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appendix

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Trends in mortality from major cancers in the Americas: 1980–2010

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Background: Between the 1970s and 2000 mortality in most of Latin America showed favorable trends for some common cancer sites, including stomach and male lung cancer. However, major concerns were related to mortality patterns from other cancers, particularly in women. We provide an up-to-date picture of patterns and trends in cancer mortality in Latin America.

Methods: We analyzed data from the World Health Organization mortality database in 2005–2009 for 20 cancer sites in 11 Latin American countries and, for comparative purposes, in the USA and Canada. We computed age-standardized (world population) rates (per 100 000 person-year) and provided an overview of trends since 1980 using joinpoint regression models.

Results: Cancer mortality from some common cancers (including colorectum and lung) is still comparatively low in Latin America, and decreasing trends continue for other cancer sites (including stomach, uterus, male lung cancers) in several countries. However, there were upward trends for colorectal cancer mortality for both sexes, and for lung and breast cancer mortality in women from most countries. During the last decade, lung cancer mortality in women rose by 1%–3% per year in all Latin American countries except Mexico and Costa Rica, whereas rises of about 1% were registered for breast cancer in Brazil, Colombia and Venezuela. Moreover, high mortality from cancer of the cervix uteri was recorded in most countries, with rates over 13/100 000 women in Cuba and Venezuela. In men, upward trends were registered for prostate cancer mortality in Brazil and Colombia, but also in Cuba, where the rate in 2005–2009 was more than twice that of the USA (23.6 versus 10/100 000).

Conclusions: Tobacco control, efficient screening programs, early cancer detection and widespread access to treatments continue to be a major priority for cancer prevention in most Latin American countries.

Key words: cancer, trends, Latin America, mortality

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introduction

Between the 1970s and 2000, cancer mortality in Latin America showed favorable trends for some common cancer sites, including stomach in both sexes, lung and other tobacco-related cancers in men. In addition, mortality from some cancers (including colorectal and lung cancers) remained appreciably lower than in North America [1]. However, despite some declines, most countries still showed very high mortality rates for cancer of the uterus [2] and female lung, and breast cancers have been increasing in several countries. Mortality from selected neoplasms amenable to treatment, including testicular cancer and leukemias, also showed unfavourable trends in the last decades of the 1990s in some areas of the continent [2, 3], though promising trends were recently observed for Hodgkin's lymphoma [4].

We updated mortality data available from major countries of the Americas up to the year 2010, including, for comparative purposes, the United States of America (USA) and Canada. We also provided an overview of cancer mortality trends in the last 30 years.

materials and methods

Certified deaths for 20 selected cancer sites and total cancer mortality for the calendar period 1980–2010 were derived from the World Health Organization (WHO) database [5]. Eleven Latin American countries were considered, i.e. Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Mexico, Puerto Rico, Uruguay and Venezuela, plus Canada and the USA.

We computed age-standardized rates per 100 000 persons-year at all ages and truncated at age 35–64 using the direct method, on the basis of the world standard population [6].

To identify significant changes in the linear slope of the trend and to estimate annual percent changes (APC) [7, 8] for each segment, joinpoint regression models were used.

The Appendix (supplementary Text S1, available at *Annals of Oncology* online) reports some details related to the methods, in particular on countries selection, data retrieval and other assumptions made for data analysis.

results

results presentation

Tables 1 (men) and 2 (women) include, for the 20 selected cancers and all neoplasms, the age-standardized overall mortality rates per 100 000, and the mean annual number of deaths between 2005 and 2009 (unless otherwise specified) in the 13 selected countries.

Figure 1 shows the trends in rates at all ages and truncated 35–64 years, for seven major cancer sites and all neoplasms, in the 11 Latin American countries considered and the USA for men and women.

For reasons of brevity, only major cancers were discussed in the main text and only principal figures and tables were reported. Supplementary data are given in Appendix, available at *Annals of Oncology* online. In particular, Supplementary Tables S1 (men) and S2 (women), available at *Annals of Oncology* online, give the age-standardized truncated mortality rates (at age 35–64) and the corresponding mean annual number of deaths between 2005 and 2009.

Supplementary Figures S1 (S1a–S1g) and S2 (S2a–S2g), available at *Annals of Oncology* online, give histograms of geographic variation of overall and truncated (35–64 years) age-standardized mortality rates for men and women.

Supplementary Table S3, available at *Annals of Oncology* online, gives the APC estimated from joinpoint regression models for all ages and truncated 35–64 years in men and women.

Supplementary Figure S3 (S3a–S3f), available at *Annals of Oncology* online, shows the trends for the cancer sites not included in Figure 1 nor discussed in our main text due to word restriction (i.e. oral cavity and pharynx, esophagus, gallbladder, pancreas, larynx, ovary, testis, bladder, kidney, Hodgkin's lymphoma, non-Hodgkin's lymphoma and multiple myeloma).

all neoplasms (malignant and benign)

We pooled all neoplasms, together both malignant and benign, including essentially brain cancers which may cause death even if benign. The highest total cancer mortality rates in men were observed in Uruguay (177/100 000), Argentina (140) and Cuba (139) while rates in North America were around 130/100 000. Rates below 75/100 000 men were registered in Mexico and Ecuador (Table 1; supplementary Figure S1g, available at *Annals of Oncology* online). In women, the highest total cancer mortality rates were in Uruguay and Cuba (~100/100 000), Argentina and Chile (~92/100 000) and ~95/100 000 in North America. Rates below 70/100 000 were registered in Puerto Rico, Mexico and Ecuador, in Brazil, and the overall cancer mortality rate in women was 74/100 000 (Table 2; supplementary Figure S1g, available at *Annals of Oncology* online). In most countries, overall cancer mortality tended to decline, particularly in men, but slight increases were observed in Brazil and Cuba (Figure 1; supplementary Table S3, available at *Annals of Oncology* online).

