# PEDIATRIC CANCER IN IDAHO 2002-2011

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The Idaho Hospital Association (IHA) contracts with, and receives funding from, the Idaho Department of Health and Welfare, Division of Public Health, to provide a statewide cancer surveillance system: the Cancer Data Registry of Idaho (CDRI).

The statewide cancer registry database is a product of collaboration among many report sources, including hospitals, physicians, surgery centers, pathology laboratories, and other states in which Idaho residents are diagnosed and/or treated for cancer. Their cooperation in reporting timely, accurate, and complete cancer data is acknowledged and sincerely appreciated.

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## Pediatric Cancer in Idaho, 2002-2011

Although relatively rare in comparison with cancer in older adults, cancer is the second leading cause of death in persons aged 1-14 years. The epidemiology of cancer among children differs markedly from that of adults, both in the patterns of anatomic sites involved and the predominant histologic types. Most notably, the tumors diagnosed in children frequently involve the hematopoietic and central nervous systems or are of mesenchymal origin. In contrast, malignancies of epithelial tissues, which are predominant in adults, are uncommon in children. Similar to adult cancers, the etiology of many childhood cancers remains unclear.

The Cancer Data Registry of Idaho (CDRI) receives several requests per year from physicians and others for data on pediatric cancer incidence for the State of Idaho. This report describes the incidence of pediatric cancers in Idaho, with comparisons to data from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) Program and the US Centers for Disease Control and Prevention's National Program of Cancer Registries (NPCR). SEER currently collects and publishes cancer incidence and survival data from population-based cancer registries covering approximately 26 percent of the US population and is considered the standard for quality among cancer registries around the world. NPCR supports central cancer registries in 45 states, the District of Columbia, Puerto Rico, and the U.S. Pacific Island Jurisdictions. These data represent 96% of the U.S. population. Together, NPCR and SEER collect data for the entire U.S. population. NPCR and SEER data are used in this report for pediatric cancer incidence rankings by state.

#### **METHODS**

The data analyzed for this report include cancers diagnosed between 2002 and 2011 among Idaho residents less than 20 years of age. Cases were grouped according to the International Classification of Childhood Cancer (ICCC) based on site and morphology coded according to ICD-O-3.<sup>3</sup>

A total of 879 cases were diagnosed among Idaho resident children under the age of 20 between 2002 and 2011. This number includes 794 malignant cancers and 65 benign and borderline behavior neoplasms. It was not possible to assign a group code of the ICCC system to 17 cases. Twenty cases were in situ, which are not included in the ICCC system. Health District was assigned from county of residence at time of diagnosis. All rates presented were calculated per million population, and are averages for the period 2002 through 2011 (rates per million, rather than per 100,000, are commonly used for pediatric cancers). Age-adjustment was performed using the direct method to the 2000 U.S. standard population. Cancer incidence, mortality and survival statistics were calculated using SEER\*Stat.<sup>4</sup> State rankings were obtained through CDC WONDER.<sup>2</sup>

#### **RESULTS**

A total of 842 cases that met the study criteria were diagnosed among Idaho residents aged less than 20 years between 2002 and 2011, yielding an overall ageadjusted rate of 185.3 cases per million population. In comparison, the SEER rate for Whites was 211.3 cases per million population for 2009-2011. The distribution of pediatric cancers by ICCC grouping was very similar for Idaho and SEER Regions. Idaho's pediatric rate of lymphoid leukemias was about 20% lower than the rate for SEER Whites. For no ICCC grouping did Idaho show a statistically significantly higher rate than SEER Regions based on the comparison of 95% confidence intervals.

For all races combined, Idaho ranked 16<sup>th</sup> highest among states in pediatric (ages 0-19) cancer incidence 2002-2010.<sup>2</sup> This result is partially related to differences in the distribution of race by state. Pediatric cancer incidence is higher among Whites, and Idaho has a higher proportion of White residents than many states. Among Whites, Idaho ranked 24<sup>th</sup> in pediatric cancer incidence.

Over 80% of children aged less than 20 years diagnosed with malignant cancer survived at least 5 years after their diagnosis, both in Idaho and SEER Regions. For no ICCC major classification category, nor overall, was there a statistically significant difference in 5-year relative survival between Idaho and SEER cases.

