Cancer mortality predictions for 2023 in Latin America with focus on stomach cancer

Claudia Santucci^a, Matteo Malvezzi^a, Fabio Levi^b, Maria Constanza Camargo^c, Paolo Boffetta^{d,e}, Carlo La Vecchia^a and Eva Negri^e

Objective We estimated cancer mortality statistics for the current year in seven major Latin American countries.

Methods We retrieved official death certification data and population figures from the WHO and the United Nations databases for the 1970–2020 calendar period. We considered mortality from all neoplasms combined and for 10 major cancer sites. We estimated the number of deaths and age-standardized mortality rates for the year 2023.

Results Age-standardized mortality rates for all cancers combined are predicted to decline in all countries, in both sexes, apart from Venezuelan women. The lowest predicted total cancer mortality rates are in Mexico, 69.8/100 000 men and 62.5/100 000 women. The highest rates are in Cuba with 133.4/100 000 men and 90.2/100 000 women. Stomach cancer is predicted to decline steadily in all countries considered, but remains the first-ranking site for men in Chile (14.3/100 000) and Colombia (11/100 000). Colorectal cancer rates also tended to decline but remain comparatively high in Argentina (14/100 000 men). Breast cancer rates were high in Argentinian women (16.5/100 000) though they tended to decline in all countries. Lung cancer mortality rates are also predicted to decline, however, rates remain exceedingly high in Cuba (30.5/100 000 men and 17.2/100 000 women) as opposed to Mexico (5.6/100 000

men and 3.2/10 000 women). Declines are also projected for cancer of the uterus, but rates remain high, particularly in Argentina and Cuba (10/100 000 women), and Venezuela (13/100 000 women) due to inadequate screening and cervical cancer control.

Conclusion Certified cancer mortality remains generally lower in Latin America (apart from Cuba), as compared to North America and Europe; this may be partly due to death certification validity. *European Journal of Cancer Prevention* 32: 310–321 Copyright © 2023 The Author(s). Published by Wolters Kluwer Health, Inc.

European Journal of Cancer Prevention 2023, 32:310-321

Keywords: cancer, Latin America, mortality, projections

^aDepartment of Clinical Sciences and Community Health, University of Milan, Milan, Italy, ^bDepartment of Epidemiology and Health Services Research, Centre for Primary Care and Public Health (Unisanté), University of Lausanne, Lausanne, Switzerland, ^cDivision of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health, Rockville, Maryland, ^dDepartment of Family, Population and Preventive Medicine, Stony Brook Cancer Center, Stony Brook University, Stony Brook, New York, USA and ^cDepartment of Medical and Surgical Sciences, University of Bologna, Bologna, Italy

Correspondence to Prof Carlo La Vecchia, MD, Department of Clinical Sciences and Community Health, University of Milan, 'La Statale', Via Celoria 22, Milan 20133, Italy

lung, breast, uterus, ovary, prostate, bladder, and leu-

kemia, as well as all cancers combined from the WHO

database (WHO, 1992). Corresponding International

Classification of Diseases codes according to the 10th

Revision are available in Supplementary Table S1,

Supplemental digital content 1, http://links.lww.com/

EJCP/A384. Resident population estimates were retrieved from the United Nations database (United

For each cancer site and country considered, we derived sex- and 5-year age group-specific mortality rates from

1970 up to the most recent available year. We obtained

age-standardized mortality rates (ASR) using the world

standard population and analyzed ASR trends by fitting

for each cancer site. We then estimated the age-specific

Tel: +39 02 3901 4527; e-mail: carlo.lavecchia@unimi.it

Received 7 March 2023 Accepted 7 March 2023.

Introduction

Projected estimates on cancer mortality figures and rates are a useful instrument to evaluate disease control because mortality integrates the effects of incidence, stage at diagnosis, and treatment. In this paper, we present projected cancer mortality deaths and rates for the year 2023 in the seven most populous countries from Latin America: Argentina, Brazil, Chile, Colombia, Cuba, Mexico, and Venezuela, updating our work on the issue. Moreover, we analyzed and discussed stomach cancer in detail.

Materials and methods

We retrieved official death certification data for the following cancer sites: stomach, colorectum, pancreas,

0959-8278 Copyright © 2023 The Author(s). Published by Wolters Kluwer Health, Inc.

joinpoint regression models (Kim *et al.*, 2000). reative Commons e, distribution, and erly cited. URL citations ap-DE vargings of the ted a logarithmic Poisson joinpoint regression model to the observed number of deaths in each 5-year age group

Nations, 2017).

This is an open access article distributed under the Creative Commons Attribution License 4.0 (CCBY), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's website (www.eurjcancerprev.com).

numbers of deaths for 2023 with the corresponding 95% prediction intervals, by applying a linear regression model to the mortality figures for each age group over the most recent trend segment identified by the joinpoint model. Finally, we calculated age-specific and age-standardized death rates (and related 95% prediction intervals) using the estimated age-specific number of death counts and the predicted populations, retrieved from the United Nations database (United Nations, 2017), for the year 2023.

We estimated the number of avoided deaths for each country for the period 1990–2023 by comparing observed and predicted deaths to those expected based on the 1990 age-specific peak rate. All analyses were performed using the software R version 4.1.1 (R Development Core Team, 2017), SAS version 9.4 (SAS Institute Inc., Cary, North Carolina, USA), and Joinpoint Regression Program version 4.9.1.0 (Statistical Methodology and Applications Branch, Surveillance Research Program, National Cancer Institute).

Results

Table 1 reports the number of predicted deaths and ASRs per 100 000 men with the corresponding 95% prediction intervals from considered cancer sites in the seven selected Latin American countries for the year 2023, in comparison with observed data for the 2015-19 quinquennium. Table 2 shows the corresponding figures among women. Figure 1 shows ASR bar plots per 100 000 persons from all neoplasms combined for each country considered, according to sex, in the 2015-19 period, and the predicted rates for 2023, with corresponding 95% prediction intervals.

Male mortality from all neoplasms combined is predicted to be favourable in the seven countries investigated, with falls in ASRs between 2015–19 and 2023 ranging from –2.7% in Mexico and –12.4% in Chile (Table 1 and Fig. 1). Cuba showed the highest rates in both periods, with ASR of 139.3/100 000 during 2015–19 and projected 133.4/100 000 for 2023, while Mexico reported the lowest ones, 71.7/100 000 in 2015–19 and 69.8/100 000 predicted in 2023. For 2023, lung cancer is predicted to be the leading cancer cause of mortality in Argentina (19.7/100 000), Brazil (12.4), and Cuba (30.5); stomach cancer topped the list in Chile (14.3) and Colombia (11.0), while prostate cancer showed the highest rate among Mexican (9.8) and Venezuelan (20.0) men (Table 1).

Female total cancer mortality is predicted to decrease in all countries considered, except Venezuela where ASR remained stable (+0.8% between 2015–19 and 2023; Table 2 and Fig. 1). Declines in ASRs for all cancers combined ranged between -1.5% in Brazil and -10.1% in Chile. Mexican women showed the lowest ASRs: 64.7/100 000 observed in 2015–19 and 62.5 projected in 2023 while Cuban women had the highest ones, 94.5/100 000 in 2015–19 and 90.2 estimated in 2023. Mexico reported the lowest ASRs for most of the cancers considered as compared to the other analyzed Latin American countries, for both 2015–19 and 2023. For 2023, the neoplasm with the highest predicted ASRs is breast cancer, with rates ranging from 9.9/100 000 in Mexico to 16.5 in Argentina, followed by uterus (ASRs ranging from 5.4/100 000 in Chile to 13.0 in Venezuela); except for Cuban women for whom lung cancer (17.2/100 000) is predicted to be the leading cancer for 2023, followed by breast (12.2) and colorectal (11.1) cancers. Compared to 2015–19, we predicted increases in mortality rates for ovarian (+6.6%) and bladder (+0.8%) cancers among Cuban women and for cancer of the uterus (+5.2%) in women from Argentina (Table 2).

The number of deaths is predicted to rise in 2023 as compared to 2015–19 in all countries and both sexes; Colombia showed the largest increase in the absolute number of cancer deaths, almost 19% since 2015–19 among men, while Venezuela had the largest percent increase, over 21% among women.

Figure 2 shows trends in total cancer mortality rates in quinquennia, in men and women separately, from 1970-74 to 2015-19, and predicted rates for 2023 with the corresponding prediction intervals. Male rates in Argentina and Chile decreased over the whole period. Trends for Colombian and Mexican men started to decline between 1990 and 2000 while Brazil, Cuba, and Venezuela showed declines in ASRs over the last decade only. In women, rates in Argentina and Chile, starting from the highest ASRs in 1970-74 showed a favorable trend over the whole period. Mexico, Colombia, and Venezuela declined from 1990 to 2000 although Venezuela levelled off around 2010. Mortality rates in Cuban women started the decline around 2010, although showing the lowest rates until 2005 Brazil displayed an unfavourable trend that became stable in recent years.

Figure 3 reports quinquennial ASR mortality trends for each cancer site and country analyzed. Male stomach cancer ASRs have been slowing down since 1970 in all countries considered, although it remains the leading cause of cancer deaths in Chile and Colombia. Trends for colorectal cancer increased until the 1990s, to then have more favourable trends in most recent years. In most countries, ASRs for lung cancer started to decline around 1990; Argentina showed a favourable trend since the 1970s; conversely, Cuba only started showing favorable trends over the last decade, starting from comparatively high rates and giving the highest predicted ASR, around 30/100 000 men. Prostate cancer rates have been rising since the early 2000s, and only declined over the last period, however maintaining relatively high rates, especially in Cuba and Venezuela, whose predicted ASRs are 23 and 20/100 000 respectively. Bladder cancer and

Table 1 Number of predicted deaths and mortality rates per 100 000 men for the year 2023 and comparison figures for the quinquennium 2015–19, from the seven selected Latin American countries, with 95% prediction intervals and percent differences between rates

Cancer	Observed number of deaths 2015–19	Predicted number of deaths 2023 (95% prediction interval)	Observed ASR 2015-19	Predicted ASR 2023 (95% prediction interval)	% Difference 2023 vs 2015–19
Argentina		·			
Stomach	1888	1910 (1825–2004)	7.13	6.48 (6.19-6.78)	-9.12
Colorectum	4247	4190 (4005–4372)	15.65	13.97 (13.35–14.58)	-10.73
Pancreas	2069	2300 (2203–2400)	7.76	7.67 (7.34–8.01)	-1.16
Lung	6242	5910 (5682–6135)	23.76	19.71 (18.90–20.53)	-17.05
Prostate	3763	3790 (3644–3942)	12.33	10.93 (10.50–11.37)	-11.35
Bladder	1054	1060 (989–1128)	3.67	3.28 (3.05–3.50)	-10.63
Leukemias	1033	1030 (959–1103)	4.07	3.59 (3.31–3.87)	-11.79
All cancers	33 525	34 410 (33831–34993)	125.01	114.21 (112.37-	-8.64
Brazil				116.05)	
Stomach	9356	9870 (9625-10105)	8.18	6.98 (6.80-7.15)	-14.67
Colorectum	11 785	14 540 (14179-14897)	10.30	10.30 (10.04-10.56)	0.00
Pancreas	5275	6290 (6082–6503)	4.64	4.50 (4.35-4.65)	-3.02
Lung	16 142	17 500 (17106–17900)	14.22	12.35 (12.07–12.63)	-13.15
Prostate	15 271	17 250 (16910–17584)	13.00	11.26 (11.03–11.5)	-13.38
Bladder	2911		2.50		-11.60
		3300 (3139–3455)		2.21 (2.11–2.32)	
Leukemias	3810	4080 (3926–4226)	3.48	3.18 (3.05–3.31)	-8.62
All cancers Chile	116 849	133 310 (131838–134791)	102.63	94.9 (93.86–95.94)	-7.53
Stomach	2186	2310 (2195-2432)	17.18	14.29 (13.54–15.05)	-16.82
Colorectum	1382	1540 (1450–1620)	10.86	9.63 (9.10–10.16)	-11.33
Pancreas	663	790 (724–847)	5.30	5.05 (4.62–5.48)	-4.72
Lung	1894	2090 (1961–2210)	15.12	13.11 (12.29–13.93)	-13.29
Prostate	2136	2280 (2163-2401)	15.09	12.45 (11.83–13.07)	-17.50
Bladder	376	390 (354–431)	2.79	2.29 (2.06–2.52)	-17.92
Leukemias	409	410 (375–454)	3.57	3.13 (2.76–3.5)	-12.32
All cancers	14 315	15 790 (15416–16167)	112.24	98.29 (95.9–100.68)	-12.43
Colombia					
Stomach	3194	3550 (3423-3671)	12.18	11.01 (10.61–11.41)	-9.61
Colorectum	1995	2120 (1976-2266)	7.55	6.44 (5.98-6.91)	-14.70
Pancreas	891	1070 (996-1133)	3.43	3.34 (3.12-3.56)	-2.62
Lung	2687	2730 (2592-2862)	10.24	8.20 (7.78-8.62)	-19.92
Prostate	3106	3610 (3457–3758)	10.92	9.82 (9.39–10.25)	-10.07
Bladder	371	390 (351–429)	1.35	1.11 (1.00–1.22)	-17.78
Leukemias	1037	1060 (991–1121)	4.09	3.70 (3.45–3.94)	-9.54
All cancers	22 426	26 590 (26228–26949)	84.72	81.41 (80.3–82.52)	-3.91
Cuba	500		5.00		4.50
Stomach	528	560 (509–602)	5.08	4.85 (4.40–5.31)	-4.53
Colorectum	1204	1330 (1249–1401)	10.94	10.50 (9.84–11.16)	-4.02
Pancreas	451	490 (447–539)	4.40	4.35 (3.90–4.79)	-1.14
Lung	3525	3640 (3466–3815)	34.02	30.47 (28.93–32.02)	-10.44
Prostate	3095	3420 (3273–3560)	24.22	23.01 (22.07-23.94)	-5.00
Bladder	491	520 (468–580)	4.23	3.98 (3.54-4.43)	-5.91
Leukemias	333	330 (296-369)	3.90	3.69 (3.12-4.25)	-5.38
All cancers	14 736	16 290 (15832-16752)	139.28	133.41 (129.61–	-4.21
Mexico				137.22)	
Stomach	3289	3520 (3391–3643)	5.49	4.93 (4.76-5.11)	-10.20
Colorectum	3666	4130 (3922–4333)	6.16	5.80 (5.50-6.10)	-5.84
Pancreas	2077	2450 (2345–2551)	3.55	3.48 (3.33–3.63)	-1.97
Lung	4187	4040 (3855–4230)	6.99	5.58 (5.31-5.84)	-20.17
Prostate	6585	7680 (7416–7951)	10.21	9.79 (9.47–10.12)	-4.11
Bladder	795	830 (775–890)	1.29	1.11 (1.03–1.18)	-13.95
Leukemias	2439	2630 (2526–2733)	3.98	3.85 (3.69-4.01)	-3.27
All cancers	43 388	50 160 (49516-50806)	71.71	69.80 (68.96-70.64)	-2.66
Venezuela		· · · ·		- · · ·	
Stomach	1116	1100 (1011–1182)	8.34	6.66 (6.13-7.19)	-20.14
Colorectum	1020	1150 (1075–1224)	7.65	7.08 (6.62–7.54)	-7.45
Pancreas	508	560 (515-607)	3.85	3.46 (3.18–3.75)	-10.13
Lung	2039	2010 (1884–2136)	15.51	12.33 (11.57–13.09)	-20.50
Prostate	2767	3310 (3162–3467)	21.51	20.02 (19.10-20.95)	-6.93
Bladder	241	280 (243–312)	1.86	1.72 (1.50–1.94)	-7.53
Leukemias	558	560 (519–609)	3.96	3.68 (3.38–3.99)	-7.07
All cancers	14 014	16 300 (15864–16740)	105.52	100.88 (98.25-103.50)	-4.40

