframe. Conversely, a downward trend was observed during that timeframe if the AAPC estimation, along with its upper limit of the 95% confidence interval, fell below zero. In all other instances, the trend was deemed stable.

The APC model stands out as a sophisticated research approach that goes beyond conventional analyses in studies of health and socio-economic development. Grounded in the Poisson distribution, it improves the typical descriptive analysis technique by breaking down the variables of interest into three dimensions: age, period, and cohort. This decomposition facilitates a thorough investigation of long-term trends in the evolution of diseases over time.[16,17] The age effect indicates how the likelihood of a particular outcome varies with changes in age, illustrating the impact of demographic changes on that outcome. Period effects refer to shifts in disease incidence and DALY rates among different populations, shaped by human factors like improvements in diagnostic methods, screening processes, and early detection techniques. The cohort effect refers to the variations in characteristics among groups born in the same year. Typically, the APC model is represented by the equation: $Y = \log(M) = \mu + \alpha(\text{age})i + \beta(\text{period})j + \gamma(\text{cohort})k + \varepsilon$. Furthermore, we assessed the significance of trends in annual percentage changes using a Wald χ^2-test.[18]

In this study, all statistical analyses and their corresponding visual representations were conducted using R statistical software, specifically version 4.3.3. A significance threshold of $P < 0.05$ was established to ensure that the findings could be interpreted appropriately within the context of statistical significance.

Result

Global Trends

Globally, a total of 383,743,07 deaths, 139,754,58 deaths, 122,020,88 deaths, and 755,947,8 deaths due to BC, CC, OC and UC respectively were reported among elder women (≥60 years old) from 1990 to 2021. In comparison to 1990, the number of deaths attributed to four cancers increased in 2021; However, the ASDR exhibited a declining trend respectively (AAPC: −0.54, 95% UI: −0.61to −0.49), (−1.12, 95% UI: −1.17 to −1.07), (−0.58, 95% UI: −0.62 to −0.54) and (−0.57, 95% UI: −0.63 to −0.52). In 2021, the incidence numbers of BC and UC increased, the ASIR showing rise trend (AAPC: 170.54, 95% UI: 152.08 to 183.62) and (AAPC: 48.51, 95% UI: 43.57 to 52.95). Meanwhile, the absolute numbers of CC and OC also increased, but the ASIR display declining trend (AAPC: 33.86, 95% UI: 30.17 to 37.02) and (AAPC: 24.73, 95% UI: 21.82 to 26.92). In 2021, the prevalence numbers of four cancers increased, However, the ASPR for OC shows a declining trend, while the ASPR for BC, CC, and UC shows an upward trend. For ASR of DALYs, the absolute number of cases for the four cancers increased in 2021. Notably, All ASR of DALYs showed a decreasing trend. On the country, Monaco exhibited the highest ASIR (681.07 per 100,000 individuals), Italy reported the highest ASPR (5007.96 per 100,000 individuals), United Arab Emirates showed the highest age-standardized DALY rate (115,32.36 per 100,000 individuals) and it also exhibited the highest ASDR (605.41 per 100,000 individuals) (Figure 1, Table 1 and Supplementary Tables 1–4).

Joinpoint Regression Analysis

Joinpoint regression analysis revealed a significant change. From 1990 to 2021, BC has higher ASIR, ASPR, ASR of DALYs, and ASDR compared to the other three types of cancer. The ASIR and ASPR of BC increased, while ASR of DALYs and ASDR decreased. For CC, The ASIR, ASR of DALYs, and ASDR show a downward trend. Significantly the ASDR of CC exhibits the most rapid decline (AAPC: −1.11). The ASIR and ASPR for UC indicate an increasing trend, while the ASR of DALYs and ASDR demonstrate a slight decline, with UC exhibiting the most pronounced increase in ASIR (AAPC:0.49). Joinpoint regression analysis revealed a consistently stable declining trend in the global burden of OC from 1990 to 2021 (Figure 2).

