State of New Jersey
DEPARTMENT OF HEALTH AND SENIOR SERVICES
DIVISION OF EPIDEMIOLOGY, ENVIRONMENTAL AND OCCUPATIONAL HEALTH
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Governor

CLIFTON R. LACY, M.D.
Commissioner

March 18, 2003

Carol Wolff
Camden Area Health Education Center
514 Cooper Street
Camden, New Jersey 08102

Dear Ms. Wolff:

As requested by the Camden Health Study Task Force, I am providing an analysis completed by Consumer and Environmental Health Services staff regarding concerns of residents of Camden City of elevated cancer incidence.

To evaluate cancer incidence, we have utilized data from the New Jersey State Cancer Registry (NJSCR), a population-based registry where all newly diagnosed cases of cancer are reported by law. The NJSCR data provides an opportunity to evaluate whether the number of reported cases was higher than expected over a 20-year period, 1979 through 1998.

A total of 6,446 newly diagnosed malignant cancer cases have been reported to the NJSCR over the 20-year period for Camden City. Table 1 presents a description of the age, race, sex, and Hispanic breakdown for Camden City. Tables 2 through 5 present a listing of the number of cancer cases by cancer type for all races combined, African-American, White, and Hispanic ethnicity.

Because Hispanic ethnicity is self-reported and considered to be incomplete in the NJSCR database, an Hispanic algorithm developed by the Illinois State Cancer Registry was adapted and used by the NJSCR to identify cases with Hispanic origin. This algorithm was used to evaluate Hispanic ethnicity in a recently released department report, *Cancer Incidence and Mortality in New Jersey 1996-2000.*

Analysis of cancer was completed using Standardized Incidence Ratios (SIR). The SIR is calculated by dividing the observed number of cases by the expected number. The expected number of cases is based on the Camden City population size and age distribution and the average annual cancer incidence rates for the whole State of New Jersey from 1979 through 1998. The Hispanic ethnicity analysis used State rates from 1996 through 2000. Camden City population estimates were derived from the U.S. Census Bureau for the years 1980, 1990 and 2000. The cancer types evaluated include all malignant cancers combined, bladder, bone and joint, brain and central nervous system (CNS), female breast, colorectal, esophagus, kidney, leukemia, liver, lung, non-Hodgkin's lymphoma, pancreas, and stomach. Selection of these cancer types was based on previous environmental epidemiologic studies as well as

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input from the Task Force.

The statistical test used to evaluate the difference between the observed and expected numbers was the 95% confidence interval. If the confidence interval includes 1.0, then the observed and expected numbers are not considered to be statistically significantly different from each other.

Tables 6 through 9 present the SIR findings. Twenty-nine of the 108 SIRs calculated were either statistically significantly high (22) or significantly low (7). For all races combined, esophageal, lung and stomach cancers were statistically significantly high for both males and females while bladder and brain/CNS cancers were statistically significantly low for both sex groups . The one cancer type which appeared to be significantly high across all race-sex groups was lung cancer.

In order to further evaluate lung cancer incidence, 3-year average annual rates age-standardized to the 2000 U.S. standard population were calculated over the 20-year review period. Figure 1 presents the Camden African-American and White lung cancer rates and the State African-American and White annual lung cancer rates for males. While the Camden African-American lung cancer rates track slightly higher than the State African-American lung cancer rates, the Camden White lung cancer rates are substantially higher than the State lung cancer rates. Figure 2 presents the female lung cancer rates. Camden African-American and White females displayed higher rates during the 1990s relative to State lung cancer rates.

While there are multiple risk factors for lung cancer, tobacco smoking is considered the most important risk factor, estimated to account for more than 85% of all lung cancer cases. Other known risk factors for lung cancer include indoor exposure to radon and environmental tobacco smoke, occupational exposure to asbestos and other cancer-causing agents in the workplace (including radioactive ores; chemicals such as arsenic, vinyl chloride, nickel, chromates, coal products, mustard gas, and chloromethyl ethers; fuels such as gasoline; and diesel exhaust), and exposure to air pollution. Urban air pollution has long been suspected as a possible risk factor for lung cancer, however, epidemiologic studies have had difficulty establishing definitive links. One recent study did conclude that long-term exposure to combustion-related fine particulate air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality [Pope et. al, JAMA, 2002, Aug21:288(7)]. While exposure to ambient air pollution may slightly increase the risk of lung cancer, that risk is far less than that caused by cigarette smoking.