Pediatric cancer incidence increased at a rate of about 0.6% per year in Idaho from 1975 to 2011. This parallels the long term increase observed in SEER Regions from 1973 to 2011 of about 0.7% per year.

Health District 2 had statistically significantly lower (p<.05) rates of ICCC major classification category I (leukemias, myeloproliferative & myelodysplastic diseases), XI (other malignant epithelial neoplasms and melanomas), and all sites combined than the State of Idaho. Health District 4 had a statistically significantly higher rate and Health District 6 had a statistically significantly lower rate of ICCC major classification category XI (other malignant epithelial neoplasms and melanomas) than the State of Idaho. This may indicate underreporting of melanomas and thyroid carcinomas from Health District 6. CDRI is working to increase reporting of cancer cases by pathology laboratories and physicians statewide. For no other ICCC major classification category was there a statistically significant difference between any health district and the State of Idaho.

From 2002 to 2012, 123 of Idaho's children aged 0-19 died from some form of cancer. The leading types of cancer mortality were leukemia and brain and other central nervous system. While pediatric cancer incidence rates have increased over time, mortality rates have decreased. From 1975-2010, pediatric cancer mortality rates have decreased about 2% per year, in Idaho and the U.S. The annual rates plotted for Idaho demonstrate large year-to-year variability that is expected due to the relatively small numbers of deaths per year. Idaho ranked 34th highest among states in pediatric (ages 0-19) cancer mortality 2002-2010.

#### CONCLUSIONS

These data demonstrate strong similarity in pediatric cancer incidence and survival patterns between Idaho and SEER Regions. Compared with cancer in adults, there is less geographic variability in pediatric cancer incidence.

Largely because of improvements in therapy for pediatric cancers, there has been a decrease in mortality rates over time. Data collected by CDRI for 2012 show that approximately 20% of pediatric patients participated in clinical trials at Idaho institutions. In addition, many pediatric cases are treated out-of-state, and may be enrolled in clinical trials through out-of-state treatment facilities. While this clinical trial participation rate is much higher than that for adults (2-3%), there remains room for improvement.