stomach cancer

Stomach cancer mortality remained appreciably higher in Latin America compared with North America in both sexes (Tables 1 and 2; supplementary Figure S1a, available at *Annals of Oncology* online). In men, the highest rate was in Chile (23/100 000) while, in most other countries, rates ranged between 10 and 17/100 000. Only Argentina, Mexico, Cuba and Puerto Rico had rates lower than 10/100 000, but still higher than those in the USA (2.9/100 000, Table 1). A similar geographical pattern was seen in women. The highest rate was in Ecuador (10.5/100 000 women) followed by Colombia, Costa Rica and Chile, with rates ~8/100 000, while Argentina, Cuba and Puerto Rico had rates below 3.5/100 000 (Table 2; supplementary Figure S1a, available at *Annals of Oncology* online), still higher than Canada and USA rates (2 and 1.5/100 000 women, respectively). The patterns were similar when only middle-aged populations were considered (supplementary Tables S1–S2 and Figure S2a, available at *Annals of Oncology* online).

Mortality from stomach cancer steadily decreased over the last three decades in all American countries and in both sexes (Figure 1; supplementary Table S3, available at *Annals of Oncology* online) with APC lower than −2% in most countries since 1990s.

Table 1. Overall age-standardized (world population) mortality rates per 100 000 men (first row) and average annual number of deaths (second row) from selected cancers in 13 selected American countries during 2005–2009 (unless otherwise specified)

Cancer site ICD 10	Oral cavity and pharynx C00–C14	Esophagus C15	Stomach C16	Colon and rectum C17–C21, C26	Liver C22.0–C22.7	Gallbladder C23–C24	Pancreas C25	Larynx C32	Lung C33–C34	Bone C40–C41	Prostate C61	Testis C62	Bladder C67	Kidney C64–C66, C68	HL C81	NHL C82–C85, C96	MM C88, C90	Leukemias C91–C95	All neoplasms C00–D48
Argentina	2.84	5.75	8.25	15.76	0.60	2.09	7.90	3.61	29.81	0.88	14.76	0.76	4.19	4.85	0.41	3.43	1.28	4.38	140.26
	597	1296	1856	3654	129	480	1779	769	6492	189	3830	160	1011	1060	88	753	287	954	31819
Brazil	5.91	6.63	10.17	8.47	1.39	1.04	3.92	3.70	15.88	0.99	13.39	0.26	2.30	1.71	0.28	2.34	1.23	3.42	104.88
	4848	5369	8287	6987	1131	853	3179	2981	12667	862	11409	261	1913	1389	253	1985	987	2992	86577
Chile	1.58	4.78	23.09	9.14	2.31	5.51	4.85	1.31	17.30	0.77	16.58	1.00	2.62	4.20	0.26	3.35	2.29	3.60	125.32
	137	435	2064	833	198	493	431	116	1519	66	1614	92	245	373	22	303	201	314	11333
Colombia	1.80	2.87	16.67	6.97	1.47	1.36	3.28	2.03	14.44	0.80	14.20	0.36	1.59	1.25	0.44	2.87	1.13	4.29	97.93
	298	463	2744	1162	238	221	533	325	2323	145	2350	78	259	209	81	506	183	829	16412
Costa Rica	2.59	1.87	17.22	8.37	2.85	0.98	3.94	1.64	7.82	0.67	14.40	0.48	1.95	1.70	0.68	3.69	1.77	4.10	96.86
	50	36	346	169	56	18	77	32	154	14	315	12	40	33	13	74	33	87	1981
Cuba	5.72	5.67	5.93	10.20	0.98	0.63	4.59	7.45	38.10	1.29	23.55	0.22	4.06	1.69	1.01	3.19	1.91	4.13	139.02
	458	447	501	905	79	53	385	603	3173	96	2364	16	374	133	75	241	156	301	11872
Ecuador	0.92	1.24	15.48	3.97	1.04	1.13	2.37	0.61	6.35	0.76	11.63	0.35	0.72	1.17	0.41	2.41	0.69	3.82	70.54
	53	72	895	234	58	63	135	36	373	47	729	23	44	65	24	140	37	249	4197
Mexico	1.43	1.51	6.45	4.76	1.95	1.17	3.74	1.60	10.30	0.72	10.63	0.68	1.25	2.30	0.53	2.52	1.00	3.89	74.33
	624	656	2864	2103	849	516	1609	690	4471	347	4913	383	560	993	252	1158	424	1980	33500
Puerto Rico	4.07	3.86	4.73	13.03	2.28	0.29	3.89	2.04	13.47	0.57	14.36	0.27	1.99	1.93	0.53	3.83	2.11	3.77	99.28
(2005–2007)	105	101	143	359	59	8	106	54	366	14	513	5	63	49	11	102	57	101	2820
Uruguay	4.89	7.16	10.42	18.91	1.90	2.26	9.15	4.59	43.19	0.11	20.38	0.45	5.88	5.97	0.55	4.46	2.16	4.52	177.06
(2007–2009)	104	169	248	480	43	55	213	103	983	2	607	8	158	137	11	102	51	103	4295
Venezuela	2.22	1.94	11.37	6.43	1.23	0.92	3.30	2.90	17.20	0.85	18.72	0.33	1.62	1.96	0.64	2.80	1.22	3.53	99.82
(2005–2007)	226	195	1145	660	125	93	335	287	1734	101	1822	45	161	204	73	306	123	427	10254
Canada	2.79	4.63	4.18	16.56	3.25	0.62	6.71	1.31	37.30	0.41	10.73	0.18	3.95	3.68	0.30	5.00	2.36	4.86	130.83
	729	1240	1186	4755	873	179	1846	356	10369	82	3649	34	1246	1030	72	1393	676	1334	37160
USA	2.51	4.90	2.89	11.98	3.49	0.53	7.46	1.33	38.96	0.42	10.00	0.20	3.62	3.70	0.34	4.64	2.49	5.40	128.24
	5401	10792	6713	28209	7535	1290	17045	2936	88834	767	28587	355	9616	8410	698	11084	6002	12539	300300