ASR, age-standardized (world population) mortality rate.

leukaemias showed modest declines in most countries, reaching predicted ASRs for 2023 below 4/100 000. Among women, ASRs for stomach and uterus cancer were declining over the whole period. Mortality trends

for uterine cancer declined substantially in all Latin American countries, although it remains among the top cancers with the highest rates observed in 2015–19 and predicted for 2023. Colorectal cancer trends were

Table 2 Number of predicted deaths and mortality rates per 100 000 women for the year 2023 and comparison figures for the quinquennium 2015–19, from the seven selected Latin American countries, with 95% prediction intervals and percent differences between rates

	Observed number	Predicted number of deaths	Observed	Predicted ASR 2023	% Difference
Cancer	of deaths 2015-19	2023 (95% prediction interval)	ASR 2015-19	(95% prediction interval)	2023 vs 2015-19
Argentina					
Stomach	1054	1100 (1023–1184)	2.91	2.77 (2.56-2.97)	-4.81
Colorectum	3671	3890 (3734–4047)	9.51	9.24 (8.89–9.6)	-2.84
Pancreas	2249	2450 (2347–2552)	5.77	5.67 (5.42–5.93)	-1.73
Lung	3160	3440 (3316–3561)	9.36	9.04 (8.70–9.38)	-3.42
Breast	5874	6200 (5965–6424)	17.40	16.51 (15.92–17.1)	-5.11
Uterus	2889		9.73		5.24
		3290 (3162-3424)		10.24 (9.79–10.69)	
Ovary	1220	1280 (1197–1355)	3.81	3.61 (3.38–3.84)	-5.25
Bladder	336	310 (268–356)	0.78	0.68 (0.59–0.77)	-12.82
Leukemias	823	840 (767–905)	2.57	2.40 (2.19–2.61)	-6.61
All cancers	31 068	33 070 (32022–34122)	89.11	86.13 (84.00-88.25)	-3.34
Brazil Stomach	5263	5740 (5536-5950)	3.62	3.29 (3.17-3.41)	-9.12
Colorectum	12 092	14 510 (14174–14840)	8.22	8.11 (7.94–8.29)	-1.34
Pancreas	5329	6370 (6164–6570)	3.60	3.48 (3.37–3.60)	-3.33
Lung					-9.21
	11 806	13 180 (12644–13715)	8.36	7.59 (7.27–7.91)	
Breast	16 766	19 470 (19005–19943)	12.22	12.12 (11.87–12.37)	-0.82
Uterus	10 008	11 520 (11223–11826)	7.37	7.29 (7.09–7.49)	-1.09
Ovary	3913	4480 (4330–4634)	2.87	2.74 (2.64–2.84)	-4.53
Bladder	1329	1490 (1423–1562)	0.84	0.74 (0.70-0.78)	-11.90
Leukemias	3244	3490 (3359–3615)	2.50	2.30 (2.2–2.40)	-8.00
All cancers	105 134	124 900 (123544–126247)	74.60	73.48 (72.68–74.27)	-1.50
Chile					
Stomach	1085	1160 (1088–1240)	6.30	5.61 (5.22-6.00)	-10.95
Colorectum	1414	1670 (1597-1751)	8.15	7.97 (7.6-8.35)	-2.21
Pancreas	783	910 (850-961)	4.70	4.50 (4.21-4.80)	-4.26
Lung	1320	1380 (1293–1461)	8.11	6.93 (6.48–7.37)	-14.55
Breast	1514	1570 (1495–1652)	10.15	8.77 (8.31–9.22)	-13.60
Uterus	956		6.64		
		930 (864–993)		5.43 (4.99-5.87)	-18.22
Ovary	488	520 (478–570)	3.45	3.18 (2.87–3.49)	-7.83
Bladder	184	200 (177–224)	0.99	0.87 (0.75–0.99)	-12.12
Leukemias	368	380 (338–411)	2.69	2.34 (2.02–2.65)	-13.01
All cancers	13 051	14 270 (13935–14607)	81.44	73.25 (71.47–75.03)	-10.06
Colombia					
Stomach	2040	2340 (2233–2441)	6.22	5.87 (5.62-6.13)	-5.63
Colorectum	2188	2490 (2361-2624)	6.67	6.3 (5.99-6.61)	-5.55
Pancreas	1002	1180 (1120-1234)	3.05	2.89 (2.75-3.04)	-5.25
Lung	1983	2110 (2006-2213)	6.05	5.13 (4.88-5.38)	-15.21
Breast	3272	3780 (3595–3956)	10.70	10.36 (9.84–10.88)	-3.18
Uterus	2357	2600 (2478–2728)	7.72	7.23 (6.86–7.60)	-6.35
Ovary	1079	1230 (1158–1295)	3.56	3.39 (3.19–3.59)	-4.78
Bladder	173	200 (175–225)	0.49	0.44 (0.39-0.50)	-10.20
Leukemias	892	940 (875–1002)	3.11	2.88 (2.67–3.10)	-7.40
All cancers	23 293	27 330 (26769–27887)	73.36	71.40 (70.1–72.7)	-2.67
Cuba Stomach	343	380 (336-415)	2.76	2.68 (2.35-3.01)	-2.90
Colorectum	1589	1670 (1584–1754)	12.05	11.11 (10.5–11.71)	-7.80
Pancreas	423	470 (423–523)	3.42	3.40 (3.05–3.76)	-0.58
Lung	2089	2340 (2221–2449)	18.08	17.20 (16.19–18.21)	-4.87
Breast	1585	1610 (1510–1714)	13.81	12.24 (11.23–13.26)	-11.37
Uterus	1183	1210 (1134–1295)	10.96	9.96 (9.06–10.87)	-9.12
Ovary	324	360 (322–402)	3.18	3.39 (2.95–3.83)	6.60
Bladder	175	190 (167–215)	1.27	1.28 (1.12–1.45)	0.79
Leukemias	265	250 (213-280)	2.90	2.34 (1.80-2.89)	-19.31
All cancers	10 892	11 930 (11633-12224)	94.51	90.24 (87.56-92.92)	-4.52
<i>A</i> exico				,	
Stomach	2876	3140 (3023-3249)	4.01	3.68 (3.54-3.82)	-8.23
Colorectum	3218	3540 (3383-3698)	4.51	4.09 (3.89–4.28)	-9.31
Pancreas	2261	2560 (2460-2653)	3.18	2.94 (2.82-3.06)	-7.55
Lung	2641	2810 (2693–2934)	3.69	3.24 (3.09–3.39)	-12.20
Breast	6789	8070 (7861–8278)	9.88	9.93 (9.68–10.19)	0.51
Uterus	5104	5680 (5513–5855)	7.39	7.00 (6.79–7.21)	-5.28
Ovary	2584	2640 (2445–2824)	3.81	3.25 (3.01-3.50)	-14.70
Bladder	339	330 (286–378)	0.44	0.34 (0.29-0.40)	-22.73
Leukemias	2095	2190 (2100-2289)	3.16	2.97 (2.83-3.10)	-6.01
All cancers	45 357	52 170 (51460-52876)	64.68	62.49 (61.61–63.37)	-3.39
enezuela					0.00
Stomach	684	790 (721–855)	4.22	3.94 (3.61-4.27)	-6.64
Colorectum	1052	1240 (1154–1316) 570 (526–606)	6.51	6.24 (5.83-6.65)	-4.15
Colorectum			3.22	2.85 (2.65–3.05)	-11.49
Pancreas	516				
Pancreas Lung	1498	1660 (1561–1766)	9.54	8.39 (7.83-8.94)	-12.05
Pancreas					

(Continued)

Cancer	Observed number of deaths 2015–19	Predicted number of deaths 2023 (95% prediction interval)	Observed ASR 2015-19	Predicted ASR 2023 (95% prediction interval)	% Difference 2023 vs 2015-19
Ovary	566	600 (550–640)	3.63	3.21 (2.96-3.46)	-11.57
Bladder	124	140 (122–166)	0.74	0.69 (0.57-0.80)	-6.76
Leukemias	416	430 (393–473)	2.67	2.54 (2.28-2.81)	-4.87
All cancers	13 610	16 490 (16063–16911)	85.83	86.54 (84.34-88.73)	0.83

ASR, age-standardized (world population) mortality rate.

favorable over the most recent calendar years, up to 2023. Female lung cancer showed increases over time in all selected countries; trends started to level off or decline over most recent periods, with favorable predicted ASRs for 2023. From 1970, breast cancer ASRs decreased in Argentina, Cuba, and Chile, while Brazil, Colombia, Mexico, and Venezuela showed a less favorable tendency, that levelled off in recent years. Rates remain exceedingly high (predicted ASR: 17.2/100 000) in Cuba. Ovarian cancer, bladder cancer, and leukaemias showed some declines, with values of predicted rates lower than 3.5/100 000 women.

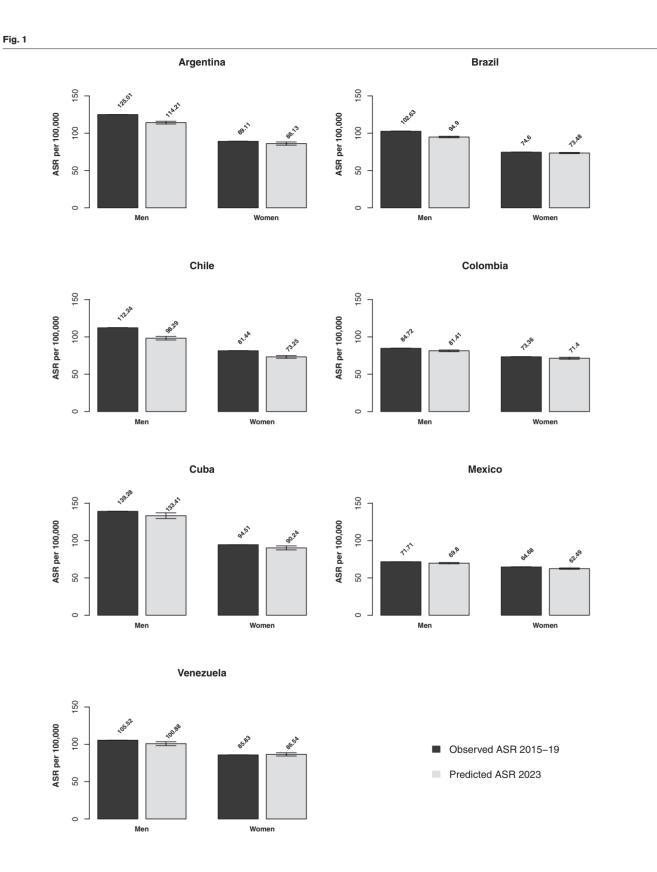
Table 3 reports ASRs from stomach cancer in both sexes at all ages and in three age groups (25–49, 50–64, and 65+ years) in the 2010–14, and 2015–19 quinquennia and predicted ASRs for 2023. Falls were observed and predicted in the middle-aged and elderly in both sexes in most countries. In the 25–49 years age group, declines were observed in men, but less consistently in women, whose rates are lower, thus suggesting a plateau may have been reached.

Figure 4 shows the estimated number of avoided cancer deaths in men and women between 1991 and 2023, assuming constant age-specific rates in 1990 (light grey area). Over the 33-year period considered, we estimated a total of over 379 100 total avoided cancer deaths in Argentina (228 400 in men and 150 700 in women), 220 400 deaths in Chile (90 400 in men and 130 100 in women), 225 500 avoided deaths in Colombia (115 200 in men and 140 300 in women), 21 100 avoided deaths in Cuba (10 500 in men and 10 700 in women), 400 000 avoided deaths in Mexico (159 900 in men and 240 100 in women), and 75 600 deaths in Venezuela (23 000 in men and 52 700 in women). No appreciable reductions in cancer deaths were observed in Brazil.