# Pediatric Cancer Incidence in Idaho and SEER Regions (Ages 0-19)

	Ida	aho 2002-2	2011	SI	ER 2009	-2011
Site/Type of Cancer	Rate	Cases	Pop	Rate	Cases	Pop
All Sites Combined	185.3	842	4,514,821	211.3	5,130	24,094,655
I Leukemias, myeloproliferative & myelodysplastic diseases	44.9	205	4,514,821	54.8	1,327	24,094,655
I(a) Lymphoid leukemias	33.5	153	4,514,821	41.8	1,011	24,094,655
I(b) Acute myeloid leukemias	6.5	30	4,514,821	8.7	211	24,094,655
I(c) Chronic myeloproliferative diseases	2.0	9	4,514,821	2.1	51	24,094,655
I(d) Myelodysplastic syndrome and other myeloproliferative	1.7	8	4,514,821	1.3	32	24,094,655
I(e) Unspecified and other specified leukemias	1.1	5	4,514,821	0.9	22	24,094,655
II Lymphomas and reticuloendothelial neoplasms	22.0	99	4,514,821	29.9	726	24,094,655
II(a) Hodgkin lymphomas	11.8	53	4,514,821	13.5	329	24,094,655
II(b) Non-Hodgkin lymphomas (except Burkitt lymphoma)	6.2	28	4,514,821	9.8	236	24,094,655
II(c) Burkitt lymphoma	2.2	10	4,514,821	3.0	73	24,094,655
II(d) Miscellaneous lymphoreticular neoplasms	1.5	7	4,514,821	3.2	78	24,094,655
II(e) Unspecified lymphomas	0.2	1	4,514,821	0.4	10	24,094,655
III CNS and misc intracranial and intraspinal neoplasms	42.4	192	4,514,821	48.3	1,167	24,094,655
III(a) Ependymomas and choroid plexus tumor	2.6	12	4,514,821	4.4	107	24,094,655
III(b) Astrocytomas	17.4	79	4,514,821	16.3	393	24,094,655
III(c) Intracranial and intraspinal embryonal tumors	7.1	32	4,514,821	7.7	186	24,094,655
III(d) Other gliomas	4.4	20	4,514,821	5.1	123	24,094,655
III(e) Other specified intracranial/intraspinal neoplasms	10.9	49	4,514,821	13.6	331	24,094,655
III(f) Unspecified intracranial and intraspinal neoplasms	0.0	0	4,514,821	1.1	27	24,094,655
IV Neuroblastoma and other peripheral nervous cell tumors	8.1	38	4,514,821	7.6	186	24,094,655
IV(a) Neuroblastoma and ganglioneuroblastoma	7.9	37	4,514,821	7.5	182	24,094,655
IV(b) Other peripheral nervous cell tumors	0.2	1	4,514,821	0.2	4	24,094,655
V Retinoblastoma	3.8	18	4,514,821	2.9	72	24,094,655
VI Renal tumors	5.6	26	4,514,821	7.1	174	24,094,655
VI(a) Nephroblastoma and other nonepithelial renal tumors	5.4	25	4,514,821	6.6	160	24,094,655
VI(b) Renal carcinomas	0.2	1	4,514,821	0.6	14	24,094,655
VI(c) Unspecified malignant renal tumors	0.0	0	4,514,821	0.0	0	24,094,655
VII Hepatic tumors	2.6	12	4,514,821	2.7	67	24,094,655
VII(a) Hepatoblastoma	1.7	8	4,514,821	2.1	51	24,094,655
VII(b) Hepatic carcinomas	0.9	4	4,514,821	0.7	16	24,094,655
VII(c) Unspecified malignant hepatic tumors	0.0	0	4,514,821	0.0	0	24,094,655
VIII Malignant bone tumors	10.8		4,514,821	9.6		24,094,655
VIII(a) Osteosarcomas	7.6	34	4,514,821	5.3	127	24,094,655
VIII(b) Chondrosarcomas	0.2	1	4,514,821	0.3	8	24,094,655
VIII(c) Ewing tumor and related sarcomas of bone	2.9	13	4,514,821	3.4	82	24,094,655
VIII(d) Other specified malignant bone tumors	0.0	0	4,514,821	0.4	9	24,094,655
VIII(e) Unspecified malignant bone tumors	0.0	0	4,514,821	0.2	4	24,094,655
IX Soft tissue and other extraosseous sarcomas	11.3	51	4,514,821	11.9	288	24,094,655
IX(a) Rhabdomyosarcomas	4.0		4,514,821	4.4	106	24,094,655
IX(b) Fibrosarcomas, peripheral nerve & other fibrous	1.5	7	4,514,821	1.0	25	24,094,655
IX(c) Kaposi sarcoma	0.0	0	4,514,821	0.1	3	24,094,655
IX(d) Other specified soft tissue sarcomas	3.5		4,514,821	4.9	119	24,094,655
IX(e) Unspecified soft tissue sarcomas	2.2		4,514,821	1.4	35	24,094,655
X Germ cell & trophoblastic tumors & neoplasms of gonads	11.2	51		14.9	366	24,094,655
X(a) Intracranial & intraspinal germ cell tumors	0.6	3	4,514,821	2.0	49	24,094,655
X(b) Extracranial & extragonadal germ cell tumors	1.1	5	4,514,821	1.5	37	24,094,655
X(c) Malignant gonadal germ cell tumors	8.4	38	4,514,821	10.4	258	24,094,655
X(d) Gonadal carcinomas	0.9	4	4,514,821	0.7	18	24,094,655
X(e) Other and unspecified malignant gonadal tumors	0.2	1	4,514,821	0.2	4	24,094,655

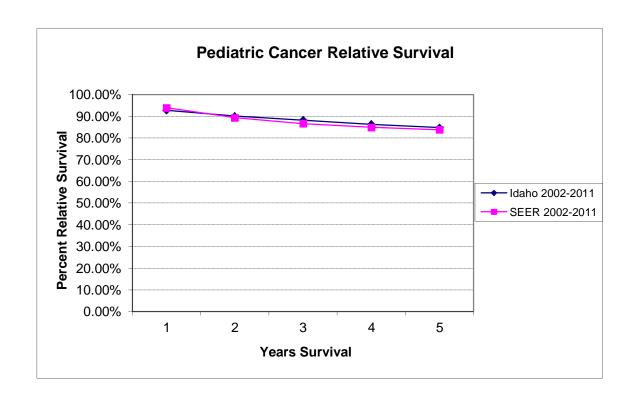
## Pediatric Cancer Incidence in Idaho and SEER Regions (Ages 0-19) - continued