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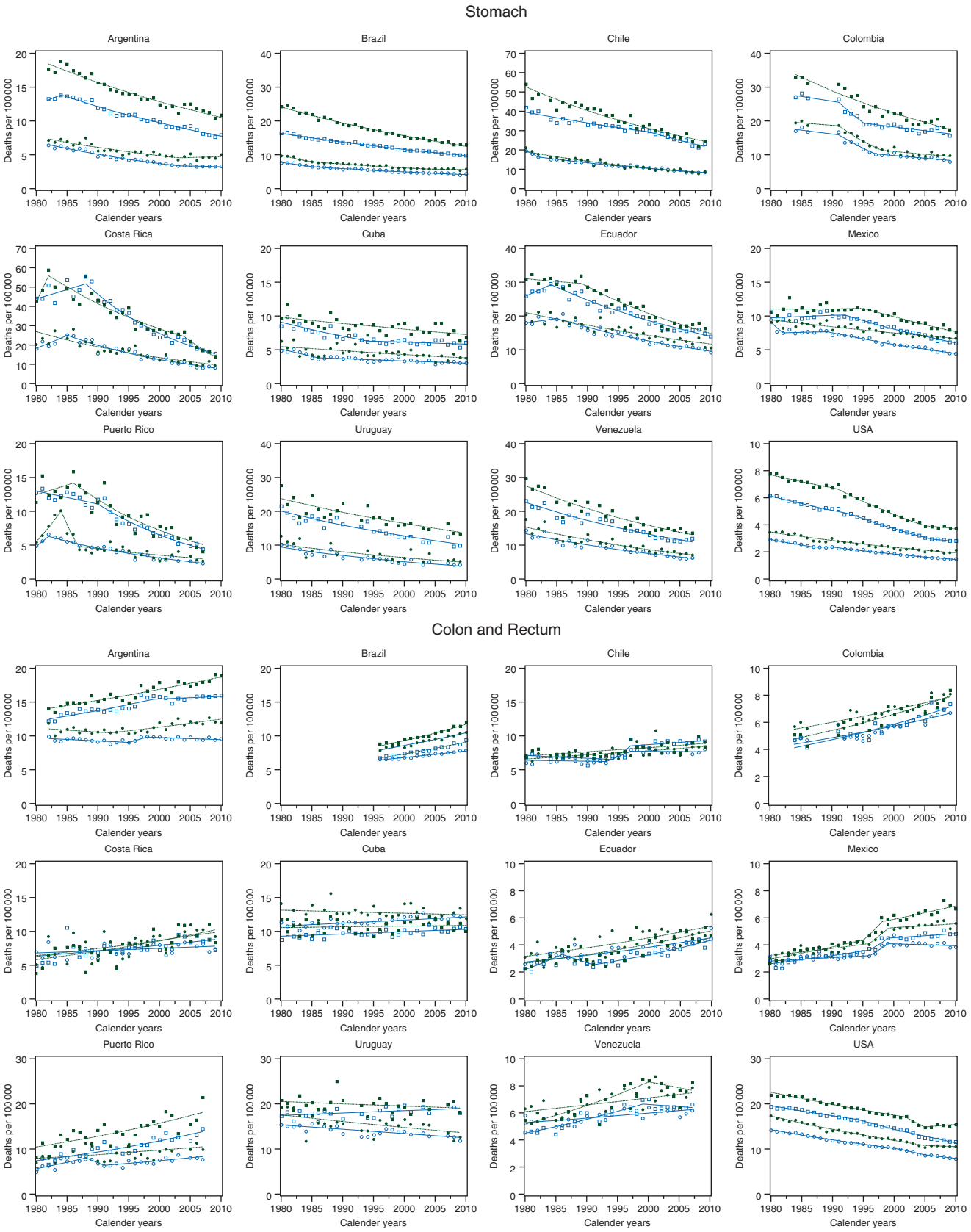

Figure 1. Joinpoint analysis for age-standardized (world population) death rates from major cancer sites (stomach, colon and rectum, lung, breast, uterus, prostate, and leukemias and all neoplasms) in 11 Latin American countries and the USA between 1980 and 2010. All-ages, men (open square) and women (open circle). Truncated 35–64 years, men (filled square) and women (filled circle).