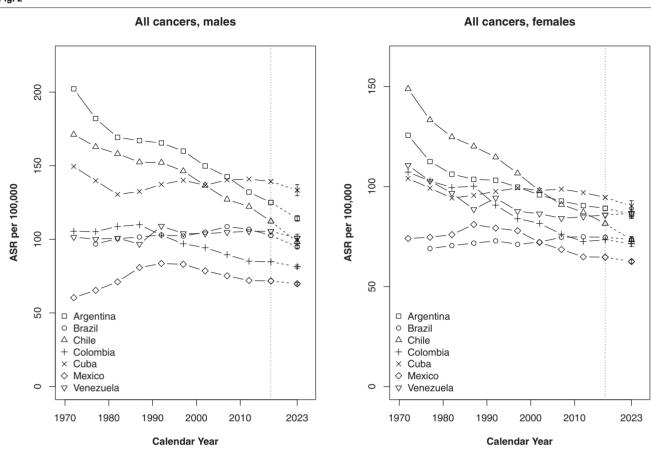
Discussion

Trends in cancer mortality in Latin American countries from all cancers and from most of the cancer sites analyzed in the present paper are predicted to be favorable, consistently with high-income areas worldwide (Sung *et al.*, 2021; Malvezzi *et al.*, 2023; Siegel *et al.*, 2023). Some exceptions were observed among women: ASRs for all cancers remained stable in Venezuela while we predicted increases in mortality rates for a few cancers among Cuban women. In spite of the generally favorable pattern, the number of cancer deaths was still increasing, due to population growth and ageing.

Stomach cancer remains a major cancer worldwide and is responsible for over 1 million new cases in 2020 and an estimated 769 000 deaths, ranking fifth for incidence and fourth for mortality globally (Sung et al., 2021). Compared to other areas worldwide. South American men ranked third for stomach cancer incidence (with rates around 12/100 000 men and 6/100 000 women), following Asian (32.5/100 000 men and 13.2/100 000 women) and East-European men (17/100 000 men and 7.1/100 000 women) (Sung et al., 2021; Pineros et al., 2022). In a recent analysis of gastric mortality trends conducted on 36 countries worldwide since the 1990s, Brazil and Chile ranked among the countries with trends of the highest rates during the considered period. Stomach cancer remains the first leading cause of cancer death among men in Chile and Colombia (Collatuzzo et al., 2023). Analyses for different age groups showed a less pronounced decrease in mortality trends in the young, particularly women, for most countries considered reflecting a levelling of low rates and possible unfavourable trends among young adults (Camargo et al., 2011; Anderson et al., 2018; Arnold et al., 2020; Heer et al., 2020; Santucci et al., 2021; Torres-Roman et al., 2022). Genetic factors also have a possible relevant impact on the young (Corso et al., 2020). Among Argentinian men, the percentage of cardia incidence was low and limited to 5% and in Chile, it was 12%, while corresponding figures for women were 3.5% and 8%, respectively. Chronic *Helicobacter pylori* infection is the key determinant of stomach cancer, in particular for noncardia cancers, which represent the higher proportion of cases in these areas (Plummer et al., 2015). The prevalence of *H. pylori* infection has been estimated at around 50% in Argentina and Mexico, and over 70% in Brazil and Chile (Hooi et al., 2017). Established risk factors beyond *H. pylori* include nonmodifiable exposures, such as male sex, family history of gastric cancer, carrying some genetic variants, or even living in high-altitude countries, which is probably a surrogate for host genetic, bacterial, dietary, and environmental factors that may cluster in the mountainous regions (Torres et al., 2013; Boldo et al., 2022), but also lifestyle factors such as tobacco smoking, alcohol use, high consumption of red and processed beef (Nikitina et al., 2023) meat, and high-sodium diet (Bonequi et al., 2013; Praud et al., 2018; Arnold et al., 2020; Deng et al., 2021; Boldo et al., 2022). In addition, populations in



Bar plots of age-standardized (world population) mortality rates (ASR) per 100 000 persons for the year 2018 and predicted ASR for 2023 with 95% prediction intervals for all cancers combined according to sex in Argentina, Brazil, Chile, Colombia, Cuba, Mexico, and Venezuela.



Age-standardized (world population) mortality rates (ASRs) in quinquennia from 1970 to 2019 and predicted ASRs for 2023, with 95% prediction intervals for all cancers combined according to sex in Argentina, Brazil, Chile, Colombia, Cuba, Mexico, and Venezuela, in men and women.

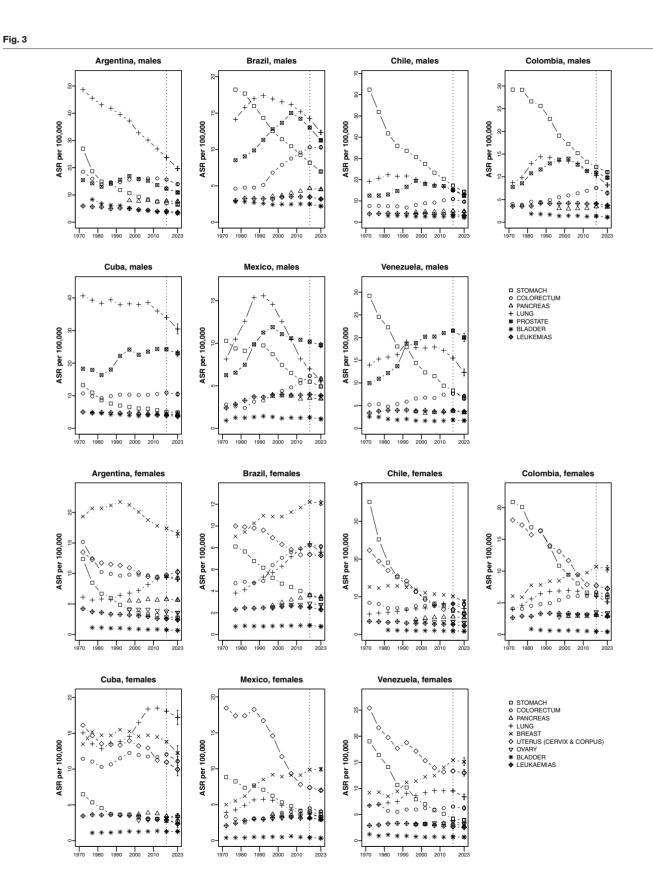
mountainous areas tend to be of lower socioeconomic status, which is a recognized determinant risk for gastric cancer (Rota *et al.*, 2020).

Conversely, higher levels of education and fruit and total vegetable consumption are associated with a moderately decreased risk. The decline in mortality from gastric cancer observed and predicted in both sexes and all Latin American countries considered is attributable to favorable changes of these modifiable and nonmodifiable factors for this neoplasm, including a decreased prevalence of *H. pylori* and improvements in the preservation and storage of foods.

Colorectal cancer mortality ranked third in the countries analyzed. Argentina showed the highest rates compared to the other Latin American countries as well as to other areas worldwide (Malvezzi *et al.*, 2023; Siegel *et al.*, 2023). This is consistent with its economic development and the extent of westernization. Moreover, Argentina is among the countries with the highest incidence and mortality rates for colorectal cancer in South America (following those from Uruguay), with two-fold excess rates as compared to Mexico. Among the major aetiological factors for this neoplasm, there are overweight, obesity, a sedentary lifestyle, tobacco smoking, and high consumption of red meat; conversely physical activity and a diet rich in fibres can play a positive role (Buamden, 2018; Siegel *et al.*, 2019). Relatively low tobacco smoking in these countries may have played some role, too. The geographic variations in rates observed within these countries are probably due to differences in the prevalence of obesity, physical inactivity, and diet, as well as improvements in early diagnosis and treatments and healthcare infrastructure (Siegel *et al.*, 2019; Stern *et al.*, 2019).

Despite the favorable pattern observed and predicted for lung cancer mortality, it remains the leading cause of cancer mortality in Latin Americas, highlighting the need to intensify tobacco control programs (Prado-Galbarro *et al.*, 2020) and improve access to diagnosis and treatment (Raez *et al.*, 2018a). Mortality rates for lung cancer in Latin America are lower compared to those from other areas worldwide, particularly in Mexico (Hashim *et al.*, 2016; Malvezzi *et al.*, 2023; Siegel *et al.*, 2023), due to the historically low levels of smoking in these countries (Raez *et al.*, 2018b; Thomson *et al.*, 2021), except for

Fig. 2

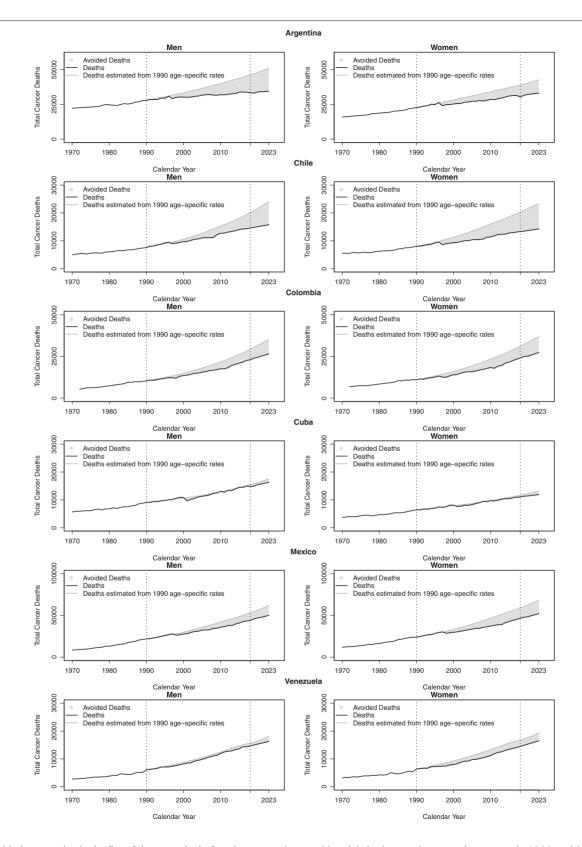


Age-standardized (world population) mortality rates (ASRs) in quinquennia from 1970 to 2019 and predicted ASRs for 2023, with 95% prediction intervals for the considered cancer sites in the seven selected Latin American countries, according to sex.

 Table 3
 Age-standardized stomach cancer mortality rates in selected Latin American countries in men and women at all ages and at different age groups during 2010–14 and 2015–

 19 periods and predicted age-standardized mortality rates for 2023 and the corresponding prediction intervals, along with percentage differences between 2015–19 and 2023