The most important risk factors for esophageal cancer are consumption of alcohol and tobacco products, which account for over 80% of the risk of squamous cell carcinoma of the esophagus. A number of studies have shown an association between esophageal cancer and low socioeconomic status, independent of smoking or drinking, which may be associated with poor nutrition.

In the 1930s, stomach cancer was the leading cause of death due to cancer in the United States. Since then, the death rates (and incidence rates) have dropped dramatically, approximately 80-90%. The decrease in stomach cancer rates is thought to be due, in part, to widespread refrigeration, which began in the 1930s. Refrigeration reduced the need for other methods of food preservation and allowed access to fresh fruits and vegetables year round, which is thought to be beneficial in reducing the risk of stomach cancer.

If you have any further questions concerning these findings, please write, or call me at (609) 588-3120.

Sincerely,

Jerald A. Fagliano, M.P.H., Ph.D.
Program Manager

c: Dr. Eddy Bresnitz, Assistant Commissioner/State Epidemiologist, DEEOH
New Jersey State Cancer Registry
Robert Lentine, Camden County Division of Health

Table 1. Camden City Malignant Cancer Incidence (1979-1998)
Select Demographic Characteristics

Demographic Characteristic	Male	Female	Total
Race:			
African-American	1,684	1,540	3,224
White	1,611	1,485	3,096
Asian American	12	9	21
Other	44	39	83
Unknown	15	7	22
Total	3,366	3,080	6,446
Hispanic Ethnicity:	386	371	757
Age at Diagnosis:			
0-4	20	15	35
5-9	8	6	14
10-14	14	9	23
15-19	19	13	32
20-24	13	23	36
25-29	30	42	72
30-34	39	85	124
35-39	63	113	176
40-44	84	155	239
45-49	151	162	313
50-54	222	227	449
55-59	334	292	626
60-64	497	367	864
65-69	570	431	1,001
70-74	508	390	898
75-79	431	340	771
80-84	222	230	452
85+	141	180	321

Data from the New Jersey Department of Health and Senior Services' State Cancer Registry with analysis by the Department's Consumer and Environmental Health Services (March 2003).

Table 2. Camden City Malignant Cancer Incidence (1979-1998)
Cancer Type and Sex: All Races Combined

Cancer Type	Male	Female
Oralpharnyx	156	74
Esophagus	104	31
Stomach	116	77
Small Intestine	13	7
Colon	277	305
Rectal	124	110
Liver	31	16
Pancreas	78	89
Other Digestive	29	48
Lung	825	399
Other Respiratory	108	39
Bones and Joints	7	7
Soft Tissue	25	20
Melanoma	20	15
Other Skin	28	10
Breast	11	759
Cervix	-	198
Uterus	-	149
Ovary	-	125
Other Female Genital	-	26
Prostate	742	-
Other Male Genital	21	-
Bladder	135	63
Kidney	62	61
Other Urinary	<5	<5
Eye	<5	<5
Brain and Central Nervous System	37	34
Thyroid	5	33
Other Endocrine	6	<5
Hodgkin's Disease	23	16
Non-Hodgkin's Lymphoma	102	89
Myeloma	58	55
Leukemia	72	64
Miscellaneous	127	136
Other	16	14
Total	3,366	3,080

Data from the New Jersey Department of Health and Senior Services' State Cancer Registry with analysis by the Department's Consumer and Environmental Health Services (March 2003).