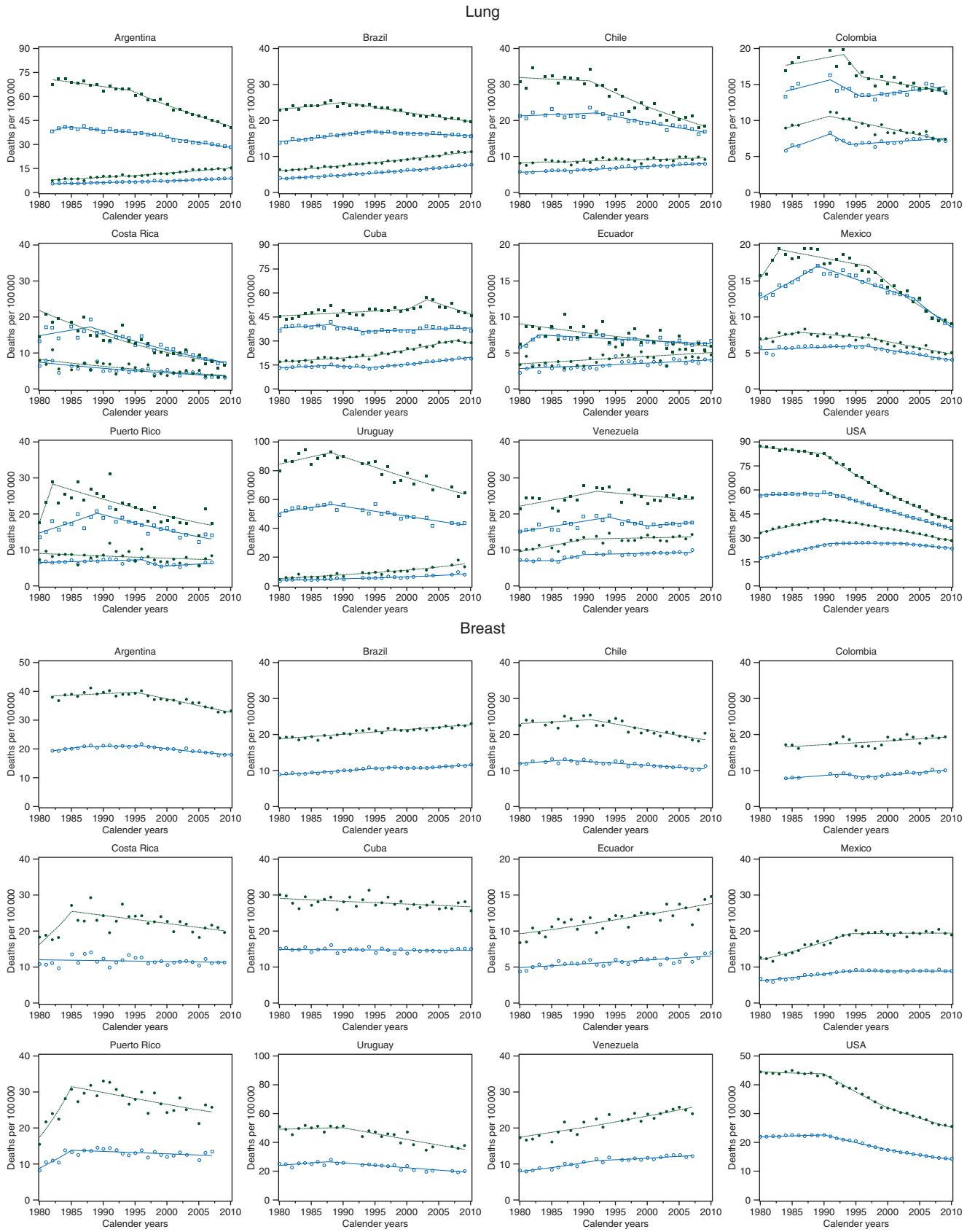

Fig. 1 *Continued*

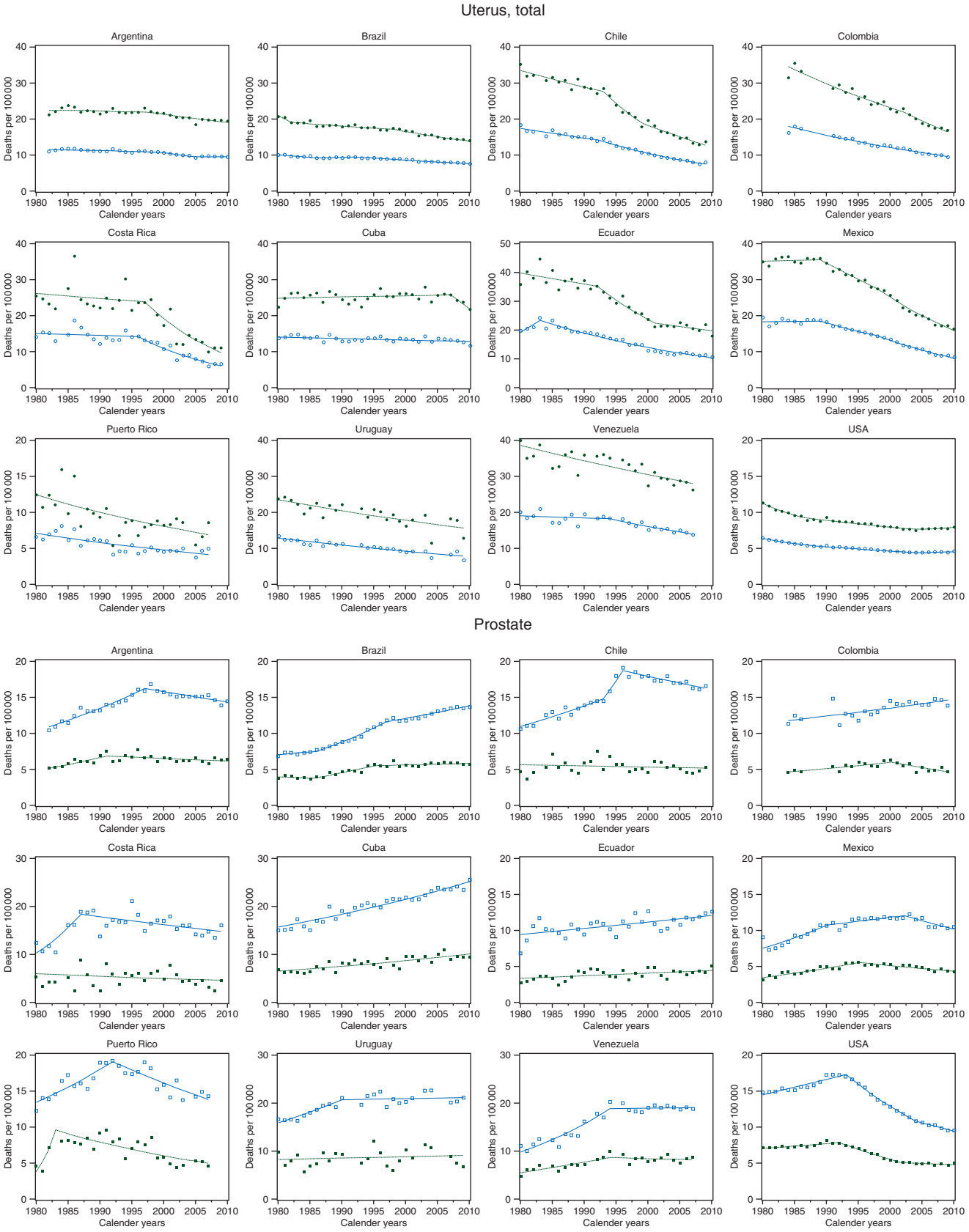

Fig. 1 *Continued*

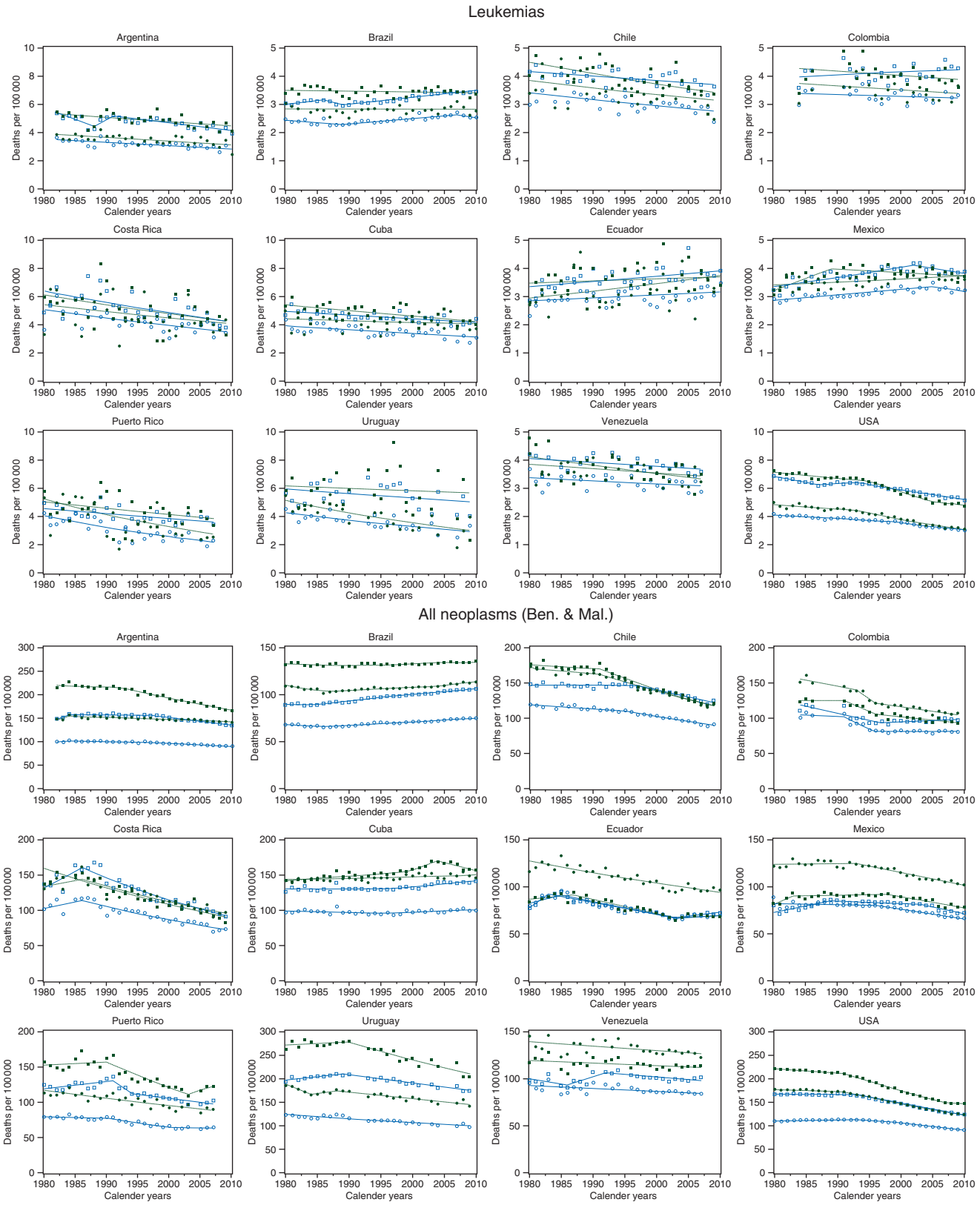

Fig. 1 *Continued*

Table 2. Overall age-standardized (world population) mortality rates per 100 000 women (first row) and average annual number of deaths (second row) from selected cancers in 13 selected American countries during 2005–2009 (unless otherwise specified)