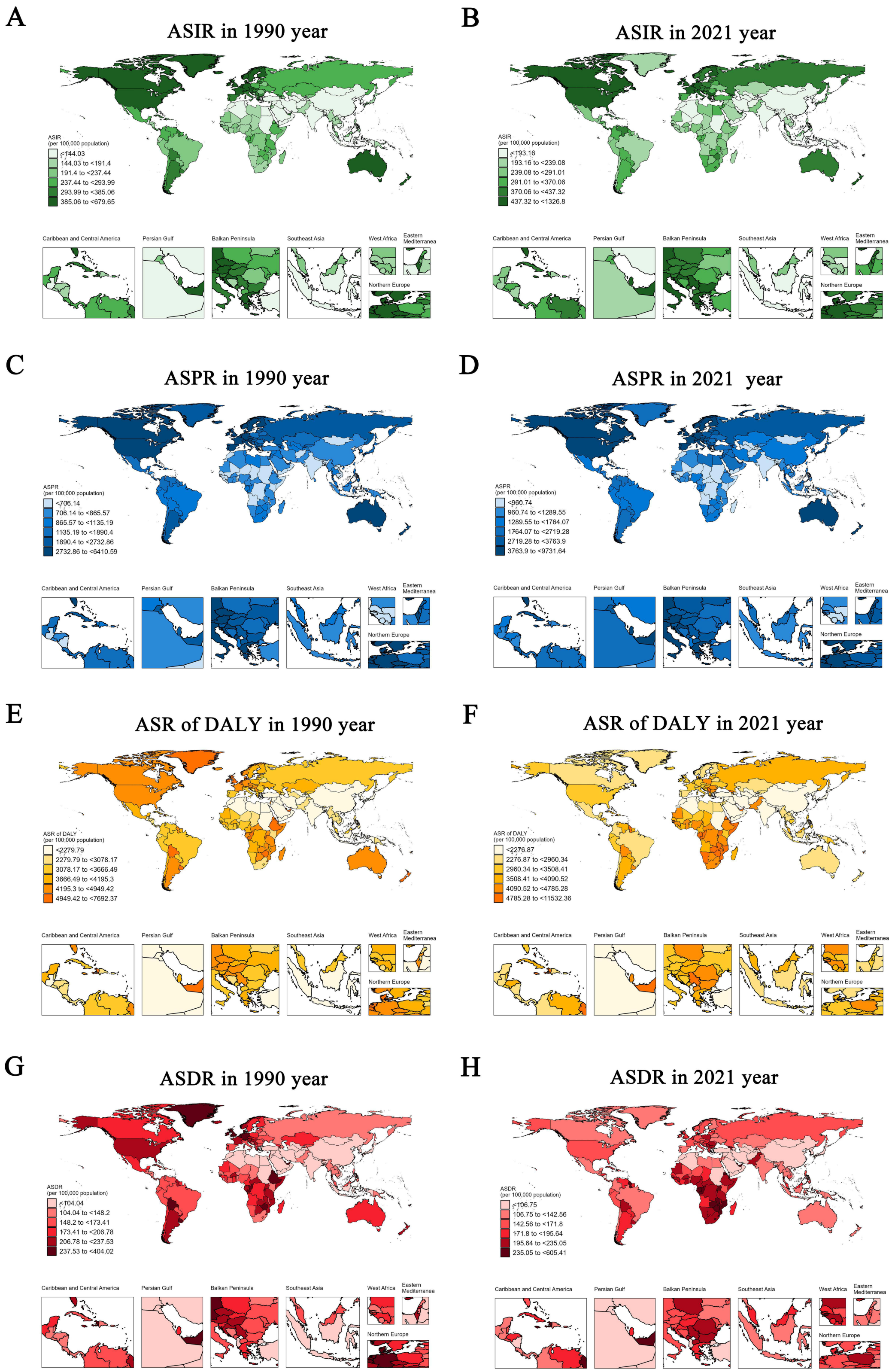

Figure 1 (**A**) The ASR of incidence in 1990; (**B**) The trend in ASR of incidence (AAPC) in 2021; (**C**) The ASR of prevalence in 1990; (**D**) The trend in ASR of prevalence (AAPC) in 2021; (**E**) The ASR of DALYs in 1990; (**F**) The trend in ASR of DALYs (AAPC) in 2021; (**G**)The ASR of Death in 1990; (**H**) The trend in ASR of Death (AAPC) in 2021.

Table 1 Trend Changes in Four Types of Tumors in Females Aged 60 and Above from 1990 to 2021