Table 3. Camden City Malignant Cancer Incidence (1979-1998)
Cancer Type and Sex: African-American

Cancer Type	Male	Female
Oralpharnyx	80	40
Esophagus	64	19
Stomach	57	44
Small Intestine	10	<5
Colon	125	140
Rectal	47	53
Liver	13	5
Pancreas	39	45
Other Digestive	10	20
Lung	416	228
Other Respiratory	51	15
Bones and Joints	5	<5
Soft Tissue	15	15
Melanoma	<5	<5
Other Skin	15	<5
Breast	6	396
Cervix	-	96
Uterus	-	69
Ovary	-	53
Other Female Genital	-	16
Prostate	443	-
Other Male Genital	<5	-
Bladder	46	31
Kidney	30	29
Other Urinary	0	<5
Eye	<5	<5
Brain and Central Nervous System	19	13
Thyroid	<5	15
Other Endocrine	<5	<5
Hodgkin's Disease	<5	12
Non-Hodgkin's Lymphoma	45	32
Myeloma	39	29
Leukemia	25	33
Miscellaneous	65	67
Other	0	<5
Total	1,684	1,540

Data from the New Jersey Department of Health and Senior Services' State Cancer Registry with analysis by the Department's Consumer and Environmental Health Services (March 2003).

Table 4. Camden City Malignant Cancer Incidence (1979-1998)
Cancer Type and Sex: Whites

Cancer Type	Male	Female
Oralpharnyx	73	33
Esophagus	36	12
Stomach	53	20
Small Intestine	<5	<5
Colon	148	161
Rectal	77	53
Liver	16	11
Pancreas	38	43
Other Digestive	16	28
Lung	400	170
Other Respiratory	56	24
Bones and Joints	0	<5
Soft Tissue	10	<5
Melanoma	15	11
Other Skin	12	6
Breast	5	354
Cervix	-	92
Uterus	-	78
Ovary	-	67
Other Female Genital	-	10
Prostate	284	-
Other Male Genital	17	-
Bladder	87	31
Kidney	31	31
Other Urinary	<5	<5
Eye	<5	<5
Brain and Central Nervous System	18	19
Thyroid	<5	15
Other Endocrine	<5	0
Hodgkin's Disease	17	<5
Non-Hodgkin's Lymphoma	51	54
Myeloma	19	25
Leukemia	42	31
Miscellaneous	61	67
Other	16	10
Total	1,611	1,485

Data from the New Jersey Department of Health and Senior Services' State Cancer Registry with analysis by the Department's Consumer and Environmental Health Services (March 2003).

Table 5. Camden City Malignant Cancer Incidence (1979-1998)
Cancer Type and Sex: Hispanics[1]

Cancer Type	Male	Female
Oralpharnyx	16	8
Esophagus	15	<5
Stomach	22	10
Small Intestine	<5	0
Colon	28	32
Rectal	8	11
Liver	6	<5
Pancreas	10	9
Other Digestive	8	6
Lung	58	19
Other Respiratory	8	7
Bones and Joints	<5	<5
Soft Tissue	<5	5
Melanoma	<5	<5
Other Skin	5	<5
Breast	0	94
Cervix	-	52
Uterus	-	19
Ovary	-	14
Other Female Genital	-	<5
Prostate	89	-
Other Male Genital	6	-
Bladder	16	<5
Kidney	9	6
Other Urinary	<5	0
Eye	<5	0
Brain and Central Nervous System	8	8
Thyroid	<5	12
Other Endocrine	<5	0
Hodgkin's Disease	10	<5
Non-Hodgkin's Lymphoma	18	16
Myeloma	5	8
Leukemia	19	10
Miscellaneous	10	6
Other	0	<5
Total	385	371

[1] Note: Hispanic ethnicity is independent of race designation. Cases designated Hispanic based on a computer algorithm used by the NJSCR.

Data from the New Jersey Department of Health and Senior Services' State Cancer Registry with analysis by the Department's Consumer and Environmental Health Services (March 2003).