ASR ASR Predicted ASR 2023 % Difference 2023 vs ASR ASR 2010-14 2015-19 (95%) prediction interval) 2015-19 2015-19 2015-19 2015-19 2015-19 1801 754 713 6.48 (6.19-6.78) -9.12 316 291 2015-19 1801 17207 165 (15.55-18.11) -5.279 21.70 232 1801 17207 1683 (15.55-18.11) -5.277 21.70 232 1801 17207 1683 (15.55-18.11) -5.277 21.70 232 1801 17207 1863 (15.55-18.11) -5.277 21.70 21.70 1812 28.56 -1.2787 190 13.20 13.81 792.29 61.1712 -1.2787 13.92 231.70 231.70 792.29 61.1712 13.66 (12.55-50.80) -1.22.21 13.91 27.85 792.29 13.11 13.016 (21.5-55.21) -1.12.21 2.47 2.31 2.31 792.20 17.18	ASR ASR ASR Predictec 2010-14 2015-19 (95%) pred 295 231 2.18 1.63 (1 49 years 2.31 1.53 (1 1.63 (1 49 years 2.31 1.52 58.22 53.58 (5 927 8.18 6.48 (6 5.98 (5 5.98 (5 927 9.27 8.18 6.98 (7 5.35 (5) (1 928 9.27 8.18 6.98 (7 5.35 (5) (1 94 years 2.206 19.77 16.37 (1) (1 55.86 (7 94 years 2.0.37 17.18 14.31 (1) (1) (10 130.67 130.86 0.86 (6) (8) (8) (8) (8) (8) (8) (8) (8) (8) (8	% Difference 2023 vs 2015–19 -9.12 -6.40 -7.97 -7.97 -14.67 -14.67 -14.67 -19.22 -19.22 -16.71	ASR 2010-14 3.16 7.92 22.79 4.01 1.90 8.84 8.84	ASR 2015-19 2.91 1.32 7.34 21.70 3.62 8.29 8.29	Predicted ASR 2023 (95% prediction interval) 2.77 (2.56–2.97) 1.06 (0.81–1.31) 7.57 (6.69–8.46) 20.39 (18.28–22.49) 3.29 (3.17–3.41) 1.76 (1.67–1.91) 8.27 (7.55–8.79) 2.3.15 (21.86–24.43)	% Difference 2023 vs 2015-19 -4.81 -19.70 3.13 -6.04 -6.04 -6.04 -0.24 -16.21 -16.21 -16.21 -10.95 3.03 -10.95
Int Total 6.48 (6.19-6.78) -9.12 3.16 2.91 05 wars 2.34 7.13 6.48 (6.19-6.78) -9.12 3.16 2.91 05 wars 1.52 5.822 5.655-16.65) -7.87 2.279 2.170 9 wars 1.52 5.822 5.856 (5.25-56.65) -7.87 2.279 2.170 9 wars 2.60 1.32 5.836 (5.25-56.65) -7.87 2.279 2.170 9 wars 2.60 1.33 5.818 (5.35-57.65) -1.457 4.01 3.82 9 wars 2.60 1.917 5.856 (5.3-57.63) -1.922 3.13 2.376 9 wars 2.037 1.316 1.316 (1.65-1.905) -1.922 3.13 2.376 9 wars 19.567 1.316 (1.95-5.22) -1.1021 7.49 5.57 9 wars 13.30 12.18 11.01 (1061-11.41) -9.61 6.82 6.32 9 wars 13.30 12.18 1.101 (1061-11.41) -9.61 6.82 6.32 </th <th>ina ges 2.31 2.18 1.63 (1. 64 years 19.01 17.97 16.82 (15 9 years 19.01 17.97 16.82 (15 9 years 19.01 17.97 16.82 (15 9 years 2.60 59.14 55.85 (5 6 years 2.206 19.77 18.37 (17 9 years 2.0.37 17.18 14.31 (13 9 years 4.01 3.36 2.98 (2 6 years 4.01 3.36 2.98 (2 195.87 17.18 14.31 (13 9 years 4.112 36.77 32.16 (2 190.86 19.58 (10.10 10.101 (10 10.101 (10 10.110 20.83 17.18 14.31 (13 11.01 (10 10.110 20.83 17.18 14.31 (13 13.30 12.18 14.31 (13 9 years 4.01 3.36 2.98 (2 10.110 10 10 10.110 20.83 17.18 14.31 (13 11.01 (10 10.110 20.86 12.18 14.41 (3 13.30 12.18 11.01 (10 10.110 10 10.110 20.86 12.18 11.01 (10 10.101 10 10.110 20.81 12.18 11.01 (10 10.101 10 10.110 20.81 12.18 11.01 (10 10.101 10 10.101 10 10.101</th> <th>-9.12 -25.23 -6.40 -7.97 -14.67 -12.77 -19.22 -16.71 -11.31</th> <th>3.16 1.60 2.22.79 4.01 1.90 3.1.91</th> <th>2.91 7.34 21.70 3.62 8.29 7.63</th> <th>2.77 (2.56–2.97) 1.06 (0.81–1.31) 7.57 (6.69–8.46) 20.39 (18.28–22.49) 3.29 (3.17–3.41) 1.79 (1.67–1.91) 8.27 (775–8.79) 23.15 (21.86–24.43)</th> <th>-4.81 -19.70 3.13 -6.04 -6.04 -3.76 -0.24 -16.21 -16.21 -10.95 3.03 3.03</th>	ina ges 2.31 2.18 1.63 (1. 64 years 19.01 17.97 16.82 (15 9 years 19.01 17.97 16.82 (15 9 years 19.01 17.97 16.82 (15 9 years 2.60 59.14 55.85 (5 6 years 2.206 19.77 18.37 (17 9 years 2.0.37 17.18 14.31 (13 9 years 4.01 3.36 2.98 (2 6 years 4.01 3.36 2.98 (2 195.87 17.18 14.31 (13 9 years 4.112 36.77 32.16 (2 190.86 19.58 (10.10 10.101 (10 10.101 (10 10.110 20.83 17.18 14.31 (13 11.01 (10 10.110 20.83 17.18 14.31 (13 13.30 12.18 14.31 (13 9 years 4.01 3.36 2.98 (2 10.110 10 10 10.110 20.83 17.18 14.31 (13 11.01 (10 10.110 20.86 12.18 14.41 (3 13.30 12.18 11.01 (10 10.110 10 10.110 20.86 12.18 11.01 (10 10.101 10 10.110 20.81 12.18 11.01 (10 10.101 10 10.110 20.81 12.18 11.01 (10 10.101 10 10.101	-9.12 -25.23 -6.40 -7.97 -14.67 -12.77 -19.22 -16.71 -11.31	3.16 1.60 2.22.79 4.01 1.90 3.1.91	2.91 7.34 21.70 3.62 8.29 7.63	2.77 (2.56–2.97) 1.06 (0.81–1.31) 7.57 (6.69–8.46) 20.39 (18.28–22.49) 3.29 (3.17–3.41) 1.79 (1.67–1.91) 8.27 (775–8.79) 23.15 (21.86–24.43)	-4.81 -19.70 3.13 -6.04 -6.04 -3.76 -0.24 -16.21 -16.21 -10.95 3.03 3.03
Quest 2.31 2.16 1.03 ($1.02 - 5.6$ (1.03) -5.40 7.27 2.79 1.20 64 years 61.52 81.8 6.82 ($15.53 - 1811$) -5.40 7.29 7.79 2.79 2.79 2.74 99 years 9.77 81.8 6.88 ($6.8 - 7.53$) -14.87 4.01 3.82 2.06 1.37 2.79 2.79 2.79 2.79 2.74 2.76 2.74 2.74 2.74 2.74 2.74 2.74 2.74 2.74 2.74 2.74 2.74 2.74 2.74 2.74 <	49 years 2.31 2.18 1.63 (1) 49 years 19.01 17.97 53.58 (50 9 years 61.52 58.22 53.58 (50 64 years 9.27 8.18 6.98 (6 64 years 2.60 19.77 16.82 (15 64 years 2.60 19.77 16.82 (17 9 years 2.60 19.77 18.37 (17 9 years 2.60 19.77 18.37 (17 9 years 2.037 17.18 14.31 (13 9 years 20.037 17.18 14.31 (13 9 years 20.037 17.18 14.31 (13 9 years 40.1 36.77 13.086 9 years 195.87 161.65 13 9 years 15.57 5.08 13 9 years 30.74 28.35 26 9 years 30.74 28.35 26 9 years 10.102 99.35 86.9 (83 9 years 10.102 99.35 86.9 (83 9 years 1.21 12.81 11.01 (10 9 years 1.21 12.83 11.01 (10 9 years 1.21 12.83 11.192 9 years 1.23	-25.12 -25.12 -6.40 -7.97 -14.67 -12.77 -12.77 -12.77 -12.54 -12.54		1.32 7.34 21.70 3.62 8.29 9.763	1.06 (0.81–1.31) 7.57 (6.69–8.46) 20.39 (18.28–22.49) 3.29 (3.17–3.41) 1.79 (1.67–1.91) 8.27 (775–8.79) 23.15 (21.86–24.43)	-19.70 3.13 -6.04 -9.12 -9.12 -16.24 -16.21 -10.95 3.03 3.03
64,760 $70,7$ $70,$	64 years 19.01 17.97 16.82 (15) 9 years 9.27 8.18 6.98 (6) 9 years 9.27 8.18 6.98 (6) 9 years 2.60 2.35 53.56 (5) 9 years 2.60 19.77 18.37 (1) 9 years 2.60 19.77 18.37 (1) 9 years 22.06 69.14 55.85 (5) 9 years 20.37 17.18 14.31 (1) 9 years 40.1 36.77 13.086 (1) 9 years 40.1 36.77 13.086 (2) 9 years 40.1 36.77 13.086 (2) 9 years 195.87 161.65 130.86 9 years 15.87 161.65 130.86 9 years 10.1 28.35 26.93 9 years 10.1 12.18 11.01 (10 9 years 10.1 12.83 11.01 (10 9 years 12.1 12.33 11.1 (9.2 9 years 12.83 2.8.3	-6.40 -7.97 -7.97 -1.2.77 -19.22 -19.22 -11.31 -11.31	7,92 22.79 4.01 8.84 8.191	7.34 21.70 3.62 1.86 8.29 8.29	7.57 (6.69–8.46) 20.39 (18.28–22.49) 3.29 (3.17–3.41) 1.79 (1.67–1.91) 8.27 (775–8.79) 23.15 (21.86–24.43)	3.13 -6.04 -9.12 -9.12 -0.24 -16.21 -10.95 3.03 3.03 -1.4.92
years 61.52 58.22 53.36 (50.52-56.65) -7.37 2.770 2.170 2.170 64 years 2.06 2.35 5.05 (189-1205) -14.67 4.01 3.62 64 years 2.06 2.35 5.05 (189-1205) -14.67 4.01 3.62 94 years 2.06 2.35 5.05 (189-1205) -19.22 31.91 2.763 94 years 2.06 13.71 5.565 (5.3-578) -19.22 31.91 2.763 95 years 2.037 17.18 14.31 (13.55-15.06) -16.71 7.49 5.763 94 years 4.01 3.36 2.98 (21-2.384) -11.31 2.47 2.49 5.763 94 years 19.17 16.165 139.13) -11.31 2.49 5.76 94 years 19.31 11.11.02 99.35 2.67.4 (24.88-26.0) -12.53 3.51 2.76 96 years 12.11 11.01 (10.61-11.41) -96.1 6.67 6.73 3.24 2.93 3.24 2.93<	years 61.52 58.22 53.58 (50 ges 9.27 8.18 6.98 (6 64 years 2.66 2.35 2.05 (1, 79.29 69.14 55.85 (5 64 years 2.2.06 19.77 18.37 (13 ges 2.0.37 17.18 14.31 (13 ges 2.0.37 17.18 14.31 (13 9 years 4.01 3.6.77 13.01.62 195.87 15.16 195.87 161.65 130.86 195.87 195.87 161.65 130.86 195.8 195.87 161.65 130.86 195.8 195.87 15.18 11.01 (10 ges 15.57 5.08 4.84 (4. 26.49 11.102 99.35 86.9 (83. 9 years 1.21 12.28 11.192, 9 years 5.66 5.49 4.93 (4. 39 years 1.21 12.81 11.102, 9 years 2.27 2.24 2.33 (2.12,33 (11,92,16) 10.90 11.90 10.10 10	-7.97 -14.67 -12.77 -12.77 -19.22 -19.22 -11.31 -11.31	22.79 4.01 8.84 3.191	21.70 3.62 1.86 8.29 27.63	20.39 (18.28-22.49) 3.29 (3.17-3.41) 1.79 (1.67-1.91) 8.27 (775-8.79) 23.15 (21.86-24.43)	-6.04 -9.12 -3.76 -0.24 -16.21 -10.95 3.03 3.03
ges 9.27 8.18 6.98 (6.81-715) -14.57 4.01 3.62 44 years 2.06 19.77 18.37 (1769-19.05) -12.77 1.90 1.36 64 years 2.06 19.77 18.37 (1769-19.05) -16.71 7.09 8.29 years 73.20 99.14 55.65 (5.30-57.8) -19.22 31.91 2.76 years 20.37 17.16 14.31 (13.55-15.06) -16.71 7.49 6.30 ges 20.37 7176 13.31 (13.55-15.06) -16.71 7.49 56.79 years 401 3.36 12.98 (12.15.9) -116.55 13.47 2.31 years 195.67 161.65 10.17 (106-11.41) -96.1 6.62 6.22 ba 357 35.1 161.165 110.1 (106-11.41) -96.1 6.30 2.76 ba 357 35.1 13.16 13.66 (2.3.9-2.22) -12.54 13.47 2.31 ba 357 357 351	ges 9.27 8.18 6.98 (6) 49 years 2.60 2.35 2.05 (1) 64 years 22.06 19.77 18.37 (1) years 22.06 19.77 18.37 (1) years 22.06 19.77 18.37 (1) ges 20.37 17.18 14.31 (1) ges 20.37 17.18 14.31 (1) years 401 3.36 2.98 (2) years 40.1 3.36 2.98 (2) years 41.12 3.677 32.16 (3) bla 195.87 161.65 11.01 (10 ges 13.30 12.18 11.01 (10 ges 13.30 12.18 11.01 (10 ges 1.21 12.83 11.01 (10 ges 1.21 12.83 11.01 (10 ges 5.57 5.08 4.94 (4) years 1.23 12.33 23.16 (2) ges 5.57 5.08 4.94 (4)	-14.67 -12.77 -12.77 -19.22 -11.31 -11.31	4.01 1.90 8.84 31.91	3.62 1.86 8.29 27.63	3.29 (3.17–3.41) 1.79 (1.67–1.91) 8.27 (7.75–8.79) 23.15 (21.86–24.43)	-9.12 -3.76 -0.24 -16.21 -10.95 3.03 3.03
ges 9.27 8.18 $6.98 (6.81 - 7.15)$ -14.67 4.01 3.62 64 years 2.66 2.37 16.71 $18.37 (1769 - 2.02)$ -70.87 18.91 12.77 18.9 12.92 31.91 2.768 years 22.06 90.14 $55.56 (53.9 - 57.8)$ -16.71 7.49 6.30 40 years 20.37 17.18 $14.31 (13.55 - 15.06)$ -16.71 7.49 6.30 40 years 20.37 17.18 $14.31 (13.55 - 15.06)$ -11.531 2.76 8.17 401 33.67 $22.93 (212 - 38.4)$ -11.531 2.49 6.30 401 3.367 $22.98 (212 - 32.9)$ -16.71 7.49 6.30 940 81.33 $11.01 (10.61 - 11.41)$ -9.61 68.77 56.78 407 33.70 4771 4.71 4.71 4.71 5.77 400 2.76 9.93 $11.01 (10.61 - 11.41)$ -9.61 $68.$	ges 9.27 8.18 6.98 (6) 49 years 2.60 2.35 2.05 (1) 9 years 2.206 19.77 18.37 (17) 9 years 2.206 19.77 18.37 (17) 9 years 2.206 19.77 18.37 (17) 9 years 79.29 69.14 55.85 (5) 9 years 4.01 3.36 2.98 (2) 49 years 4.01 3.36 2.98 (2) 9 years 195.87 161.65 130.06 (2) 9 years 195.87 161.65 130.06 (2) 9 years 13.30 12.18 11.01 (10 9 years 30.74 28.35 26.43 9 years 111.02 99.35 86.9 (8) 9 years 111.02 99.35 86.9 (8) 9 years 1.21 1.281 11.61 (0) 9 years 1.21 1.233 11.93 (36) 9 years 1.551 12.28 4.33 (4) 9 years 5.66 <t< td=""><td>-14.67 -12.77 -7.08 -19.22 -19.22 -11.31 -11.31</td><td>4.01 1.90 8.84 31.91</td><td>3.62 1.86 8.29 27.63</td><td>3.29 (3.17–3.41) 1.79 (1.67–1.91) 8.27 (7.75–8.79) 23.15 (21.86–24.43)</td><td>-9.12 -9.76 -0.24 -16.21 -10.95 3.03 3.03</td></t<>	-14.67 -12.77 -7.08 -19.22 -19.22 -11.31 -11.31	4.01 1.90 8.84 31.91	3.62 1.86 8.29 27.63	3.29 (3.17–3.41) 1.79 (1.67–1.91) 8.27 (7.75–8.79) 23.15 (21.86–24.43)	-9.12 -9.76 -0.24 -16.21 -10.95 3.03 3.03