	Idaho 2002-2011			S	-2011	
Site/Type of Cancer	Rate	Cases	Pop	Rate	Cases	Pop
XI Other malignant epithelial neoplasms and melanomas	22.3	100	4,514,821	20.9	512	24,094,655
XI(a) Adrenocortical carcinomas	0.0	0	4,514,821	0.3	8	24,094,655
XI(b) Thyroid carcinomas	9.8	44	4,514,821	10.4	255	24,094,655
XI(c) Nasopharyngeal carcinomas	0.2	1	4,514,821	0.5	12	24,094,655
XI(d) Malignant melanomas	7.5	34	4,514,821	4.8	118	24,094,655
XI(e) Skin carcinomas	0.0	0	4,514,821	0.1	3	24,094,655
XI(f) Other and unspecified carcinomas	4.7	21	4,514,821	4.7	116	24,094,655
XII Other and unspecified malignant neoplasms	0.4	2	4,514,821	0.6	15	24,094,655
XII(a) Other specified malignant tumors	0.4	2	4,514,821	0.4	9	24,094,655
XII(b) Other unspecified malignant tumors	0.0	0	4,514,821	0.2	6	24,094,655
Not classified by ICCC or in situ	8.1	37	4,514,821	7.1	174	24,094,655

Rates are per 1,000,000 and age-adjusted to the 2000 U.S. standard.

SEER data are for White race. Cases and rates are for benign, borderline, and malignant behavior.

Statistical Note: Rates based upon 10 or fewer cases (numerator) should be interpreted with caution.



# Five-Year Relative Cancer Survival by Major ICCC Classification Category

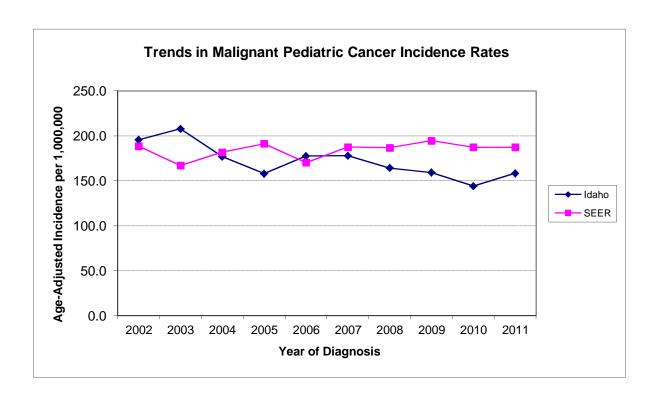
		Idaho 200	2-2011		2-2011	
Site/Type of Cancer	Cases	% Survival	95% CI	Cases	% Survival	95% CI
All Sites Combined	768	84.7%	81.6% - 87.3%	14,810	83.8%	83.1% - 84.4%
I Leukemias, myeloproliferative & myelodysplastic diseases	193	84.7%	77.8% - 89.6%	4,093	83.6%	82.3% - 84.9%
II Lymphomas and reticuloendothelial neoplasms	96	92.4%	83.1% - 96.6%	2,081	91.2%	89.8% - 92.5%
III CNS and misc intracranial and intraspinal neoplasms	138	80.3%	71.8% - 86.5%	2,503	75.0%	73.1% - 76.9%
IV Neuroblastoma and other peripheral nervous cell tumors	38	77.7%	58.0% - 89.0%	664	81.2%	77.5% - 84.3%
V Retinoblastoma	18	93.1%	57.9% - 99.1%	264	98.1%	94.7% - 99.3%
VI Renal tumors	26	94.2%	64.4% - 99.2%	517	88.6%	85.0% - 91.4%
VII Hepatic tumors	12	58.4%	27.0% - 80.2%	224	73.4%	66.4% - 79.2%
VIII Malignant bone tumors	44	74.5%	55.8% - 86.2%	758	70.9%	66.9% - 74.6%
IX Soft tissue and other extraosseous sarcomas	51	76.5%	59.9% - 86.9%	974	74.0%	70.7% - 76.9%
X Germ cell & trophoblastic tumors & neoplasms of gonads	51	90.1%	77.2% - 95.9%	1,142	92.6%	90.7% - 94.1%
XI Other malignant epithelial neoplasms and melanomas	99	92.4%	84.3% - 96.4%	1,549	93.0%	91.4% - 94.3%
XII Other and unspecified malignant neoplasms	2	+	+ - +	41	84.5%	65.7% - 93.5%

<sup>+</sup> The statistic could not be calculated.