Table 6. Camden City Malignant Cancer Incidence (1979-1998)
SIR Analysis by Cancer Type and Sex: All Races Combined

Cancer Type	Sex	Observed	Expected	SIR[1]		95% CI
All Cancers Combined	Male	3,366	2,975.9	1.13	*	1.09 - 1.17
	Female	3,080	3,123.3	0.99		0.95 - 1.02
Bladder	Male	135	213.8	0.63	**	0.53 - 0.75
	Female	63	82.5	0.76	**	0.59 - 0.98
Bone/Joint	Male	7	9.1	0.77		0.31 - 1.58
	Female	7	7.7	0.90		0.36 - 1.86
Brain/CNS	Male	37	53.4	0.69	**	0.49 - 0.96
	Female	34	47.8	0.71	**	0.49 - 0.99
Breast	Female	759	923.9	0.82	**	0.76 - 0.88
Colorectal	Male	401	416.7	0.96		0.87 - 1.06
	Female	415	426.9	0.97		0.88 - 1.07
Esophagus	Male	104	46.0	2.26	*	1.85 - 2.74
	Female	31	18.0	1.72	*	1.17 - 2.44
Kidney	Male	62	80.2	0.77	**	0.59 - 0.99
	Female	61	53.8	1.13		0.87 - 1.46
Leukemia	Male	72	91.6	0.79	**	0.62 - 0.99
	Female	64	76.1	0.84		0.65 - 1.07
Liver	Male	31	24.3	1.28		0.87 - 1.81
	Female	16	12.2	1.31		0.75 - 2.13
Lung	Male	825	523.0	1.58	*	1.47 - 1.69
	Female	399	341.6	1.17	*	1.06 - 1.29
Non-Hodgkin's Lymphoma	Male	102	112.7	0.91		0.74 - 1.10
	Female	89	105.7	0.84		0.68 - 1.04
Pancreas	Male	78	68.3	1.14		0.90 - 1.42
	Female	89	77.1	1.15		0.93 - 1.42
Stomach	Male	116	79.4	1.46	*	1.21 - 1.75
	Female	77	54.8	1.40	*	1.11 - 1.76

[1] Note: *=statistically high, **= statistically low.

$SIR = \frac{Observed}{Expected}$

Data from the New Jersey Department of Health and Senior Services' State Cancer Registry with analysis by the Department's Consumer and Environmental Health Services (March 2003).

Table 7. Camden City Malignant Cancer Incidence (1979-1998)
SIR Analysis by Cancer Type and Sex: African-American

Cancer Type	Sex	Observed	Expected	SIR[1]		95% CI
All Cancers Combined	Male	1,684	1,616.2	1.04		0.99 - 1.09
	Female	1,540	1,430.4	1.08	*	1.02 - 1.13
Bladder	Male	46	43.1	1.07		0.78 - 1.42
	Female	31	26.8	1.16		0.79 - 1.64
Bone/Joint	Male	5	3.9	1.30		0.42 - 3.02
	Female	<5	NR	1.47		0.40 - 3.76
Brain/CNS	Male	19	17.1	1.11		0.67 - 1.74
	Female	13	16.3	0.80		0.43 - 1.37
Breast	Female	396	391.2	1.01		0.92 - 1.12
Colorectal	Male	172	173.7	0.99		0.85 - 1.15
	Female	193	194.9	0.99		0.86 - 1.14
Esophagus	Male	64	57.4	1.12		0.86 - 1.42
	Female	19	20.4	0.93		0.56 - 1.46
Kidney	Male	30	37.0	0.81		0.55 - 1.16
	Female	29	24.3	1.19		0.80 - 1.71
Leukemia	Male	25	33.3	0.75		0.49 - 1.11
	Female	33	30.9	1.07		0.74 - 1.50
Liver	Male	13	16.3	0.80		0.42 - 1.37
	Female	5	7.1	0.71		0.23 - 1.65
Lung	Male	416	338.6	1.23	*	1.11 - 1.35
	Female	228	168.9	1.35	*	1.18 - 1.54
Non-Hodgkin's Lymphoma	Male	45	44.8	1.00		0.73 - 1.34
	Female	32	37.8	0.85		0.58 - 1.20
Pancreas	Male	39	39.8	0.98		0.70 - 1.34
	Female	45	45.5	0.99		0.72 - 1.32
Stomach	Male	57	52.6	1.08		0.82 - 1.40
	Female	44	38.4	1.15		0.83 - 1.54

[1] Note: *=statistically high, **= statistically low, NR= not reported because observed <5.