Measure	Indicator	Breast Cancer	Cervical Cancer	Ovarian Cancer	Uterine Cancer
Incidence	1990year Number (95%UI)	410645.96(381281.32 to 430408.4)	114379.48(105283.78 to 123371.37)	75685.88(69465.01 to 81145.82)	113267.04(104374.08 to 120085.43)
	ASIR 1990 (95%UI)	155.19(143.39 to 162.97)	42.51(39.04 to 45.87)	28.49(26.04 to 30.57)	42.16(38.73 to 44.74)
	2021year Number (95%UI)	1000134.13(891500.73 to 1076980.27)	198096.46(176491.12 to 216630.18)	145081.83(127986.63 to 157940.98)	286580.24(255249.59 to 310219.11)
	ASIR 2021 (95%UI)	170.54(152.08 to 183.62)	33.86(30.17 to 37.02)	24.73(21.82 to 26.92)	48.91(43.57 to 52.95)
AAPC (95% CI)		0.35(0.29 to 0.4)	−0.7(−0.73 to −0.67)	−0.54(−0.58 to −0.5)	0.48(0.43 to 0.52)
Prevalence	1990year Number (95%UI)	4655615.28(3992721.05 to 5517799.66)	260988.03(243626.82 to 277538.28)	202819.65(188273.54 to 215613.92)	715698.83(665270.08 to 754661.28)
	ASPR 1990 (95%UI)	1770.37(1509.38 to 2109.81)	95.09(88.69 to 101.15)	74.63(69.16 to 79.38)	261.81(243.08 to 276.17)
	2021year Number (95%UI)	10672923(9796509.04 to 11513750.85)	550470.04(492304.24 to 607056.52)	400990.5(358054.18 to 433426.6)	1926169.02(1735548.38 to 2064084.72)
	ASPR 2021 (95%UI)	1819.42(1670.23 to 1962.37)	94.57(84.59 to 104.27)	68.56(61.23 to 74.11)	329.28(296.68 to 352.86)
AAPC (95% CI)		0.17(0.08 to 0.25)	0.04(0 to 0.08)	−0.35(−0.38 to −0.31)	0.75(0.7 to 0.79)
DALYs (Disability-Adjusted Life Years)	1990year Number (95%UI)	4143181.88(3868398.14 to 4376085.38)	1962058.4(1796308.52 to 2138314.09)	1330380.16(1227615.35 to 1428486.08)	852318.04(766726.41 to 920656.88)
	ASR of DALY 1990 (95%UI)	1556.5(1447.76 to 1646.32)	723.19(661.29 to 788.22)	494.2(454.76 to 530.9)	317.24(284.79 to 342.88)
	2021year Number (95%UI)	7971313.19(7212687.12 to 8591920.1)	2970353.37(2675843.17 to 3239482.45)	2466786.63(2205925.29 to 2684312.09)	1595542.21(1407082.04 to 1771493.44)
	ASR of DALY 2021 (95%UI)	1360.56(1231.6 to 1466.33)	508.14(457.87 to 554.15)	421.12(376.67 to 458.25)	272(239.89 to 302)
AAPC (95% CI)		−0.47(−0.52 to −0.43)	−1.13(−1.18 to −1.09)	−0.61(−0.65 to −0.57)	−0.51(−0.56 to −0.46)
Deaths	1990year Number (95%UI)	194870.47(180087.31 to 205323.36)	89797.24(81951.33 to 97785.34)	63742.26(58241.38 to 68497.24)	39825.28(35665.85 to 43011.78)
	ASDR 1990 (95%UI)	76.06(69.73 to 80.37)	33.85(30.8 to 36.87)	24.34(22.12 to 26.19)	15.27(13.61 to 16.51)
	2021year Number (95%UI)	383743.07(338493.84 to 415208.14)	139754.58(124460.37 to 152975.5)	122020.88(107,338.5 to 133236.45)	75594.78(65751.01 to 84436.92)
	ASDR 2021 (95%UI)	65.22(57.57 to 70.55)	23.83(21.23 to 26.08)	20.77(18.28 to 22.67)	12.85(11.18 to 14.35)
AAPC (95% CI)		−0.54(−0.61 to −0.49)	−1.12(−1.17 to −1.07)	−0.58(−0.62 to −0.54)	−0.57(−0.63 to −0.52)

Abbreviations: UI, uncertainty intervals; AAPC, annual average percent change; CI, confidence interval; ASR, age-standardized rate; DALY, disability-adjusted life year.