40 years 2.60 2.35 $2.05 (189-222)$ -12.77 190 186 64 years 79.20 19.77 $55.85 (736-19.05)$ -7.08 8.29 2.93 years 79.20 69.17 $55.85 (736-19.05)$ -16.71 749 6.30 ges 20.37 1718 $14.31 (1355-15.06)$ -116.71 749 6.30 delyears 40112 336 $2.98 (212-3.84)$ -1131 2.47 2.31 delyears 40112 336 $2.98 (212-3.84)$ -1131 2.77 2.31 delyears 40112 336 $2.98 (212-3.84)$ -1131 2.73 2.73 delyears 40112 3367 2.731 2.47 2.31 delyears 13.30 12.18 $11.01 (1061-11.41)$ -9.61 6.77 2.50 delyears 13.30 12.18 $11.01 (1061-11.41)$ -9.61 6.77 2.678 delyears 31.33	49 years 2.60 2.35 2.05 (1) 9 years 22.06 19.77 18.37 (17) years 79.29 69.14 55.85 (5) ges 20.37 17.18 14.31 (13) ges 20.37 17.18 14.31 (13) ges 20.37 17.18 14.31 (13) 49 years 4.01 3.36 2.98 (2) bia 195.87 161.65 13.086 bia 13.30 12.18 11.01 (10) 99 years 4.67 4.71 3.216 (2) 49 years 111.02 99.355 86.9 (8) 99 years 1.2.18 11.01 (10) 49 years 111.02 99.355 86.9 (8) 99 years 1.2.81 11.61 (0) 99 years 1.2.81 11.61 (0) 94 years 1.2.81 1.34 (3) 99 years 5.57 5.08 4.93 (4) 99 years 5.66 5.49 4.93 (4) 99 years <t< td=""><td>-12.77 -7.08 -19.22 -16.71 -11.31 -12.54</td><td>1.90 8.84 31.91</td><td>1.86 8.29 27.63</td><td>1.79 (1.67–1.91) 8.27 (7.75–8.79) 23.15 (21.86–24.43)</td><td>-3.76 -0.24 -16.21 -16.21 3.03 3.03 3.03 -1.4.92</td></t<>	-12.77 -7.08 -19.22 -16.71 -11.31 -12.54	1.90 8.84 31.91	1.86 8.29 27.63	1.79 (1.67–1.91) 8.27 (7.75–8.79) 23.15 (21.86–24.43)	-3.76 -0.24 -16.21 -16.21 3.03 3.03 3.03 -1.4.92
Vertical (3, 20.6) 19.77 18.37 ($17.69 - 19.05$) -7.08 8.84 8.29 years 79.29 69.14 55.85 ($53.9 - 57.8$) -19.22 31.91 27.63 ges 20.37 17.18 14.31 ($13.55 - 15.06$) -16.71 7.49 6.30 ges 20.37 17.18 14.31 ($12.55 - 1.9.05$) -11.31 2.747 6.30 years 14.12 33.36 22.16 ($281 - 55.22$) -12.52 -13.36 12.11 years 133.30 12.18 11.01 ($10.61 - 11.41$) -9.61 68.77 56.78 56.78 ges 133.30 12.18 11.01 ($10.61 - 11.41$) -9.61 68.77 56.78 53.20 47.31 years 13.30 12.18 11.01 ($10.61 - 11.41$) -6.37 33.52 47.31 years 11.102 28.64 ($3.89 - 5.29$) -5.78 33.76 27.76 years 11.102 28.64 ($3.89 - 5.29$) -4.72	64 years 22.06 19.77 18.37 (17) 18.37 (17) years 79.29 69.14 55.85 (5) ges 20.37 17.18 14.31 (13) ges 4.01 3.36 2.98 (2) years 4.01 3.36 2.98 (2) years 4.01 3.6.77 130.86 years 4.1.12 3.6.77 130.86 years 4.1.12 3.6.77 130.86 bla 11.101 105.87 10.101 (10 49 years 1.1.01 9.9.35 86.9 (83) years 1.2.18 11.01 (10 49 years 1.21 1.2.8 1.61 (0) 64 years 1.21 1.2.8 1.61 (0) 99.35 5.08 1.69 (83) 1.61 (0) 99.46 1.2.81 1.161 (0) 4.41 (3) 64 years 1.2.1 12.28 1.161 (0) 99.35 5.66 5.49 4.93 (4) 99 1.2.3 12.81	-7.08 -19.22 -16.71 -11.31 -12.54	8.84 31.91	8.29 27.63	8.27 (7.75–8.79) 23.15 (21.86–24.43)	-0.24 -16.21 -10.95 3.03 -1.1.92
years 79.29 69.14 55.85 (53–57.8) -19.22 31.91 27.63 ges 20.37 17.18 14.31 (13.55–15.66) -16.71 7.49 6.30 49 years 40.1 3.36 2.98 (2.12–35.22) -11.31 2.47 2.31 years 195.87 161.65 13.05.86 (12.59- -19.05 68.77 56.78 years 195.87 161.65 130.086 (12.59- -19.05 68.77 56.78 years 193.13 12.18 11.01 (10.61-11.41) -9.61 68.77 56.78 bia 133.00 12.18 11.01 (10.61-11.41) -9.61 68.77 56.78 years 457 4.71 24.14 3.86 7.77 57.78 3.51 3.51 years 11.02 99.35 26.48 - 28.6) -16.57 3.51 3.52 4.73 years 11.102 99.35 26.44 (4.395 - 22.9) -12.53 3.51 3.51 3.57 years 11.102	years 79.29 69.14 55.85 (5 ges 20.37 17.18 14.31 (13 ges 4.01 3.6.77 3.216 (22 49 years 4.1.12 3.6.77 32.16 (22 64 years 4.1.12 3.6.77 32.16 (22 95.87 161.65 13.086 13 bia 195.87 161.65 130.86 bia 13.30 12.18 11.01 (10 49 years 4.67 4.71 4.41 (3) 64 years 30.74 28.35 86.9 (83) 99.35 99.35 86.9 (83) 10.1 (10 49 years 1.21 12.81 11.01 (10 99.35 99.35 86.9 (83) 11.02 99.35 12.81 11.1 (9.2) 11.02 99.35 99.35 86.9 (83) 11.01 (10 64 years 1.23 12.33 11.1 (9.2) 91 12.83 12.83 11.1 (9.2) 91 12.83 12.83	-19.22 -16.71 -11.31 -12.54	3191	27.63	23.15 (21.86–24.43)	-16.21 -10.95 3.03 -14.92
ges 20.37 17.18 14.31 (13.55-15.06) -16.71 7.49 6.30 49 years 401 3.36 2.98 (2.12-3.84) -11.31 2.47 5.78 49 years 401 3.36 2.98 (2.12-3.84) -11.31 2.47 5.78 years 19.57 19.56 19.61 (22.59- -19.05 68.77 5.678 bla 133.10 12.18 11.01 (10.61-1.1.41) -9.61 6.62 6.22 ges 133.0 12.18 11.01 (10.61-1.1.41) -9.61 6.62 6.22 dyvers 30.74 2.835 26.9 (83.06-90.74) -17.53 3.51 3.52 years 11.102 99.35 86.9 (83.06-90.74) -17.53 3.56 2.76 years 11.102 99.35 86.9 (83.06-90.74) -17.33 3.37 3.347 years 11.102 99.35 86.9 (83.06-90.74) -17.53 3.36 2.76 ges 557 50.8 (4.39-5.29) -12.53 </td <td>ges 20.37 17.18 14.31 (13) 49 years 4.01 3.3.6 2.9.8 (2.) 64 years 4.01 3.6.77 32.16 (2) 64 years 4.1.12 3.6.77 32.16 (2) 15 195.87 161.65 13.086 16 195.87 161.65 13.086 17 13.30 12.18 11.01 (10) 16 4.67 4.71 4.41 (3.) 64 years 30.74 29.35 86.9 (83.) 99 ars 30.74 29.35 86.9 (83.) 99 ars 1.2.18 11.01 (10) (10) 64 years 1.21 12.81 11.01 (10) 99 ars 1.2.1 12.81 11.09.2 91 years 1.2.1 12.81 11.03.2 91 years 1.2.65 1.2.81 11.10.2 91 years 2.27 2.27 2.3.3 (21) 91 years 2.66 5.49 4.93 (4.) 91 years 2.65 4.3.63<!--</td--><td>-16.71 -11.31 -12.54</td><td></td><td></td><td></td><td>-10.95 3.03 -11.12</td></td>	ges 20.37 17.18 14.31 (13) 49 years 4.01 3.3.6 2.9.8 (2.) 64 years 4.01 3.6.77 32.16 (2) 64 years 4.1.12 3.6.77 32.16 (2) 15 195.87 161.65 13.086 16 195.87 161.65 13.086 17 13.30 12.18 11.01 (10) 16 4.67 4.71 4.41 (3.) 64 years 30.74 29.35 86.9 (83.) 99 ars 30.74 29.35 86.9 (83.) 99 ars 1.2.18 11.01 (10) (10) 64 years 1.21 12.81 11.01 (10) 99 ars 1.2.1 12.81 11.09.2 91 years 1.2.1 12.81 11.03.2 91 years 1.2.65 1.2.81 11.10.2 91 years 2.27 2.27 2.3.3 (21) 91 years 2.66 5.49 4.93 (4.) 91 years 2.65 4.3.63 </td <td>-16.71 -11.31 -12.54</td> <td></td> <td></td> <td></td> <td>-10.95 3.03 -11.12</td>	-16.71 -11.31 -12.54				-10.95 3.03 -11.12
ges 2.37 17.18 $1.4.31(13.55-15.06)$ -16.71 7.49 6.30 years 4.01 3.36 $2.98(2.12.59-1)$ -11.31 2.47 5.678 years 41.12 38.77 $2.98(2.12.59-1)$ -11.31 2.47 5.678 years 41.12 38.77 $2.98(2.12.59-1)$ -19.05 68.77 56.78 64 years 11.01 $10.61-11.41$ -9.61 6.62 6.22 457 4.71 4.71 $2.44(3.88-28.6)$ -6.37 3.51 3.57 49 years 3.074 28.35 $68.9(36-90.74)$ -12.53 53.20 47.31 70.74 28.35 $66.74(24.88-28.6)$ -12.53 53.20 47.31 70.74 28.35 $66.74(24.88-28.6)$ -12.53 53.20 47.31 70.74 $28.366-90.74$ -12.53 68.2 68.2 68.2 68.2 68.2 70.74 6.56 <td< td=""><td>ges 20.37 17.18 14.31 (13 14.31 (13 14.31 (13 14.31 (13 14.31 (13 14.31 (13 14.31 (13 14.31 (13 14.31 (13 13.36 13.36 (16) 13.016 (20) 13.016 (2</td><td>-16.71 -11.31 -12.54</td><td></td><td></td><td></td><td>-10.95 3.03 -11.12</td></td<>	ges 20.37 17.18 14.31 (13 14.31 (13 14.31 (13 14.31 (13 14.31 (13 14.31 (13 14.31 (13 14.31 (13 14.31 (13 13.36 13.36 (16) 13.016 (20) 13.016 (2	-16.71 -11.31 -12.54				-10.95 3.03 -11.12
401 3.36 $2.98 (2.12-3.84)$ -11.31 2.47 2.31 49 years 195.87 161.65 130.130 -12.54 11.31 2.47 2.31 years 155.87 161.65 130.130 -12.54 13.36 2.37 56.78 2.31 bia 133.0 12.18 11.01 (106-11.44) -9.61 6.62 6.22 6.73 35.7 35.7 56.78 33.47 bia 33.07 2.33 12.18 $11.01 (106-11.44)$ -9.61 6.62 6.22 6.22 typears 4.67 4.71 $4.41 (388-4.93)$ -6.37 33.51 35.7	49 years 4.01 3.36 2.98 (2.) 64 years 41.12 36.77 32.16 (2) years 195.87 161.65 130.86 years 195.87 161.65 130.86 ibia 13.30 12.18 11.01 (10 ges 13.30 12.18 11.01 (10 49 years 3.074 28.35 26.74 (2) 49 years 111.02 99.35 86.9 (8) 49 years 112.1 12.81 11.61 (0) 64 years 11.21 12.81 11.61 (0) 99.35 5.57 5.08 4.84 (4) 99.49 1.21 1.281 11.61 (0) 64 years 1.51 1.281 11.61 (0) 64 years 1.53 12.81 11.92 99.35 5.66 5.49 4.93 (4) 64 years 1.53 12.81 11.92 9 years 1.2.81 11.62 1.33 (3) 9 years 5.66 5.49 4.93 (3) 9 years 5.65 5.49 4.93 (3) 9 years 1.2.63 12.51 12.33 (2) 9 years 12.63 12.63 2.3 (2) 9 years 12.63 <td>-11.31 -12.54 -0.05</td> <td>7.49</td> <td>6.30</td> <td>5.61 (5.22–6)</td> <td>3.03 </td>	-11.31 -12.54 -0.05	7.49	6.30	5.61 (5.22–6)	3.03
64 years 41.12 36.77 32.16 (29.1–35.22) -12.54 14.36 12.11 years 195.87 161.65 130.86 (12.59- -19.05 68.77 56.78 12.11 bia 13.30 12.18 11.01 (10.61-11.41) -9.61 6.62 6.22 6.78 56.78	64 years 41.12 36.77 32.16 (2) ·years 195.87 161.65 13.086 bia 13.30 12.18 11.01 (10 def years 3.0.74 28.35 26.74 (2) 49 years 3.0.74 28.35 26.74 (2) 49 years 3.0.74 28.35 26.74 (2) ·years 111.02 99.35 86.9 (83) ·years 111.02 99.35 86.9 (83) ·years 1.21 1.28 1.61 (0) ·49 years 1.21 1.28 1.61 (0) ·49 years 1.21 12.81 111.02 ·90.35 5.08 4.93 (4) ·91 years 1.21 12.81 11.10() ·91 years 1.28 1.61 (0) 1.62 (0) ·91 years 1.28 1.61 (0) 1.16 (0) ·91 years 1.28 1.16 (0) 1.10 (0) ·91 years 1.28 1.16 (0) 1.10 (0) ·91 years 1.26 (0) 2	-12.54 10.05	2.47	2.31	2.38 (1.88–2.88)	-8.92
years195.87161.65130.86 (122.59- 139.13) -19.05 68.7756.78bia tia13.3012.1811.01 (10.61-11.41) -9.61 6.626.2249 years4.674.714.41 (3.88-4.93) -6.37 3.513.52564 years30.7428.3526.74 (2.488-28.6) -5.68 13.3513.37574 years111.0299.3586.9 (83.06-90.74) -12.53 5.32.047.315575.084.84 (4.39-5.29) -4.72 3.062.7664 years1.211.281161 (0.93-2.29) -4.72 3.062.765575.084.84 (4.39-5.29) -4.72 3.062.7664 years1.211.281161 (0.93-2.29) -6.37 3.062.7664 years1.28111.61 (0.93-2.29) -6.57 3.062.7664 years1.28111.61 (0.93-2.29) -6.37 -4.72 3.0664 years1.28111.61 (0.93-2.90) -4.72 -4.72 -4.72 64 years1.28111.61 (0.93-2.93) -6.37 -4.72 -4.72 64 years2.665.49 $4.33 (4.76-5.11)$ -10.20 -14.13 2.17 $64 years2.665.494.33 (4.76-5.11)-10.20-14.132.1164 years2.665.494.33 (4.76-5.11)-10.202.112.0164 years2.685.665.494.33 (4.76-5.11)-10.202.12$	years 195.87 161.65 130.86 bla 13.30 12.18 11.01 (10 ges 13.30 12.18 11.01 (10 49 years 4.67 4.71 4.41 (3. 64 years 30.74 28.35 26.74 (2. years 30.74 29.35 86.9 (83. years 111.02 99.35 86.9 (83. 49 years 1.21 1.28 1.61 (0. 64 years 1.21 1.28 1.61 (0. 64 years 1.21 1.28 1.61 (0. 99.35 5.08 1.281 11.192 99.40 1.21 1.28 1.61 (0. 64 years 1.21 12.81 11.192 years 5.66 5.49 4.93 (4. 0 64 years 1.281 11.192 0 12.63 12.51 12.33 (11 0 64 years 2.27 2.3 (21 166 5.49 4.53 (31 163 9.40 8.34 164 9.40 8.34 168 9.40 8.34 168 9.40 8.34 168 9.40 8.66 (6.	10.05	14.36	12.11	11.03 (9.41–12.65)	-1110
biabia -9.61 6.62 6.22 6.7 4.71 $4.101(10.61-11.41)$ -9.61 6.62 6.22 6.4 years 13.30 12.18 $11.01(10.61-11.41)$ -9.61 6.62 6.22 6.4 years 30.74 28.35 $26.74(24.88-493)$ -5.68 13.35 3.51 3.57 years 30.74 28.35 $26.74(24.88-26.6)$ -12.53 3.51 3.57 3.73 years 11.102 99.35 $86.9(83.06-90.74)$ -12.53 3.06 2.76 years 15.77 5.08 $4.84(4.39-5.29)$ -4.72 3.06 2.76 years 15.71 1.28 $1.61(0.39-2.29)$ 2.578 0.083 0.98 14.53 12.81 $11.61(0.32-2.12.77)$ -14.72 3.06 2.76 years 15.77 $4.03(4.76-5.11)$ -14.13 7.17 6.26 years 12.66 5.49 $4.93(4.76-5.11)$ -10.20 4.17 4.01 ges 5.66 5.49 $4.93(4.76-5.11)$ -10.20 4.17 4.01 ges 2.27 2.42 $2.34.67$ -3.48 26.49 $2.31.4$ years 12.63 $12.33(1.1.61-1.3.06)$ -14.13 -10.20 4.17 4.01 ges $2.366(34.65-38.47)$ -10.20 $-1.14.4$ 9.92 9.08 years 2.66 5.49 23.477 -16.20 2.114 2.116 years 2.66 5.49 $23.65(34.6$	bia 11.01 (10 (10 (10 (10 (10 (10 (10 (10 (10 (0.00	68.77	56.78	48.59 (44.56–52.63)	