Malignant Pediatric Cancer Incidence in Idaho and SEER Regions (Ages 0-19)

Year of	ldah	no 2002-20	)11	SE	ER 2002-2	2011
Diagnosis	Rate	Cases	Pop	Rate	Cases	Pop
Total	171.6	780	4,514,821	184.3	15,097	81,328,748
2002	195.7	83	421,525	188.6	1,563	8,283,179
2003	207.9	89	424,477	167.1	1,381	8,246,604
2004	177.0	77	429,860	181.9	1,503	8,213,472
2005	158.1	70	439,230	191.3	1,575	8,166,849
2006	177.7	81	449,429	170.3	1,397	8,130,741
2007	177.9	83	460,456	187.6	1,536	8,099,740
2008	164.3	77	468,822	186.9	1,530	8,093,508
2009	159.4	76	472,822	194.8	1,588	8,075,140
2010	144.2	69	474,858	187.5	1,515	8,027,765
2011	158.4	75	473,342	187.5	1,509	7,991,750

Rates are per 1,000,000 and age-adjusted to the 2000 U.S. standard.



## Pediatric Cancer Incidence in Idaho (Ages 0-19) by Health District, Major Classification Categories

	Health District 1				Health District 2		Health District 3			
Site/Type of Cancer	Rate	95% CI	Cases	Rate	95% CI	Cases	Rate	95% CI	Cases	
All Sites Combined	158.3	126.6 - 195.5	86	93.0	59.7 - 138.4	25	200.3	170.0 - 234.4	156	
I Leukemias, myeloproliferative & myelodysplastic diseases	47.7	30.8 - 70.3	25	17.3	4.7 - 43.8	4	49.0	34.8 - 67.0	39	
II Lymphomas and reticuloendothelial neoplasms	21.2	10.9 - 37.2	12	17.3	5.5 - 41.8	5	26.4	16.1 - 40.8	20	
III CNS and misc intracranial and intraspinal neoplasms	25.5	13.9 - 42.9	14	24.1	9.5 - 51.1	7	45.7	32.0 - 63.3	36	
IV Neuroblastoma and other peripheral nervous cell tumors	9.7	3.1 - 22.5	5	8.9	1.1 - 31.1	2	4.7	1.3 - 12.2	4	
V Retinoblastoma	1.9	0.0 - 10.6	1	0.0	0.0 - 15.0	0	2.3	0.3 - 8.7	2	
VI Renal tumors	5.8	1.2 - 16.8	3	0.0	0.0 - 15.0	0	12.0	5.7 - 22.2	10	
VII Hepatic tumors	3.8	0.5 - 13.6	2	0.0	0.0 - 15.0	0	0.0	0.0 - 4.7	0	
VIII Malignant bone tumors	10.8	4.0 - 23.6	6	12.4	2.5 - 35.9	3	7.9	2.9 - 17.1	6	
IX Soft tissue and other extraosseous sarcomas	5.2	1.1 - 15.5	3	0.0	0.0 - 15.0	0	5.2	1.4 - 13.3	4	
X Germ cell & trophoblastic tumors & neoplasms of gonads	9.0	2.9 - 21.1	5	10.2	2.0 - 31.5	3	18.7	10.2 - 31.2	14	
XI Other malignant epithelial neoplasms and melanomas	17.7	8.5 - 32.7	10	2.9	0.1 - 19.7	1	28.4	17.5 - 43.2	21	
XII Other and unspecified malignant neoplasms	0.0	0.0 - 6.9	0	0.0	0.0 - 15.0	0	0.0	0.0 - 4.7	0	