Cancer site ICD 10	Oral cavity and pharynx C00–C14	Esophagus C15	Stomach C16	Colon and rectum C17–C21,C26	Liver C22.0–C22.7	Gallbladder C23–C24	Pancreas C25	Larynx C32	Lung C33–C34	Bone C40–C41	Breast C50	Uterus C53–C55	Ovary C56–C57.4	Bladder C67	Kidney C64–C66, C68	HL C81	NHL C82–C85, C96	MM C88, C90	Leukemias C91–C95	All neoplasms C00–D48
Argentina	0.71	1.66	3.24	9.55	0.24	2.58	5.66	0.35	8.09	0.53	18.57	9.43	4.08	0.80	1.68	0.26	1.99	0.95	2.93	91.66
	222	570	1027	3240	71	785	1888	100	2294	143	5328	2450	1124	306	505	67	598	293	800	27520
Brazil	1.22	1.60	4.32	7.48	0.76	1.78	3.15	0.42	7.14	0.64	11.25	7.80	2.75	0.78	0.88	0.19	1.58	0.99	2.61	73.95
	1258	1591	4455	7720	751	1781	3211	413	6992	636	11172	7753	2699	839	871	194	1591	970	2609	74270
Chile	0.47	1.97	8.33	7.62	1.21	11.66	4.59	0.15	7.82	0.50	10.77	7.97	3.40	1.05	1.81	0.19	2.26	1.56	2.75	91.98
	59	267	1035	950	138	1302	536	18	890	55	1191	873	358	138	211	20	259	180	289	10656
Colombia	0.98	1.06	8.55	6.46	1.34	2.57	3.11	0.44	7.36	0.55	9.75	9.84	3.33	0.65	0.79	0.26	1.96	0.89	3.24	80.45
	209	225	1817	1363	271	523	638	92	1490	118	2036	2076	682	141	161	54	404	174	707	16845
Costa Rica	0.69	0.47	8.49	7.67	1.92	1.60	3.41	0.17	3.41	0.35	11.42	6.73	2.91	0.59	0.88	0.53	2.71	1.39	3.67	74.49
	15	11	194	170	42	34	76	4	73	8	247	149	60	14	19	13	59	28	82	1661
Cuba	1.59	1.26	3.06	11.91	0.78	1.05	3.92	1.09	18.43	0.97	14.89	13.10	2.94	1.32	1.05	0.70	2.22	1.36	3.09	99.53
	153	119	294	1230	69	97	377	99	1639	76	1306	1104	242	140	90	55	182	124	241	8962
Ecuador	0.58	0.37	10.53	4.17	1.25	2.20	2.54	0.12	3.81	0.66	6.33	11.47	2.09	0.37	0.76	0.24	1.82	0.52	3.04	68.93
	38	25	706	278	80	137	161	7	246	43	383	717	128	25	48	16	118	32	202	4443
Mexico	0.58	0.46	4.78	3.97	1.89	2.38	3.53	0.21	4.35	0.54	9.12	9.33	3.29	0.63	1.31	0.33	1.78	0.75	3.28	68.34
	304	237	2494	2072	954	1195	1792	108	2238	288	4566	4707	1635	336	652	178	923	362	1759	35042
Puerto Rico (2005–2007)	0.62	0.64	2.38	7.82	0.77	0.47	2.66	0.18	6.07	0.39	12.57	4.39	2.94	0.71	0.76	0.15	2.24	1.37	2.15	62.78
	24	27	95	303	27	16	103	6	219	11	389	138	95	31	27	5	75	51	71	2201
Uruguay (2007–2009)	0.95	1.88	4.12	12.41	0.48	2.87	6.17	0.27	8.18	0.06	19.97	7.90	4.32	1.09	2.33	0.20	2.44	1.51	2.94	99.60
	33	72	152	521	15	96	232	10	238	2	602	220	128	51	77	5	86	54	94	3382
Venezuela (2005–2007)	0.94	0.60	5.93	5.91	0.85	1.61	3.20	0.43	9.31	0.73	12.22	14.25	3.24	0.74	1.11	0.41	1.92	1.06	2.98	84.20
	111	70	693	692	96	181	362	50	1057	87	1435	1712	374	88	128	51	229	118	373	9902
Canada	1.00	1.03	2.01	10.67	1.39	0.80	5.12	0.24	25.40	0.27	15.45	3.67	5.03	1.20	1.71	0.20	3.18	1.59	2.84	97.74
	340	383	748	4197	478	300	1881	79	8135	63	4959	1147	1603	540	612	53	1176	590	1004	33553
USA	0.84	0.95	1.48	8.27	1.26	0.66	5.41	0.29	24.38	0.28	15.01	4.40	5.30	1.08	1.63	0.23	2.81	1.59	3.14	93.78
	2498	2887	4644	27326	3622	2111	17195	792	69873	599	40762	11433	14786	4145	5027	560	9529	5144	9528	276979