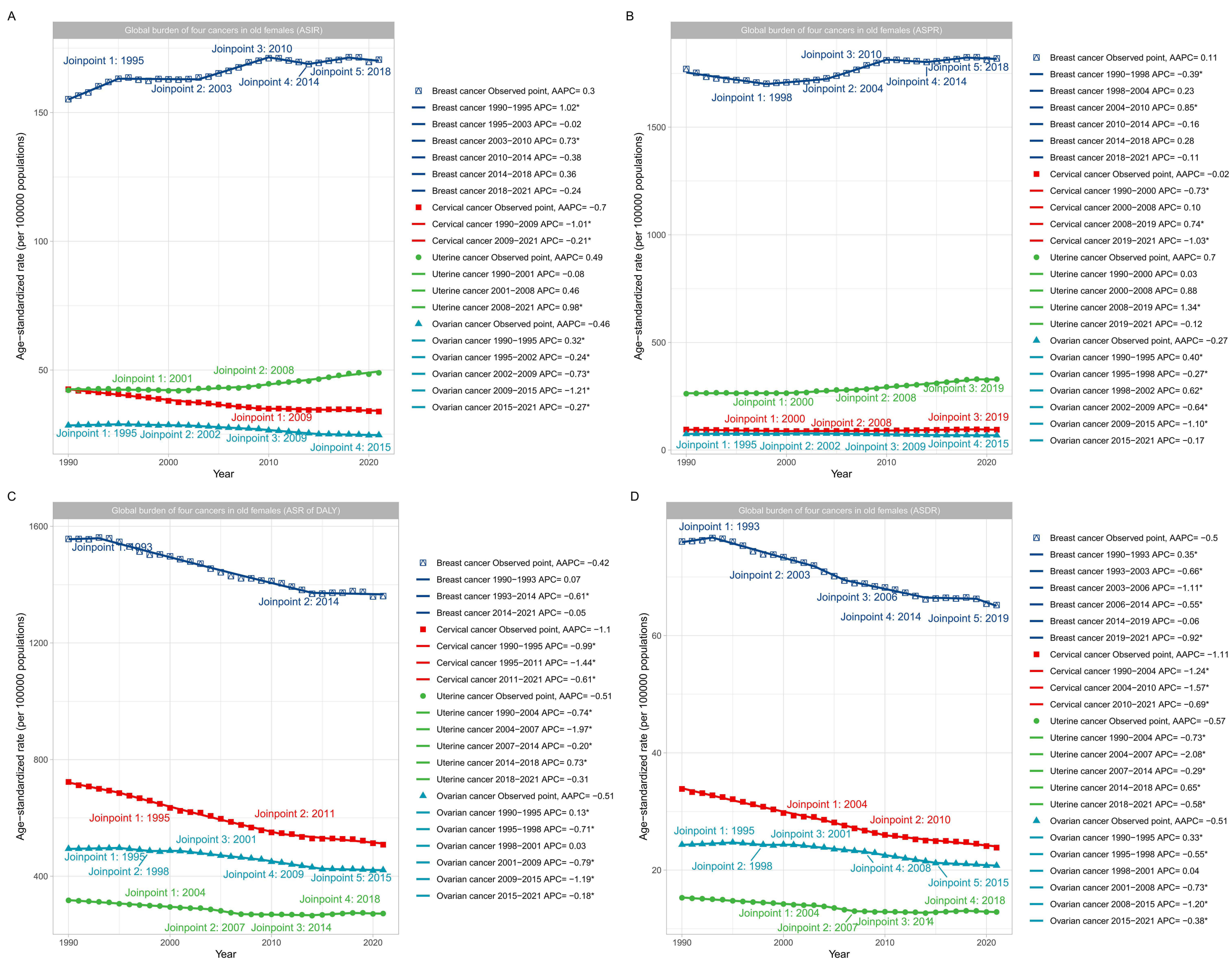

Figure 2 Global trends in age-standardized rates of female cancers among older women from 1990 to 2021. (**A**) Age-standardized incidence rate. (**B**) Age-standardized prevalence rate. (**C**) Age-standardized DALYs rate. (**D**) Age-standardized death rate.

Association with Socio-Demographic Index

At the regional level, from 1990 to 2021, a notable increase can be observed in the ASIR and ASPR of four cancers with increasing SDI (Figure 3). This indicates that socioeconomic development is a key driver of the risk associated with these cancers and contributes significantly to the overall disease burden within the population.

Cross-Country Inequalities

This research also uncovered substantial absolute and relative disparities in the burden of four types of cancer linked to the SDI, with regions of high SDI experiencing an excessively heavy burden. From 1990 to 2021, The ASIR and ASPR of the four cancers exhibited a consistent increase alongside the rise in the SDI level. In 1990, the slope index of ASIR was 245, representing the highest SDI compared to that of the country with the lowest SDI at that time. This disparity further widened to 283 by 2021. At the same time, Compared to low-SDI regions, we found that cumulative fraction of incidence and prevalence of four cancers are higher in high-SDI regions. Furthermore, in 1990, the increase in SDI levels correlated with a rise in the ASR of DALYs and ASDR. However, by 2021, as SDI levels continued to rise, the ASR of DALYs and ASDR for the four cancers declined. Overall, the increasing rates of incidence and prevalence highlight growing health concerns, while the decreasing concentration indices suggest improvements in health equity among different populations (Figure 4A–D).