		Health District 4		Health District 5			Health District 6			Health District 7		
Site/Type of Cancer	Rate	95% CI	Cases	Rate	95% CI	Cases	Rate	95% CI	Cases	Rate	95% CI	Cases
All Sites Combined	211.1	185.7 - 239.0	250	191.5	156.8 - 231.6	106	198.0	162.4 - 239.1	108	166.0	136.2 - 200.3	109
I Leukemias	55.4	42.9 - 70.3	67	50.0	33.2 - 72.3	28	33.1	19.6 - 52.2	18	37.6	24.1 - 55.9	24
II Lymphomas	17.3	10.6 - 26.7	20	29.2	16.7 - 47.3	16	24.5	13.0 - 41.7	13	18.0	9.3 - 31.6	12
III CNS and	42.4	31.6 - 55.8	51	48.7	32.1 - 70.9	27	57.4	39.0 - 81.4	31	39.6	25.9 - 58.1	26
IV Neuroblastoma	10.5	5.6 - 17.9	13	3.4	0.4 - 12.5	2	13.9	6.0 - 27.6	8	5.9	1.6 - 15.1	4
V Retinoblastoma	4.0	1.3 - 9.4	5	5.2	1.1 - 15.4	3	5.3	1.1 - 15.7	3	5.8	1.6 - 15.0	4
VI Renal tumors	4.8	1.8 - 10.5	6	1.7	0.0 - 9.7	1	5.3	1.1 - 15.7	3	4.5	0.9 - 13.3	3
VII Hepatic tumors	5.7	2.3 - 11.7	7	3.5	0.4 - 12.8	2	0.0	0.0 - 6.7	0	1.7	0.0 - 9.0	1
VIII Malignant bone tumors	9.6	4.8 - 17.1	11	18.5	8.9 - 33.9	10	13.2	5.3 - 27.0	7	8.3	2.7 - 19.1	5
IX Soft tissue	17.1	10.4 - 26.4	20	7.4	2.0 - 18.8	4	21.5	11.1 - 37.6	12	12.1	5.2 - 23.8	8
X Germ cell	10.6	5.5 - 18.4	12	7.2	2.0 - 18.5	4	16.4	7.5 - 31.1	9	5.5	1.5 - 14.4	4
XI Other malig epithelial	33.8	23.9 - 46.3	38	16.6	7.6 - 31.5	9	7.5	2.0 - 19.1	4	24.1	13.7 - 39.2	16
XII Other/unspecified	0.0	0.0 - 3.1	0	0.0	0.0 - 6.6	0	0.0	0.0 - 6.7	0	2.9	0.3 - 10.6	2

Rates are per 1,000,000 and age-adjusted to the 2000 U.S. standard.

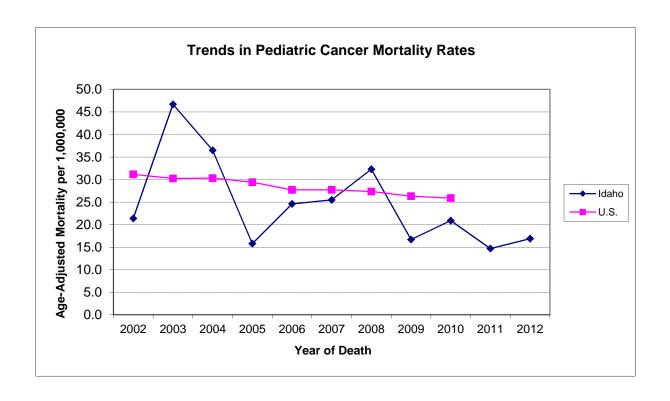
Confidence intervals (CIs) are 95% for rates.

Statistical Note: Rates based upon 10 or fewer cases (numerator) should be interpreted with caution.

Pediatric Cancer Mortality in Idaho and the U.S. (Ages 0-19)

Year of	Idah	o 2002-20	)12	U	.S. 2002-2	010
Death	Rate	Deaths	Pop	Rate	Deaths	Pop
Total	24.5	123	4,986,005	28.4	21,136	741,016,922
2002	21.4	9	421,525	31.2	2,530	81,173,400
2003	46.7	20	424,477	30.3	2,466	81,425,816
2004	36.5	16	429,860	30.3	2,481	81,754,354
2005	15.8	7	439,230	29.4	2,420	82,005,260
2006	24.6	11	449,429	27.7	2,291	82,324,418
2007	25.5	12	460,456	27.7	2,302	82,749,431
2008	32.3	15	468,822	27.4	2,286	83,118,264
2009	16.7	8	472,822	26.3	2,200	83,280,391
2010	20.9	10	474,858	25.9	2,160	83,185,588
2011	14.7	7	473,342			
2012	16.9	8	471,184			

Rates are per 1,000,000 and age-adjusted to the 2000 U.S. standard.



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