colon and rectum

In 2005–2009, mortality rates from colorectal cancer in men were lower than in North America in most Latin American countries. Rates were below 10.5/100 000, with the exception of Puerto Rico, Argentina and Uruguay, where rates were about 13, 16 and 19/100 000 men, respectively, compared with 12/100 000 in the USA (Table 1; supplementary Figure S1b, available at *Annals of Oncology* online). Less marked differences were registered in women, for whom most countries had rates between 6.5 and 10/100 000 (Table 2; supplementary Figure S1b, available at *Annals of Oncology* online). The lowest female rates (4/100 000) were in Mexico and the highest in Uruguay and Cuba (12/100 000 women). Similar patterns were registered in middle-aged populations (supplementary Tables S1–S2 and Figure S2b, available at *Annals of Oncology* online). Colorectal cancer mortality patterns were less favorable in Latin America than in the USA (for which APC were lower than −2% over the last decade in both sexes), with even slight but continuous increases during the last two decades in most countries, with the lowest significant APC of 0.3% in Uruguay and the highest APC (∼2%), in Brazil, Colombia, Ecuador and Puerto Rico (Figure 1; supplementary Table S3, available at *Annals of Oncology* online).

lung (including trachea, bronchus and lung)

Between 2005 and 2009, lung cancer mortality rates in men were lower in most Latin American countries than in North America (39 and 37/100 000 in the USA and Canada, respectively). The highest rates were registered in Uruguay, Cuba and Argentina (43, 38 and 30/100 000, respectively), whereas the lowest ones were observed in Ecuador, Costa Rica and Mexico (6.4, 7.8 and 10/100 000, respectively) (Table 1; supplementary Figure S1c, available at *Annals of Oncology* online). In women, lung cancer mortality rates were below 10/100 000 for all countries with the exception of Cuba (18/100 000 women). These rates were appreciably lower than those in the USA and Canada (∼25/100 000 women) (Table 2; supplementary Figure S1c, available at *Annals of Oncology* online). In men, after rises in the 1980s, all countries showed steady, though moderate, decreases in lung cancer mortality, except Argentina and Ecuador where the decline started earlier (mid-1980s). Only in Colombia, Cuba and Venezuela, some increases were registered during the last decade (APC between 0.5% and 0.8%). Female lung cancer mortality increased over the last three decades, except in Costa Rica and Mexico, for which a moderate downward trend (APC ∼−2.5%) was evident since the mid-1990s (Figure 1; supplementary Table S3, available at *Annals of Oncology* online).

breast

The highest breast cancer mortality rates were registered in Uruguay and Argentina (i.e. 20 and 19/100 000, respectively) while, in North America (and Cuba), rates were ∼15/100 000. In most other countries, rates were between 10 and 13/100 000 while, in Colombia, Mexico and Ecuador, rates were below 10/100 000 (Table 2; supplementary Figure S1d, available at *Annals of Oncology* online). Over the last two decades, rates remained stable in most countries except Brazil, Colombia, Ecuador and Venezuela for which some rises were evident. In middle-aged women, slight declines occurred since the early 1990s in Argentina, Costa Rica, Puerto Rico and Uruguay (Figure 1; supplementary Table S2 and Figure S2d, available at *Annals of Oncology* online) with APC lower than −1%. Conversely, in the USA, breast cancer mortality has been steadily and appreciably declining, particularly in middle-aged women, over the last two decades (Figure 1; supplementary Table S3, available at *Annals of Oncology* online).

uterus, mainly cervix uteri

Uterine cancer rates remained exceedingly high in Latin America, particularly in Venezuela, Cuba and Ecuador, with rates higher than 11/100 000 and 21/100 000 in all-ages and middle-aged women, respectively (Table 2; supplementary Table S2, Figures S1d and S2d, available at *Annals of Oncology* online). In most other countries, rates were between 7–10/100 000 in all women and 11–19/100 000 at age 35–64. Only in Puerto Rico, rates were similar to those registered in the USA and Canada (about 4 and 7/100 000 in all-ages and in middle-aged women, respectively). Steady falls were observed since the 1980s, particularly in middle-aged women, but the extent of the decline remained limited, particularly in Argentina, Brazil, Ecuador, Uruguay and Venezuela with APC that remained around −1.5% (Figure 1; supplementary Table S3, available at *Annals of Oncology* online). The distinction between cervix and corpus uteri is difficult in several countries, since an appreciable and variable proportion of deaths are registered as 'uterus, unspecified'. Still, when only deaths registered as cervix uteri were considered, in 2005–2009, the higher rates were in Venezuela (10/100 000), Mexico (8.0/100 000) and Colombia (7.7/100 000) (supplementary Table S5, available at *Annals of Oncology* online).

prostate

Between 2005 and 2009, Cuba, Uruguay and Venezuela showed the highest prostate cancer mortality rates (over 18/100 000 overall), while most other countries (i.e. Chile, Argentina, Costa Rica, Puerto Rico, Colombia and Brazil) had overall rates between 13 and 17/100 000 (Table 1; supplementary Figure S1d, available at *Annals of Oncology* online). Uruguay, Venezuela and Cuba had also exceedingly high rates in middle-aged men (8–10/100 000 men) (supplementary Table S1 and Figure S2d, available at *Annals of Oncology* online). The lowest rates were in Ecuador and Mexico, comparable with those of North America, i.e. ∼10–11/100 000 overall and 4/100 000 in middle age (Table 1; supplementary Table S1, Figures S1d and S2d, available at *Annals of Oncology* online). At all ages, some upward trends were observed in Cuba and Brazil (APC = 1.4% since 1980 and 1997, respectively), Colombia and Ecuador (APC of about 1% since the 1980s), whereas, after the rise in the 1980s, downward trends, with APC of about −1%, were registered in Argentina, Chile, Costa Rica and Puerto Rico since 1992 and Mexico since 2002, for which APC were around −2% (Figure 1; supplementary Table S3, available at *Annals of Oncology* online).