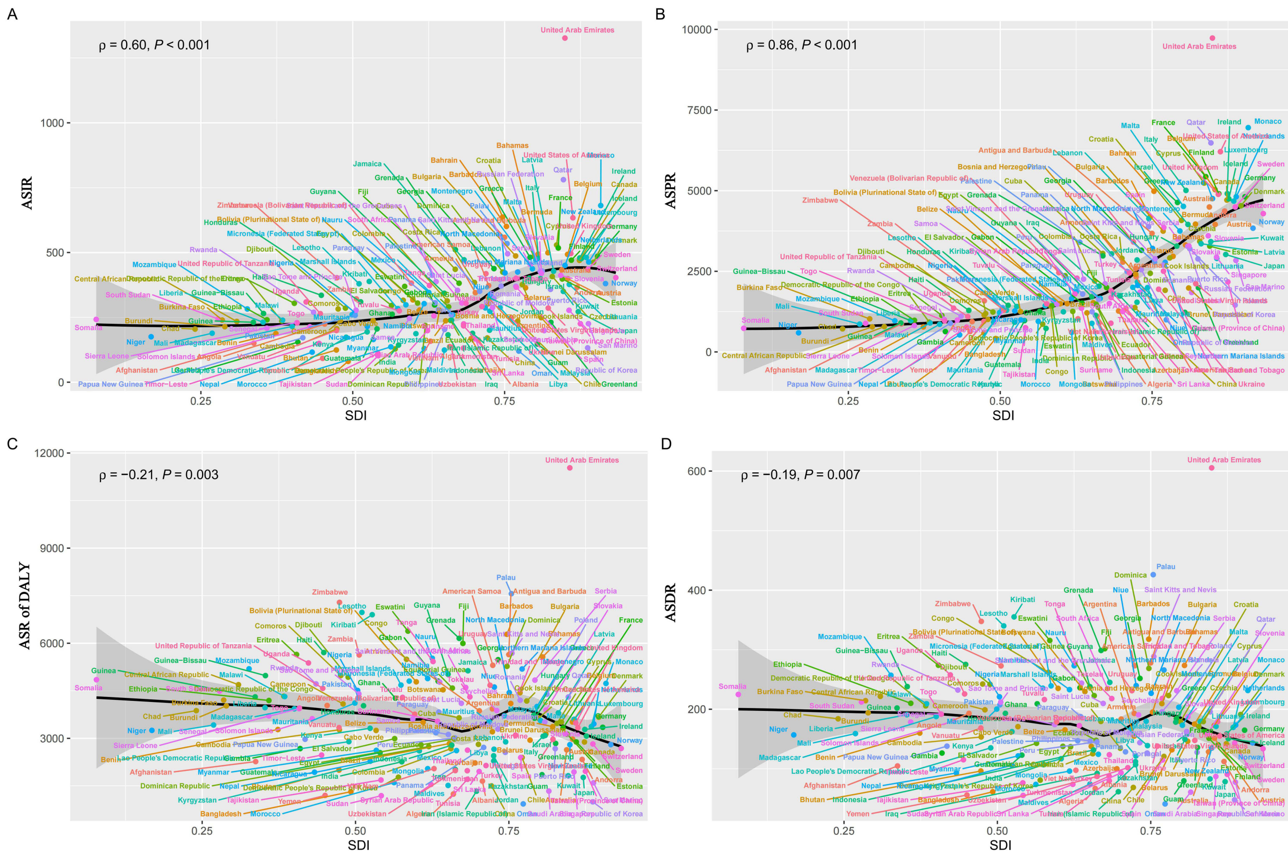

Figure 3 Trends of age-standardized rates of female cancers in 21 regions by SDI from 1990 to 2021 among older woman. (**A**) Age-standardized incidence rate. (**B**) Age-standardized prevalence rate. (**C**) Age-standardized DALYs rate. (**D**) Age-standardized death rate.

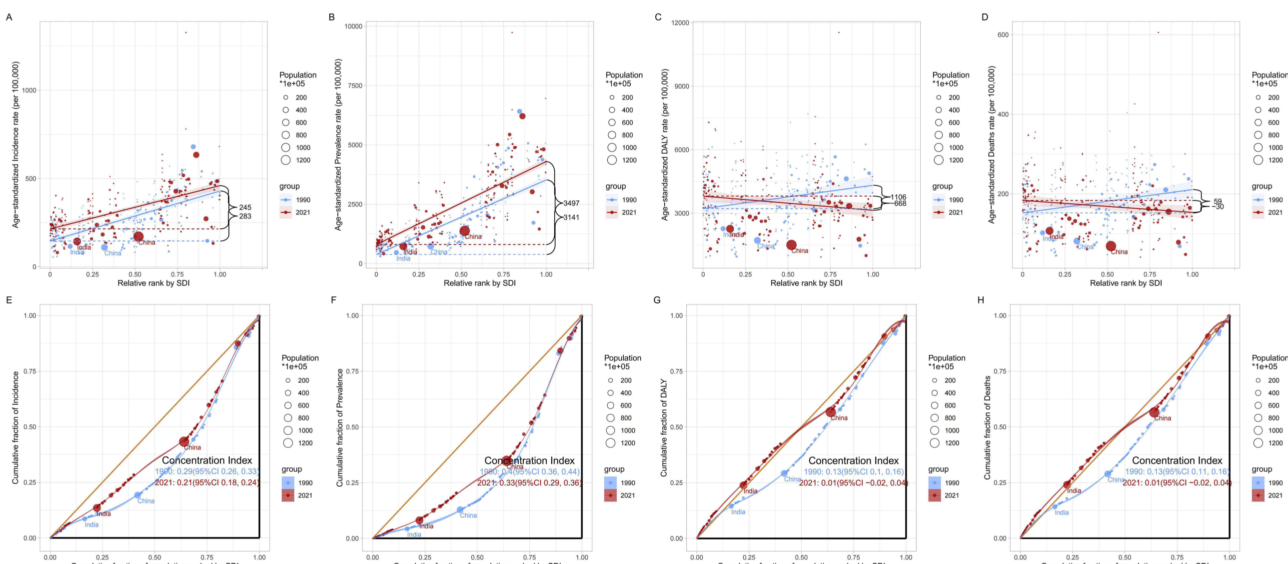

Figure 4 Health inequality regression curves (**A–D**) and concentration curves (**E–H**) for the incidence, prevalence, DALYs and Death of female cancers among older woman from 1990 to 2021 across the world.

The Burden Proportion of the Four Cancers in 27 Super Regions

Among the 26 regions, the incidence, prevalence, DALYs, and deaths from BC are higher than those associated with the other three cancers. The Australasia region exhibits the highest disease burden, with proportions of 72.1%, 85.2%, 63.6%, and 61.9%, followed closely by the North Africa and Middle East regions, which report 72.2%, 85.4%, 61.3%, and 60.0%. CC presents a higher disease burden in the Central sub-Saharan Africa region, with proportions of 44.5%, 18.4%, 48.2%, and 47.2%. Conversely, the burden of CC is notably lower in high-SDI regions, with proportions of 4.5%, 1.8%, 7.6%, and 7.9%. Additionally, OC shows the lowest disease burden in Oceania, with proportions of 5.6%, 2.5%, 5.2%, and 5.3%. In contrast, UC has the highest disease burden in Eastern Europe, with proportions of 32.1%, 29.1%, 18.2%, and 17.6%. These findings underscore the necessity of considering regional differences when developing prevention strategies. (Figure 5A–D).