ges13.3012.1811.01 (10.61-11.41) -9.61 6.62 6.22 49 years 4.67 4.71 $4.41 (3.88-4.93)$ -6.37 3.51 3.52 49 years 1.67 4.71 $4.41 (3.88-4.93)$ -6.37 3.51 3.52 64 years 11.102 99.35 $86.9 (83.06-90.74)$ -12.53 53.20 4.731 30.74 28.35 $26.74 (24.88-28.6)$ -12.53 53.20 4.731 30.74 28.35 $86.9 (83.06-90.74)$ -12.53 53.20 4.731 30.74 28.35 $86.9 (83.06-90.74)$ -12.53 53.20 4.731 30.74 28.35 $86.9 (83.06-90.74)$ -12.53 53.20 4.731 47 11.21 1.28 $1.61 (0.93-2.29)$ -4.72 3.06 2.76 49 years 1.21 1.28 $1.1 (9.22-12.77)$ -14.13 20.49 23.14 9 years 14.53 12.81 $11 (9.22-12.77)$ -14.13 20.49 23.14 9 years 12.66 5.49 $4.93 (4.76-5.11)$ -14.13 20.49 2.11 9 years 2.27 $2.32 (2.11-2.49)$ -10.20 4.17 4.01 49 years 2.27 $2.33 (11.61-13.06)$ -1.44 9.92 9.68 9.40 8.34 $66.6 (5.13-7.19)$ -1.020 4.17 4.01 40 years 2.76 $2.3 (2.11-2.49)$ -1.64 9.92 9.68 9.40 8.34 $66.6 (6.13-7.19$	Iges 13.30 12.18 11.01 (10 49 years 4.67 4.71 4.41 (3. 64 years 4.67 4.71 4.41 (3. 64 years 30.74 28.35 26.74 (2. 99.35 99.35 86.9 (83. 4.84 (4. 49 years 11.02 99.35 86.9 (83. 49 years 1.21 1.28 16.1 (0. 44 years 1.21 1.281 11.1 (92. 64 years 1.51 1.281 11.34 (36. 0 99.35 5.66 5.49 4.93 (4. 0 99 ears 1.2.81 11.1 (92. 4.34 (3. 0 99 ears 1.2.81 11.1 (92. 4.34 (36. 0 99 ears 1.2.81 11.1 (92. 4.34 (36. 0 99 ears 1.2.65 4.93 (31. 4.34 (36. 0 99 ears 2.27 2.27 2.23 (21. 4.93 (31. 0 1.66 9.43 (31. 2.53 (31. 4.36 (31. <t< td=""><td></td><td></td><td></td><td></td><td></td></t<>					
4.67 4.71 $4.41(3.88-4.93)$ -6.37 3.51 3.52 64 years 30.74 28.35 $26.74(24.88-28.6)$ -5.68 13.35 13.47 7 years 111.02 99.35 $86.9(83.06-90.74)$ -12.53 53.20 4731 707 5.57 5.08 $4.84(4.39-5.29)$ -4.72 3.06 2.76 49 years 1.21 1.28 $1.61(0.93-2.29)$ -4.72 3.06 2.76 49 years 1.21 1.28 $1.61(0.93-2.29)$ -4.72 3.06 2.76 49 years 1.21 1.28 $1.61(0.93-2.29)$ -4.72 3.06 2.76 6.4 years 1.21 1.28 $1.61(0.93-2.29)$ -4.72 3.06 2.314 717 6.26 5.49 $4.134(36.77-45.91)$ -14.13 26.49 231.4 717 6.56 5.49 $4.93(4.76-5.11)$ -10.20 4.17 4.01 64 years 2.27 2.42 $2.3(2.11-2.49)$ $-1.4.4$ 9.92 9.68 49 years 2.27 2.42 $2.3(1.61-13.06)$ -1.44 9.92 9.68 49 years 12.63 $12.63(34.65-38.47)$ -16.20 $3.1.9$ 2.11 2.11 49 years 2.76 $3.6(6.13-7.19)$ -1.62 $3.1.9$ 2.17 9.68 49 years 2.76 $3.63(34.65-38.47)$ -16.20 $3.1.9$ 2.11 2.12 49 years 2.16 0.83 $0.666(6.13-7.19)$ -1.62	49 years 4.67 4.71 4.41 (3. 64 years 30.74 28.35 26.74 (2. 1.9ears 31.11.02 99.35 86.9 (83. .years 111.02 99.35 86.9 (83. .ges 5.57 5.08 4.84 (4. .9ars 1.21 1.28 1.61 (0. 64 years 1.21 1.28 1.61 (0. 64 years 1.453 12.81 11.92 .years 1.46.73 42.83 41.34 (36. .years 5.66 5.49 4.93 (4. .ges 2.27 2.42 2.3 (21. .gears 2.56 2.49 4.33 (3. .years 46.52 43.63 36.56 (3. .years 46.52 43.63 36.56 (6.	-9.61	6.62	6.22	5.87 (5.62–6.13)	-5.63
64 years 30.74 28.35 $26.74 (24.88-28.6)$ -5.68 13.35 13.47 · years 111.02 99.35 $86.9 (83.06-90.74)$ -12.53 53.20 4731 · ges 5.57 5.08 $4.84 (4.39-5.29)$ -4.72 3.06 2.76 $49 years$ 1.21 1.28 $1.61 (0.93-2.29)$ -4.72 3.06 2.76 $64 years$ 1.21 1.28 $1.61 (0.93-2.29)$ -4.72 3.06 2.76 $64 years$ 1.21 1.281 $11 (9.22-12.77)$ -14.13 26.49 23.14 0.83 0.98 $41.34 (36.77-45.91)$ -3.48 26.49 23.14 0.83 5.66 5.49 $4.93 (4.76-5.11)$ -10.20 4.17 4.01 0.85 5.66 5.49 $4.33 (4.76-5.11)$ -10.20 4.17 4.01 0.83 2.78 $2.3 (2.11-2.49)$ -14.13 26.49 $2.31.4$ 0.9 2.78 $2.36.56 (34.55-38.47)$ -16.20 2.11 2.11 0.9 2.78 $2.36.56 (34.55-38.47)$ -16.20 2.11 2.92 0.40 8.34 $6.66 (6.13-7.19)$ $-2.01.4$ 5.16 4.22 0.40 8.34 $6.66 (6.13-7.19)$ $-2.01.4$ 5.16 4.22 0.40 8.34 $6.66 (6.13-7.19)$ $-2.01.4$ 5.16 4.22 0.40 8.34 $6.66 (6.13-7.19)$ $-2.01.4$ 5.16 4.22 0.40 8.34 $6.69 (13.52-17.86)$	64 years 30.74 28.35 26.74 (2) · years 111.02 99.35 86.9 (83. iges 5.57 5.08 4.84 (4. 49 years 1.21 1.28 1.61 (0. 64 years 1.21 12.81 111 (9.2 9.35 5.08 4.84 (4. 69 years 1.21 12.81 11 (9.2 64 years 1.45.3 12.81 11 (9.2 9 9 33 42.83 41.34 (36 9 9 12.81 11 (9.2 9.33 (4. 9 9 5.66 5.49 4.93 (4. 9 9 2.42 2.3 (2.1 12.51 12.33 (1.1 9 9 12.63 12.51 12.33 (1.1 2.3 (2.1 1 16 8.34 6.66 (6. 6.66 (6.	-6.37	3.51	3.52	3.49 (3.13–3.85)	-0.85
years 111.02 99.35 86.9 (83.06-90.74) -12.53 53.20 47.31 ges 5.57 5.08 4.84 (4.39-5.29) -4.72 3.06 2.76 49 years 1.21 1.28 1.61 (0.33-2.29) 25.78 0.83 0.98 49 years 1.21 1.28 1.61 (0.33-2.29) 25.78 0.83 0.98 64 years 1.4.53 12.81 11 (9.22-12.77) -14.13 7.17 6.26 years 46.73 42.83 41.34 (36.77-45.91) -3.48 26.49 23.14 0 9 2.56 5.49 4.93 (4.76-5.11) -10.20 4.17 6.26 0 9 2.36.56 5.49 4.93 (4.76-5.11) -10.20 4.17 2.11 operation 2.27 2.42 2.3 (2.11-2.49) -4.96 2.11 2.11 operation 2.26 4.365 36.465-38.47 -14.4 9.92 9.68 years 2.27 2.42 2.3 (1.161-1.3.06) -1.14.4 9.92 9.68 years 12.63 12.33	years 111.02 99.35 86.9 (83.) ges 5.57 5.08 4.84 (4.) ges 5.57 5.08 4.84 (4.) 49 years 1.21 1.28 1.61 (0.) 64 years 1.21 1.28 1.61 (0.) 64 years 14.53 12.81 11 (9.2 9 years 14.53 12.81 11 (9.2 9 years 5.66 5.49 4.93 (4.) 9 years 5.66 5.49 4.93 (4.) 64 years 12.63 12.51 12.33 (1.) 164 years 12.63 12.51 12.33 (3.) 16a 9.40 8.34 6.66 (6.)	-5.68	13.35	13.47	14.32 (13.21–15.43)	6.31
qes 5.57 5.08 4.84 (4.39-5.29) -4.72 3.06 2.76 49 years 1.21 1.28 1.61 (0.93-2.29) 25.78 0.83 0.98 64 years 1.21 1.28 1.61 (0.93-2.29) 25.78 0.83 0.98 64 years 14.53 12.81 11 (9.22-12.77) -14.13 7.17 6.26 94 years 16.73 42.83 41.34 (36.77-45.91) -3.48 26.49 23.14 0 5.66 5.49 4.93 (4.76-5.11) -14.13 7.17 6.26 149 years 2.27 2.42 2.3 (2.11-2.49) -14.4 9.92 9.68 64 years 12.63 12.51 12.33 (11.61-13.06) -14.4 9.92 9.68 94 years 2.27 2.43 43.65-38.47 -16.20 31.19 2.91 16a 9.40 8.34 6.66 (6.13-7.19) -16.20 31.19 29.28 .940 8.34 6.66 (6.13-7.19) -16.20 31.19	ges 5.57 5.08 4.94 (4.12) 49 years 1.21 1.28 1.61 (0.12) 64 years 1.21 1.28 1.61 (0.12) 64 years 14.53 12.81 11 (9.2) 9 years 14.53 12.81 11 (9.2) 9 years 46.73 42.83 41.34 (36) 9 years 5.66 5.49 4.93 (4.13) 64 years 5.66 5.49 4.93 (4.13) 64 years 12.63 12.51 12.33 (11) 10a 12.63 12.51 12.33 (11) 10a years 46.52 43.63 36.56 (34) 10a 9.40 8.34 6.66 (6.13)	-12.53	53.20	47.31	41 (38.54–43.46)	-13.34
5.57 5.08 4.84 (4.39-5.29) -4.72 3.06 2.76 ears 1.21 1.28 1.61 (0.93 - 2.9) 25.78 0.83 0.98 ears 1.21 1.28 1.61 (0.93 - 2.9) 25.78 0.83 0.98 ears 14.53 12.81 11.61 (0.92 - 12.77) -14.13 7.17 6.26 ears 14.53 12.81 11.60.22 - 12.77) -3.48 26.49 23.14 ears 12.65 5.49 4.134 (36.77 - 45.91) -3.48 26.49 23.14 ears 12.63 12.51 12.33 (4.76 - 5.11) -10.20 4.17 4.01 ears 12.63 12.51 12.33 (4.76 - 5.11) -16.20 2.11 2.11 ears 12.63 12.63 12.33 (4.16 - 13.06) -1.44 9.92 9.68 ears 12.63 12.51 12.33 (11.61 - 13.06) -1.6.20 31.19 29.29 ears 3.20 3.30 3.6.66 (3.4.65 - 38.47) -16.20 31.	5.57 5.08 4.84 (4. (4. (4. (4. (4. (4. (4. (4. (4. (4					
I.21 1.28 1.61 (0.93-2.29) 25.78 0.83 0.98 cars 14.53 12.81 11 (9.22-12.77) -14.13 7.17 6.26 rears 14.53 12.81 11 (9.22-12.77) -14.13 7.17 6.26 rears 14.53 12.81 11 (9.22-12.77) -14.13 7.17 6.26 rears 12.63 11.94 9.34 (36.77-45.91) -3.48 2.6.49 2.3.14 ears 5.66 5.49 4.93 (4.76-5.11) -10.20 4.17 4.01 ears 12.63 12.51 12.33 (11.61-13.06) -1.44 9.92 9.68 rears 12.63 12.51 12.33 (11.61-13.06) -1.44 9.92 9.68 rears 12.63 36.56 (34.65-38.47) -16.20 31.19 29.28 rears 3.30 3.30 3.6.96 (1.3-7.19) -20.14 5.16 4.22 rears 3.30 3.20 3.6.69 (1.3-7.19) -20.14 5.16 4.22	ears 1.21 1.28 1.61 (0. ears 1.4.53 1.281 1.1 (9.2 irs 4.6.73 4.2.83 4.1.34 (36 ears 2.27 2.42 2.3 (3.4 ears 1.2.63 1.2.51 1.2.33 (11 irs 4.6.52 4.3.63 36.56 (3.4 ears 1.2.63 1.2.51 1.2.33 (11 irs 9.40 8.34 6.66 (6.1)	-4.72	3.06	2.76	2.68 (2.35–3.01)	-2.90
14.53 12.81 11 (9.22-12.77) -14.13 7.17 6.26 rs 46.73 42.83 41.34 (36.77-45.91) -3.48 26.49 23.14 rs 5.66 5.49 4.93 (4.76-5.11) -10.20 4.17 4.01 ears 2.27 2.42 2.3 (2.11-2.49) -4.96 2.11 2.11 rears 12.63 12.51 12.33 (11.61-13.06) -1.44 9.92 9.68 rs 46.52 43.65 36.56 (34.55-38.47) -16.20 31.19 29.28 ears 3.30 3.20 3.6.56 (3.13-7.19) -20.14 5.16 4.22 ears 3.30 3.20 36.56 (3.13-7.19) -16.20 21.16 4.22 ears 3.30 3.20 3.6.69 (13.52-17.86) -15.69 2.18 9.45	rears 14.53 12.81 11 (9.2) rs 46.73 42.83 41.34 (36 ears 2.27 2.42 2.3 (34 rears 12.63 12.51 12.33 (11 rs 46.52 43.63 36.56 (34 rs 9.40 8.34 6.66 (6	25.78	0.83	0.98	1.12 (0.51–1.72)	14.29
Ins 46.73 42.83 41.34 (36.77-45.91) -3.48 26.49 23.14 Fears 5.66 5.49 4.93 (4.76-5.11) -10.20 4.17 4.01 Fears 2.27 2.42 2.3 (2.11-2.49) -4.96 2.11 2.11 Fears 2.27 2.42 2.3 (2.11-2.49) -1.44 9.92 9.68 Fears 12.63 12.51 12.33 (11.61-13.06) -1.44 9.92 9.68 frass 12.63 36.56 (34.65-38.47) -16.20 31.19 29.28 frass 3.30 33.20 8.34 6.66 (6.13-7.19) -20.14 5.16 4.22 fears 3.30 3.20 3.6.63 (3.08-4.12) 12.50 11.64 9.45	rs 46.73 42.83 41.34 (36 6.66 5.49 4.93 (4, ears 2.27 2.42 2.3 (2,1 rears 12.63 12.51 12.33 (11 rs 46.52 43.63 36.56 (34 9.40 8.34 6.66 (6, 12, 12, 12, 12, 12, 12, 12, 12, 12, 12	-14.13	7.17	6.26	5.19 (3.96–6.41)	-17.09
5.66 5.49 4.93 (4.76-5.11) -10.20 4.17 4.01 ears 2.27 2.42 2.3 (2.11-2.49) -4.96 2.11 2.11 2.11 ears 12.63 12.51 12.33 (11.61-13.06) -1.44 9.92 9.68 ris 46.52 43.63 36.56 (34.65-38.47) -16.20 31.19 29.28 ears 12.63 12.51 12.33 (11.61-13.06) -16.20 31.19 29.28 ears 33.0 36.56 (34.65-38.47) -16.20 31.19 29.28 ears 3.30 3.320 3.6 (3.08-4.12) 12.50 31.19 29.28 ears 3.30 3.20 3.6 (3.08-4.12) 12.50 2.16 4.22 ears 21.76 18.66 15.69 (13.52-17.86) -15.92 11.64 9.45	5.66 5.49 4.93 (4. rears 2.27 2.42 2.3 (2.1 rears 12.63 12.51 12.33 (11 rears 12.63 12.51 12.33 (11 rears 46.52 43.63 36.56 (34 9.40 8.34 6.66 (6.6)	-3.48	26.49	23.14	23.6 (20.6–26.6)	1.99
5.66 5.49 4.33 (4.76-5.11) -10.20 4.17 4.01 ears 2.27 2.42 2.3 (2.11-2.49) -4.96 2.11 2.11 2.11 ears 12.63 12.51 12.33 (11.61-13.06) -1.44 9.92 9.68 rs 46.52 43.63 36.56 (34.65-38.47) -16.20 31.19 29.28 rs 46.52 43.63 36.56 (34.65-38.47) -16.20 31.19 29.28 ears 3.30 3.32 36.56 (31.3-7.19) -20.14 5.16 4.22 ears 3.30 3.20 3.6 (3.08-4.12) 12.50 2.18 4.7 ears 21.76 18.66 15.69 (13.52-17.86) -15.92 11.64 9.45	5.66 5.49 4.93 (4) ears 2.27 2.42 2.3 (2) (ears 12.63 12.51 12.33 (1) (ears 12.63 13.63 36.56 (5) (ars 46.52 43.63 36.56 (5) (ars 9.40 8.34 6.66 (6)					
cars 2.27 2.42 2.3 (2.11-2.49) 4.96 2.11 2.12 9.68 3.13 3.6.56 3.6.56 3.6.53 3.6.53 3.6.53 3.6.53 3.6.53 3.6.53 3.6.53 3.6.53 3.6.63 3.6.56 3.6.63	rears 2.27 2.42 2.3 (2.1 rears 12.63 12.51 12.33 (11 rrs 46.52 43.63 36.56 (34 9.40 8.34 6.66 (6	-10.20	4.17	4.01	3.68 (3.54–3.82)	-8.23
rears 12.63 12.51 12.33 (11.61-13.06) -1.44 9.92 9.68 rs 46.52 43.63 36.56 (34.65-38.47) -16.20 31.19 29.28 rs 9.40 8.34 6.66 (6.13-7.19) -20.14 5.16 4.22 rears 3.30 3.20 3.6 (3.08-4.12) 12.50 2.25 2.18 rears 21.76 18.66 (13.52-17.86) -15.92 11.64 9.45	rears 12.63 12.51 12.33 (11 rrs 46.52 43.63 36.56 (34 9.40 8.34 6.66 (6	-4.96	2.11	2.11	2.07 (1.88–2.27)	-1.90
Ifs 46.52 43.63 36.56 (34.65–38.47) -16.20 31.19 29.28 9.40 8.34 6.66 (6.13–7.19) -20.14 5.16 4.22 ears 3.30 3.20 3.6 (3.08–4.12) 12.50 2.25 2.18 ears 21.76 18.66 15.69 (13.52–17.86) -15.92 11.64 9.45	rs 46.52 43.63 9.40 8.34	-1.44	9.92	9.68	9.18 (8.5–9.86)	-5.17
9.40 8.34 6.66 (6.13-7.19) -20.14 5.16 4.22 ears 3.30 3.20 3.6 (3.08-4.12) 12.50 2.18 iears 21.76 18.66 15.69 (13.52-17.86) -15.92 11.64 9.45	9.40 8.34	-16.20	31.19	29.28	25.68 (24.45–26.91)	12.30
9.40 8.34 6.66 (6.13-7.19) -20.14 5.16 4.22 ears 3.30 3.20 3.6 (3.08-4.12) 12.50 2.25 2.18 ears 21.76 18.66 13.52-1786) -15.92 11.64 9.45	9.40 8.34 2.20 2.00					
3.30 3.20 3.6 (3.08-4.12) 12.50 2.25 2.18 21.76 18.66 15.69 (13.52-17.86) 15.92 11.64 9.45	000	-20.14	5.16	4.22	3.94 (3.61–4.27)	-6.64
21.76 18.66 15.69 (13.52–17.86) —15.92 11.64 9.45	3.30 3.20	12.50	2.25	2.18	2.23 (1.85–2.62)	2.29
	21.76 18.66	-15.92	11.64	9.45	9.04 (7.54–10.54)	-4.34
78.35 69.27 48.93 (43.01–54.85) -29.36 41.21 32.48	65+ years 78.35 69.27 48.93 (43.01-54.85)	-29.36	41.21	32.48	28.76 (25.41–32.12)	-11.45