Below age 65, no appreciable trends were observed except for Puerto Rico, Argentina, Colombia and Mexico, where declining trends were observed (Figure 1; supplementary Table S3, available at *Annals of Oncology* online). In the USA, mortality from prostate cancer has been appreciably declining.

leukemias

In all countries, mortality from leukemias was comparable with that of North America in both sexes, with rates in men between 3.4/100 000 in Brazil and 4.5/100 000 in Uruguay and ~5/100 000 in Canada and the USA (Table 1; supplementary Figure S1g, available at *Annals of Oncology* online). In women, rates were ~3/100 000 except in Puerto Rico where the rate was 2.2/100 000 women (Table 2; supplementary Figure S1g, available at *Annals of Oncology* online). In the USA, a steady decrease in mortality from leukemia was observed since the early 1980s, whereas trends in Latin American countries were less consistent, with limited declines in Argentina, Chile, Costa Rica, Cuba, Puerto Rico and Venezuela, and increases in Brazil and Ecuador (Figure 1; supplementary Table S3, available at *Annals of Oncology* online). In Mexico, mortality leveled off in 2002 after two decades of increase (Figure 1; supplementary Table S3, available at *Annals of Oncology* online).

discussion

Over the last decade, total cancer mortality rates remained comparatively low in most Latin American countries with a few exceptions, i.e. Uruguay, Cuba, Argentina and Chile, whose rates are comparable with those of the USA and Canada. Favorable trends were registered in most countries over the last three decades, except for Brazil and Cuba, for which unfavorable total cancer mortality trends were observed. This reflects site-specific unfavorable patterns such as breast cancer in Brazil, uterine (cervix) cancer in Cuba, and prostate and lung cancer in both countries. The falls in all cancer mortality are more marked in middle-age in all countries except Brazil, suggesting that further declines are likely in the near future.

Lung cancer mortality trends essentially reflect differences in the stage and degree of the tobacco epidemic [9]. Even though, in most Latin American countries, mortality rates continue to be lower than in the USA, concerns still persist for women, given recent unfavorable trends in smoking prevalence [10, 11].

The favorable trends in gastric cancer mortality in Latin America mainly reflect better food preservation [12, 13] and, at least in men, the possible reduction in tobacco smoking [14]. However, mortality from stomach cancer is still comparatively high in Latin America. This may be due to the high prevalence of *Helicobacter pylori* in these countries [15, 16], but also to unfavorable dietary habits such as high consumption of red and processed meat and salt [17].

Even if colorectal cancer remained lower in most Latin American countries than in the USA and Canada, temporal trends were unfavorable in most countries, probably as a consequence of modifications in dietary and lifestyle habits. Latin America is undergoing a nutritional transition with a progressive increase in the prevalence of obesity, with ~23% of the population recently classified overweight or obese [10, 18]. Conversely, in the USA, a marked decrease in colorectal cancer incidence was registered in both sexes, which largely reflects detection and removal of precancerous lesions through colorectal cancer screening, and improved treatment [19]. Trends in Latin America indicate that screening, early detection and management of colorectal cancer remain inadequate in most areas of the continent.

In most Latin American countries, breast cancer is the leading cause of cancer death in women, except in Cuba, where lung cancer is higher [1]. The upward trends in breast cancer mortality may be partly attributable to changes in reproductive habits (i.e. reduced number of children [20]), as a consequence of socioeconomic development, but also to geographical differences in access to screening, early diagnosis and treatment services [21, 22]. Delays in the adoption of adequate prevention plans and treatments are also the reason for the persisting exceedingly high mortality rates for cervical cancer in all Latin America [23, 24], even though a high prevalence of Human papillomavirus remains a key factor. In Mexico and Costa Rica, the prevalence was estimated to be ~20% in women with normal cytology [25].

Changes in the diagnosis and certification of prostate cancer may partly explain the upward trends in Latin America, particularly among the elderly. The high rates registered in most Latin American countries may reflect the lack of early detection [26]. The favorable trends observed in some countries (i.e. Chile, Argentina and Costa Rica) since the late 1990s may reflect improvements in the management of the disease.

No major differences emerged in mortality from leukemias between Latin and North American countries, even though trends in Latin America were less favorable. As for prostate cancer (testicular cancer and Hodgkin's disease), this suggest delays in the adoption of modern effective therapeutic schemes, particularly in the younger population [27].

Integrated cancer prevention campaigns, efficient screening programs and the access to treatment, whenever effective, continue to be the critical issues of most Latin American countries in the 2000s. Even though all the countries considered are classified as having a high development index (HDI) [28], large inequalities persist between and within countries that strongly affect the availability of health care [27, 29].

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disclosure

The authors have declared no conflicts of interest.

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