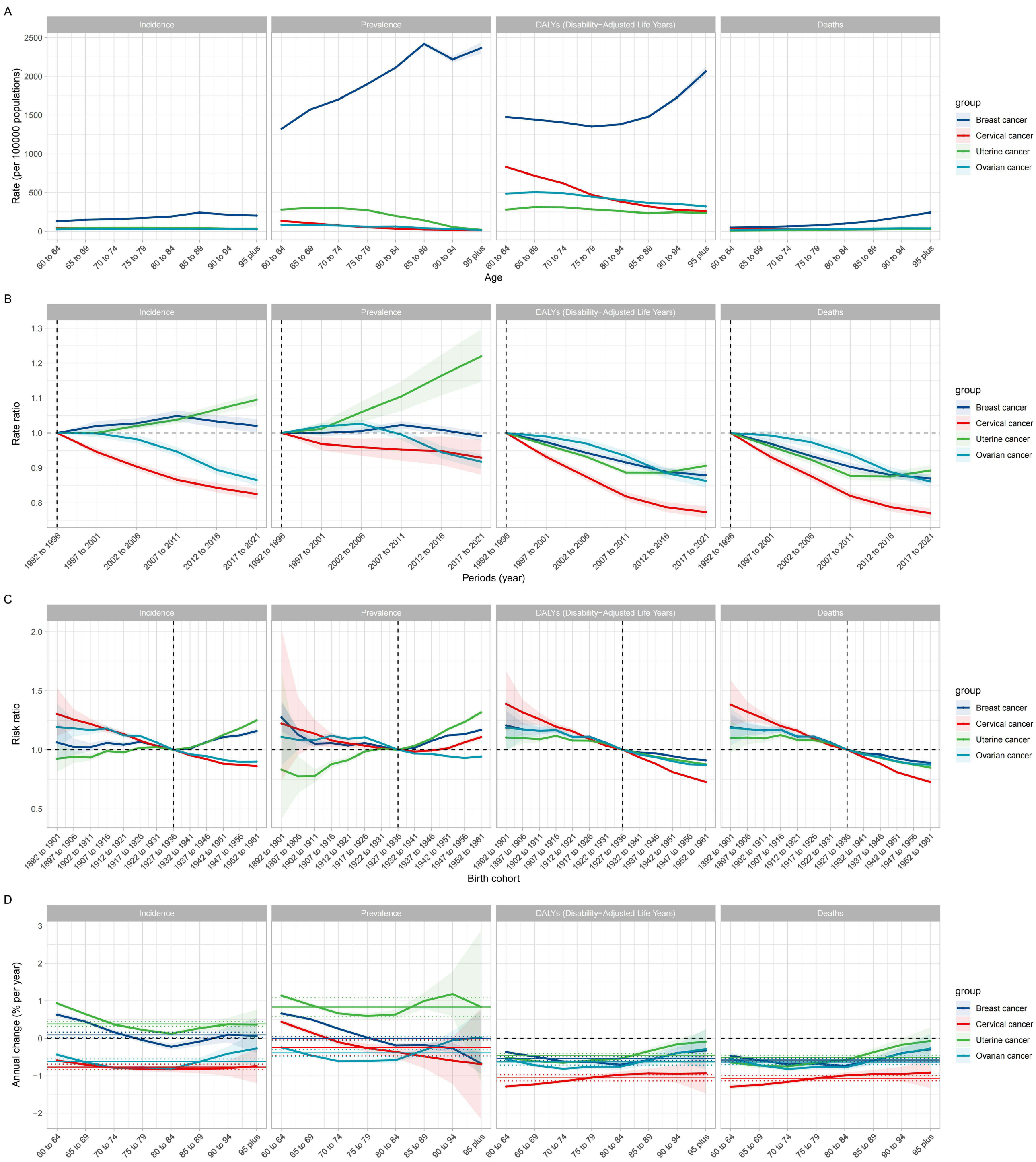

Figure 5 The overall age, period, and cohort effects for the incidence, prevalence, DALY and death rates from 1990 to 2021.