Total avoided cancer deaths for five of the seven Latin American countries considered, in both sexes between the top rate in 1990 and 2023 (light grey area); observed and predicted numbers of cancer deaths from 1991 to 2023 (black line); estimated numbers of total cancer deaths by applying 1990 age-specific peak mortality rates (grey line). During the 33-year period, a total of about 1 351 800 cancer deaths have been avoided in six of the seven countries considered (627 300 in men and 724 500 in women). No reduction in cancer deaths was registered in Brazil. In 2023 alone, about 48 100 deaths are predicted to be avoided in men and about 48 300 in women.

Cuba, particularly among women, characterized by high prevalence of smoking, resulting in the highest lung cancer rates (Pinheiro *et al.*, 2017).

Compared to the European Union (EU) and North America (Malvezzi *et al.*, 2023; Siegel *et al.*, 2023), pancreatic cancer rates in Latin America remained relatively low. Diabetes and obesity are recognized etiologic factors for this cancer; the low smoking prevalence in this area contributed to this pattern (Wong *et al.*, 2017); however, this cancer is difficult to diagnose, and these results should be interpreted with caution because underestimation and overestimation are possible in some countries.

The lower mortality rates from bladder cancer, compared to other geographical areas, can be explained by the more favourable smoking patterns in Latin America, too. Differences in rates between the two sexes may also reflect different occupational exposures. The presence of arsenic in drinking water found in selected areas of Chile and Argentina is also associated with this neoplasm (Khan *et al.*, 2020).

Breast cancer mortality rates in Latin America were favourable and similar to or lower than in the EU and the USA (Malvezzi *et al.*, 2023; Siegel *et al.*, 2023), except for Argentina, a pattern that could be associated with factors like European ancestry. Besides improvements in disease diagnosis and treatment, the lower rates may be due to reproductive patterns in these countries (Romieu *et al.*, 2018).

Mortality from ovarian cancer showed favourable rates in all countries, except for Cuba where the projected rate is expected to rise to reach the levels of the other Latin American countries considered. The use of oral contraceptives, which contrasts the effect of a high prevalence of obesity presumably has influenced the favorable trends (Stern *et al.*, 2019).

The favorable patterns for uterus (both corpus and cervix) cancer mortality are principally due to falls in cervical cancer which are mostly attributable to screening, early diagnosis, and human papillomavirus vaccination, which has been implemented in over 80% of the Americas, and Latin American countries have high coverage, with an estimated 70% of the target population receiving the full recommended schedule doses during 2019 (Bruni *et al.*, 2021). This will lead to a persisting favorable trend in the younger generation. Only Argentina showed unfavourable trends, possibly due to low screening coverage – below 50% during 2018 (Nuche-Berenguer and Sakellariou, 2021) – and possibly some increase in endometrial corpus not otherwise specified cancer mortality as seen in the US (Cronin *et al.*, 2022).

Prostate cancer rates were higher than those from the EU and USA (Malvezzi *et al.*, 2023; Siegel *et al.*, 2023). The particularly high rates observed in Cuba are probably related to the considerable presence of Cubans of West African ancestry, characterized by a higher incidence and mortality for this neoplasm (Taitt, 2018; Dess *et al.*, 2019); however, the favourable declines in prostate cancer mortality observed indicate the efficacy of improved therapies together with some possible impacts of earlier diagnosis (Culp *et al.*, 2020; Reis *et al.*, 2020).

Improved management also played a role in the declining patterns of leukaemias in Latin America; however, rates remained higher than in most high-income countries of the world due to delays in the adoption of innovative treatments and disparities in access to healthcare (Chiattone *et al.*, 2020).

Predicted estimates should be interpreted with caution, considering the limitation of the model, which is not suited to detect very recent changes in trends or major long-term cohort effects; however, the analysis is limited to large countries, thus reducing issues of excessive random variation. Because observed cancer deaths for 2019 are available now in the WHO database, we compared observed cancer rates for 2019 with our previous predictions for that year (Carioli *et al.*, 2020) and we found that for all cancers combined errors in our predictions were lower than 5%, except for Colombia and Mexico.

Improvements in cancer management and prevention are needed, particularly in Brazil where trends may be largely influenced by improved death certification, where we did not register a reduction in cancer deaths, and in Cuba and Venezuela, for which no substantial number of cancer deaths were avoided since 1991.

The estimates provided herein do not reflect the impact of severe acute respiratory syndrome coronavirus 2 because they are based on extrapolations of cancer data collected in years before the pandemic. Although the full extent of the impact of the coronavirus disease (COVID) 2019 pandemic in different world regions is currently unknown, delays in diagnosis and treatment are expected to cause a short-term decline in cancer incidence followed by increases in advancedstage diagnoses and cancer mortality in some settings (Dinmohamed *et al.*, 2020; Kutikov *et al.*, 2020; Maringe *et al.*, 2020; Sharpless, 2020). The impact of COVID on cancer mortality is however smaller than on cardiovascular and other major causes of death (Ruhm, 2022).

Acknowledgements

This work was supported by the Italian Association for Cancer Research (AIRC, project N. 22987).

Conflicts of interest

There are no conflicts of interest.

References

Anderson WF, Rabkin CS, Turner N, Fraumeni JF Jr, Rosenberg PS, Camargo MC (2018). The changing face of noncardia gastric cancer incidence among US non-Hispanic Whites. J Natl Cancer Inst 110:608–615.

- Arnold M, Park JY, Camargo MC, Lunet N, Forman D, Soerjomataram I (2020). Is gastric cancer becoming a rare disease? A global assessment of predicted incidence trends to 2035. *Gut* 69:823–829.
- Boldo E, Fernandez de Larrea N, Pollan M, Martin V, Obon-Santacana M, Guevara M, *et al.* (2022). Meat intake, cooking methods, doneness preferences and risk of gastric adenocarcinoma in the MCC-Spain Study. *Nutrients* **14**:4852.
- Bonequi P, Meneses-Gonzalez F, Correa P, Rabkin CS, Camargo MC (2013). Risk factors for gastric cancer in Latin America: a meta-analysis. *Cancer Causes Control* 24:217–231.
- Bruni L, Saura-Lazaro A, Montoliu A, Brotons M, Alemany L, Diallo MS, et al. (2021). HPV vaccination introduction worldwide and WHO and UNICEF estimates of national HPV immunization coverage 2010-2019. Prev Med 144:106399.
- Buamden S (2018). Association between food availability and mortality due to colorectal cancer in the Americas. *Salud Colect* **14**:579–595.
- Camargo MC, Anderson WF, King JB, Correa P, Thomas CC, Rosenberg PS, et al. (2011). Divergent trends for gastric cancer incidence by anatomical subsite in US adults. Gut 60:1644–1649.
- Carioli G, Bertuccio P, Malvezzi M, Rodriguez T, Levi F, Boffetta P, et al. (2020). Cancer mortality predictions for 2019 in Latin America. Int J Cancer 147:619-632.
- Chiattone C, Gomez-Almaguer D, Pavlovsky C, Tuna-Aguilar EJ, Basquiera AL, Palmer L, et al. (2020). Real-world analysis of treatment patterns and clinical outcomes in patients with newly diagnosed chronic lymphocytic leukemia from seven Latin American countries. *Hematology* 25:366–371.
- Collatuzzo G, Santucci C, Malvezzi M, La Vecchia C, Boffetta P, Negri E (2023). Trends in gastric cancer mortality 1990-2019 in 36 countries worldwide, with predictions to 2025, and incidence, overall and by subtype. *Cancer Med* doi: 10.1002/cam4.5685. Online ahead of print.
- Corso G, Montagna G, Figueiredo J, La Vecchia C, Fumagalli Romario U, Fernandes MS, et al. (2020). Hereditary gastric and breast cancer syndromes related to CDH1 germline mutation: a multidisciplinary clinical review. Cancers 12:1598.
- Cronin KA, Scott S, Firth AU, Sung H, Henley SJ, Sherman RL, et al. (2022). Annual report to the nation on the status of cancer, part 1: National cancer statistics. Cancer 128:4251–4284.
- Culp MB, Soerjomataram I, Efstathiou JA, Bray F, Jemal A (2020). Recent global patterns in prostate cancer incidence and mortality rates. *Eur Urol* **77**:38–52.
- Deng W, Jin L, Zhuo H, Vasiliou V, Zhang Y (2021). Alcohol consumption and risk of stomach cancer: a meta-analysis. *Chem Biol Interact* **336**:109365.
- Dess RT, Hartman HE, Mahal BA, Soni PD, Jackson WC, Cooperberg MR, et al. (2019). Association of black race with prostate cancer-specific and othercause mortality. JAMA Oncol 5:975–983.
- Dinmohamed AG, Visser O, Verhoeven RHA, Louwman MWJ, van Nederveen FH, Willems SM, et al. (2020). Fewer cancer diagnoses during the COVID-19 epidemic in the Netherlands. *Lancet Oncol* 21:750–751.
- Hashim D, Boffetta P, La Vecchia C, Rota M, Bertuccio P, Malvezzi M, et al. (2016). The global decrease in cancer mortality: trends and disparities. Ann Oncol 27:926–933.
- Heer EV, Harper AS, Sung H, Jemal A, Fidler-Benaoudia MM (2020). Emerging cancer incidence trends in Canada: the growing burden of young adult cancers. *Cancer* **126**:4553–4562.
- Hooi JKY, Lai WY, Ng WK, Suen MMY, Underwood FE, Tanyingoh D, et al. (2017). Global prevalence of Helicobacter pylori infection: systematic review and meta-analysis. *Gastroenterology* **153**:420–429.
- Khan KM, Chakraborty R, Bundschuh J, Bhattacharya P, Parvez F (2020). Health effects of arsenic exposure in Latin America: an overview of the past eight years of research. *Sci Total Environ* **710**:136071.
- Kim HJ, Fay MP, Feuer EJ, Midthune DN (2000). Permutation tests for joinpoint regression with applications to cancer rates. (Erratum in: Stat Med 2001;20: 655). Stat Med 19:335–351.
- Kutikov A, Weinberg DS, Edelman MJ, Horwitz EM, Uzzo RG, Fisher RI (2020). A war on two fronts: cancer care in the time of COVID-19. Ann Intern Med 172:756–758.
- Malvezzi M, Santucci C, Boffetta P, Collatuzzo G, Levi F, La Vecchia C, et al. (2023). European cancer mortality predictions for the year 2023 with focus on lung cancer. Ann Oncol S0923-7534(23)00048-0.
- Maringe C, Spicer J, Morris M, Purushotham A, Nolte E, Sullivan R, et al. (2020). The impact of the COVID-19 pandemic on cancer deaths due to delays in diagnosis in England, UK: a national, population-based, modelling study. Lancet Oncol 21:1023–1034.
- Nikitina E, Burk-Korner A, Wiesenfarth M, Alwers E, Heide D, Tessmer C, et al. (2023). Bovine meat and milk factor protein expression in tumor-free mucosa of colorectal cancer patients coincides with macrophages and might interfere with patient survival. *Mol Oncol* doi:10.1002/1878-0261.13390. Online ahead of print.

- Nuche-Berenguer B, Sakellariou D (2021). Socioeconomic determinants of participation in cancer screening in Argentina: a cross-sectional study. Front Public Health 9:699108.
- Pineros M, Laversanne M, Barrios E, Cancela MC, de Vries E, Pardo C, *et al.* (2022). An updated profile of the cancer burden, patterns and trends in Latin America and the Caribbean. *Lancet Reg Health Am* **13**:None.
- Pinheiro PS, Callahan KE, Siegel RL, Jin H, Morris CR, Trapido EJ, et al. (2017). Cancer mortality in Hispanic ethnic groups. Cancer Epidemiol Biomarkers Prev 26:376–382.
- Plummer M, Franceschi S, Vignat J, Forman D, de Martel C (2015). Global burden of gastric cancer attributable to Helicobacter pylori. Int J Cancer 136:487–490.
- Prado-Galbarro FJ, Auchincloss AH, Perez-Ferrer C, Sanchez-Franco S, Barrientos-Gutierrez T (2020). Adolescent tobacco exposure in 31 Latin American cities before and after the framework convention for tobacco control. Int J Environ Res Public Health 17:7423.
- Praud D, Rota M, Pelucchi C, Bertuccio P, Rosso T, Galeone C, et al. (2018). Cigarette smoking and gastric cancer in the Stomach Cancer Pooling (StoP) Project. Eur J Cancer Prev 27:124–133.
- Raez LE, Nogueira A, Santos ES, Dos Santos RS, Franceschini J, Ron DA, et al. (2018a). Challenges in lung cancer screening in Latin America. J Glob Oncol 4:1–10.
- Raez LE, Cardona AF, Santos ES, Catoe H, Rolfo C, Lopes G, et al. (2018b). The burden of lung cancer in Latin-America and challenges in the access to genomic profiling, immunotherapy and targeted treatments. Lung Cancer 119:7–13.
- Reis RBD, Alias-Melgar A, Martinez-Cornelio A, Neciosup SP, Sade JP, Santos M, et al. (2020). Prostate cancer in Latin America: challenges and recommendations. *Cancer Control* 27:1073274820915720.
- Romieu I, Biessy C, Carayol M, His M, Torres-Mejia G, Angeles-Llerenas A, et al. (2018). Reproductive factors and molecular subtypes of breast cancer among premenopausal women in Latin America: the PRECAMA study. Sci Rep 8:13109.
- Rota M, Alicandro G, Pelucchi C, Bonzi R, Bertuccio P, Hu J, et al. (2020). Education and gastric cancer risk – an individual participant data metaanalysis in the StoP project consortium. Int J Cancer 146:671–681.
- Ruhm CJ (2022). Excess deaths in the United States during the first year of COVID-19. *Prev Med* 162:107174.
- Santucci C, Boffetta P, Levi F, La Vecchia C, Negri E, Malvezzi M (2021). Colorectal cancer mortality in young adults is rising in the United States, Canada, United Kingdom, and Australia but not in Europe and Asia. *Gastroenterology* 160:1860–1862.e2.
- Sharpless NE (2020). COVID-19 and cancer. Science 368:1290.
- Siegel RL, Torre LA, Soerjomataram I, Hayes RB, Bray F, Weber TK, et al. (2019). Global patterns and trends in colorectal cancer incidence in young adults. *Gut* 68:2179–2185.
- Siegel RL, Miller KD, Wagle NS, Jemal A (2023). Cancer statistics, 2023. CA Cancer J Clin 73:17–48.
- Stern MC, Barnoya J, Elder JP, Gallegos-Carrillo K (2019). Diet, physical activity, obesity and related cancer risk: strategies to reduce cancer burden in the Americas. Salud Publica Mex 61:448–455.
- Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. (2021). Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin 71:209–249.
- Taitt HE (2018). Global trends and prostate cancer: a review of incidence, detection, and mortality as influenced by race, ethnicity, and geographic location. Am J Men's Health 12:1807–1823.
- Thomson B, Tapia-Conyer R, Lacey B, Lewington S, Ramirez-Reyes R, Aguilar-Ramirez D, et al. (2021). Low-intensity daily smoking and cause-specific mortality in Mexico: prospective study of 150 000 adults. Int J Epidemiol 50:955–964.
- Torres J, Correa P, Ferreccio C, Hernandez-Suarez G, Herrero R, Cavazza-Porro M, et al. (2013). Gastric cancer incidence and mortality is associated with altitude in the mountainous regions of Pacific Latin America. Cancer Causes Control 24:249–256.
- Torres-Roman JS, Alvarez CS, Guerra-Canchari P, Valcarcel B, Martinez-Herrera JF, Davila-Hernandez CA, et al. (2022). Sex and age differences in mortality trends of gastric cancer among Hispanic/Latino populations in the United States, Latin America, and the Caribbean. Lancet Reg Health Am 16:100376.
- United Nations Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, Key Findings and Advance Tables.
- Wong MCS, Jiang JY, Liang M, Fang Y, Yeung MS, Sung JJY (2017). Global temporal patterns of pancreatic cancer and association with socioeconomic development. *Sci Rep* 7:3165.
- World Health Organization (1992). *International classification of disease and related health problems: 10th revision*. World Health Organization.