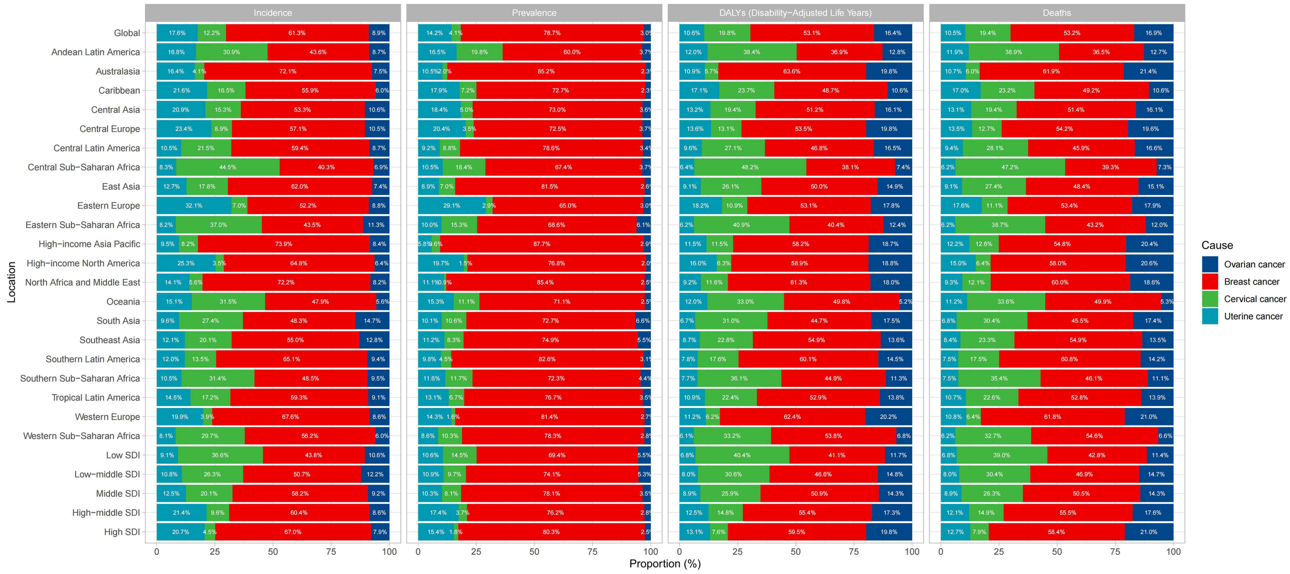

Figure 6 Proportion of total burden related to female cancers among elder woman from 1990 to 2021 at the global and region.

Age, Period and Birth Cohort Analysis

The age, period, and birth cohort effects on four cancers, as derived from the APC model, were analyzed. The results of the age effect analysis for the prevalence of BC indicate a trend of increasing risk with advancing age, peaking in the group aged 85–90 years (Relative Risk [RR] = 242.08, 95% Confidence Interval [CI]: 238.30 to 245.91). In contrast, the DALYs for CC consistently decrease with increasing age. UC and OC do not show significant changes in disease burden with age. Compared to the period from 1992 to 1996, the period effect revealed a persistent downward trend in the incidence risk of CC among patients from 2017 to 2021 (RR = 1.02, 95% CI: 1.00 to 1.04). From 1992 to 2021, the risk of DALYs and mortality associated with the four cancers has gradually declined. The cohort RR of incidence exhibited a notable decreasing trend following the cohort of 1927–1936 for both OC and CC. In the 1952–1961 cohort, the incidence of CC and OC was reported as RR = 0.86 (95% CI: 0.85 to 0.87) and RR = 0.90 (95% CI: 0.88 to 0.92), respectively. Additionally, the trends for CC and BC prevalence initially declined before experiencing an increase. Furthermore, the RR of DALYs and mortality from the four cancers rises with later birth rates. The age group of 60–64 years exhibited the largest annual decrease in incidence and prevalence of the four cancers between 1992 and 1996. The annual percentage changes in DALYs and deaths from these cancers showed slight fluctuations. (Figure 6).

Discussion

The incidence of BC has significantly increased among older women, consistent with previous studies.[19] However, global deaths and DALYs have decreased between 1990 and 2021. This rise in BC incidence among older women can be attributed to several factors, including the global aging population, genetic predispositions, and advancements in BC screening technologies —particularly the widespread use of mammography and ultrasound.[20–23] Additionally, declining hormone levels and various lifestyle and environmental factors, such as physical inactivity, obesity, and high-fat diets, contribute to this trend.[24] Furthermore, advancements in treatment modalities, including surgical techniques, chemotherapy, radiotherapy, immunotherapy, and targeted therapies, have markedly enhanced treatment outcomes of BC, resulting in prolonged survival and decreased mortality rates.[25–27] The enhancement of public health awareness and the overall improvement in societal health management also play a vital role in reducing the mortality.[28] In 2021, incidence, prevalence, DALYs and deaths were the utmost proportion in high-SDI regions. Areas with high SDI typically possess superior healthcare infrastructure, leading to a greater number of diagnoses for diseases such as cancer, which in turn results in elevated incidence and prevalence rates. Generally, regions with high SDI also exhibit longer life expectancies, allowing individuals with chronic diseases like cancer to live longer, thereby increasing DALYs. Although healthcare quality is improved in these areas, extended lifespans enable individuals to coexist with the disease for many years, contributing to a heightened burden of disease. Furthermore, in populations with higher life expectancies, a larger proportion of older adults may succumb to age-related diseases, including cancer.

CC is a preventable disease through the use of an effective and safe vaccine, alongside appropriate screening measures.[29] ASIR, ASR of DALYs, and ASDR for CC demonstrate a downward trend, with the ASDR showing the most significant decline. This decline is closely associated with the global implementation of HPV vaccination and the widespread adoption of cytology screening.[30,31] The trends reflected by the current data can be primarily attributed to the widespread adoption of cervical cancer screening and advancements in treatment technologies. Additionally, the impact of HPV vaccination is expected to be a key factor that will predominantly shape the disease burden landscape in the coming decades. This may result in significant regional heterogeneity in global trends due to variations in vaccination strategies and coverage rates across different countries. Furthermore, in 2021, the burden proportion of CC (incidence, prevalence, DALYs and deaths) in low-SDI countries was the highest, and the proportion of disease burden decreased as the SDI level increased. This situation arises from a combination of ineffective screening and prevention measures, inadequate healthcare resources, and low vaccination rates in low-income areas.[32] Therefore, it is crucial to enhance the CC screening, expand HPV vaccination initiatives, strengthen health education and promotion efforts, and improve healthcare services to alleviate the burden of CC among elder women.

OC, while less prevalent than OC and CC among gynecological malignancies, is the most lethal type, earning it the moniker "silent killer."[33] The early symptoms of the condition are subtle, and the absence of effective screening methods leads to over 70% of patients being diagnosed at an advanced stage.[34,35] Research indicates that over the past 30 years, the incidence, prevalence, DALYs, and mortality rates of OC among elderly women have exhibited a declining trend, a phenomenon not seen in other cancer types. High-grade serous carcinoma, the most prevalent subtype of OC in elderly women, accounts for 70–80% of related deaths and is characterized by a poor prognosis and a high likelihood of recurrence.[36] Early screening methods, including pelvic examinations, transvaginal ultrasound, and serum CA-125 testing, along with the decreased utilization of hormone replacement therapy, have collectively contributed to the decline in both the incidence and mortality rates of OC among elderly women.[37,38] In recent years, the trends of delayed childbearing, a reduced number of births, and an increased use of oral contraceptives have contributed to a lower risk of developing the disease.[39,40] In terms of treatment, advancements in risk stratification, genetic testing, surgical techniques, targeted therapy, and immunotherapy have significantly improved survival rates and alleviated the disease burden for elderly patients.[41,42] It is noteworthy that the burden indicators of OC in low- and middle-SDI regions are higher than those in other regions, which is associated with low accessibility to medical resources, delayed diagnosis, insufficient treatment, and socioeconomic factors.[43] There is an urgent need to formulate effective prevention and control strategies targeting low-income populations.

From 1990 to 2021, the ASIR and ASPR of UC showed an increasing trend, while the ASR of DALYs and deaths exhibited a downward trend. Furthermore, when compared to other SDI regions, the ASIR, ASPR, and ASR of DALYs and deaths associated with UC are lowest in low-SDI regions. Older women living in high-income areas exhibit a significantly higher likelihood of obesity, a trend attributed to lifestyle changes such as the consumption of a calorie-dense, low-fiber diet, and high-fat, along with insufficient physical activity.[44,45] This increase in obesity contributes to a notable rise in estrogen levels within the body, which subsequently elevates the risk of developing UC.[46] Consequently, the implementation of public health initiatives focused on weight management and the promotion of increased physical activity is essential for mitigating the rising incidence of UC among older women in high-income regions.

Our study, based on the latest estimates from GBD 2021, presents the global burden of four female cancers in older women. However, several limitations must be acknowledged. First, the estimation of the cancer burden in elderly women largely depends on the availability and quality of GBD 2021 data. In certain countries and regions, particularly low- and middle-income areas, access to raw data may be limited, which can lead to reduced accuracy of the collected data. Second, the COVID-19 pandemic has introduced significant uncertainty in mortality estimates for all diseases, particularly in regions most affected by the pandemic. Furthermore, despite employing rigorous statistical methods, disparities in health information systems and reporting mechanisms across different regions may also impact the accuracy of the results. The interpretation of our findings should be considered in the context of the limitations associated with relying on aggregated GBD data. To address these limitations, future global cancer surveillance efforts should aim to: (1) collect more granular, age-specific data for the elderly population; (2) systematically integrate information on tumor subtypes, stage at diagnosis, and key risk factors; and (3) strengthen cancer registration systems in low- and middle-income countries to fill critical data gaps. These improvements would substantially support the development of more targeted prevention and control strategies.

Conclusion

In summary, over the past three decades, the global incidence of female cancers among elderly women has consistently risen, imposing significant economic, psychological, and physical burdens. BC remains the most prevalent and lethal cancer among elderly women, with its disease burden intensifying alongside increases in the SDI. This study also reveals a negative correlation between SDI and the DALY rate and mortality rate for UC and OC. Conversely, the burden of CC diminishes with higher SDI, presenting more severe medical challenges in countries with low SDI. It is recommended that policymakers and healthcare institutions closely monitor these trends, develop age-specific, gender-specific, and regionally differentiated screening strategies, allocate resources judiciously, and particularly focus on vulnerable populations.

Data Sharing Statement

The data presented in this study are available on the Global Health Data Exchange GBD 2021 website at http://ghdx.healthdata.org/gbd-2021/sources.

Ethics Statements

According to Article 32 of the Ethical Review Measures for Life Science and Medical Research Involving Human Beings of the People's Republic of China, the data used in this study will not cause any form of harm to human beings, nor will it touch sensitive personal privacy or trade secrets, so the ethical review can be exempted. In addition, the database used in this study was publicly available and legally available.

Acknowledgments

We appreciate the excellent work of the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2021 collaborators. We extend our gratitude to Guoxu Wang, Yujie Pan, and Ziyan Wu for their invaluable discussions, technical support, and assistance in revising the manuscript throughout the course of this research.

Funding

Zhejiang Province Anti-Cancer Association-Qilu Cancer Prevention and Control Clinical Research Special Fund Project (zjskaxhqllckyxm202208).

Disclosure

The authors declare no competing interests in this work.

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