Data from the New Jersey Department of Health and Senior Services' State Cancer Registry with analysis by the Department's Consumer and Environmental Health Services (March 2003).

Table 8. Camden City Malignant Cancer Incidence (1979-1998)
SIR Analysis by Cancer Type and Sex: Whites

Cancer Type	Sex	Observed	Expected	SIR[1]		95% CI
All Cancers Combined	Male	1,611	1,225.8	1.31	*	1.25 - 1.38
	Female	1,485	1,235.6	1.20	*	1.14 - 1.26
Bladder	Male	87	98.9	0.88		0.70 - 1.09
	Female	31	37.6	0.82		0.56 - 1.17
Bone/Joint	Male	0	2.4	-		-
	Female	<5	NR	1.42		0.28 - 4.14
Brain/CNS	Male	18	17.5	1.03		0.61 - 1.62
	Female	19	15.9	1.20		0.72 - 1.87
Breast	Female	354	350.9	1.01		0.913 - 1.12
Colorectal	Male	225	184.8	1.22	*	1.06 - 1.39
	Female	214	193.4	1.11		0.96 - 1.27
Esophagus	Male	36	16.2	2.22	*	1.55 - 3.07
	Female	12	6.9	1.74		0.90 - 3.04
Kidney	Male	31	32.2	0.96		0.65 - 1.37
	Female	31	22.0	1.41		0.96 - 2.00
Leukemia	Male	42	33.7	1.25		0.90 - 1.68
	Female	31	28.6	1.08		0.74 - 1.54
Liver	Male	16	8.9	1.80	*	1.03 - 2.93
	Female	11	4.8	2.29	*	1.14 - 4.10
Lung	Male	400	217.5	1.84	*	1.66 - 2.03
	Female	170	144.4	1.18	*	1.01 - 1.37
Non-Hodgkin's Lymphoma	Male	51	42.5	1.20		0.89 - 1.58
	Female	54	43.2	1.25		0.94 - 1.63
Pancreas	Male	38	29.0	1.31		0.93 - 1.80
	Female	43	34.3	1.25		0.91 - 1.69
Stomach	Male	53	32.5	1.63	*	1.22 - 2.13
	Female	30	23.4	1.28		0.87 - 1.83

[1] Note: *=statistically high, **= statistically low, NR= not reported because observed <5.

Data from the New Jersey Department of Health and Senior Services' State Cancer Registry with analysis by the Department's Consumer and Environmental Health Services (March 2003).

Table 9. Camden City Malignant Cancer Incidence (1979-1998)
SIR Analysis by Cancer Type and Sex: Hispanic

Cancer Type	Sex	Observed	Expected	SIR[1]		95% CI
All Cancers Combined	Male	386	354.1	1.09		0.98 - 1.20
	Female	371	365.0	1.02		0.92 - 1.13
Bladder	Male	16	16.0	1.00		0.57 - 1.62
	Female	<5	NR	0.76		0.20 - 1.94
Bone/Joint	Male	<5	NR	0.89		0.10 - 3.23
	Female	<5	NR	0.39		0.01 - 2.19
Brain/CNS	Male	8	10.4	0.77		0.33 - 1.51
	Female	8	9.1	0.88		0.38 - 1.74
Breast	Female	94	106.2	0.88		0.72 - 1.08
Colorectal	Male	36	36.7	0.98		0.69 - 1.36
	Female	43	36.0	1.20		0.86 - 1.61
Esophagus	Male	15	5.0	2.99	*	1.67 - 4.94
	Female	<5	NR	2.22		0.25 - 8.01
Kidney	Male	9	10.0	0.90		0.41 - 1.71
	Female	6	7.5	0.80		0.29 - 1.74
Leukemia	Male	19	15.8	1.20		0.72 - 1.87
	Female	10	15.2	0.66		0.32 - 1.21
Liver	Male	6	7.7	0.78		0.28 - 1.70
	Female	<5	NR	0.70		0.08 - 2.54
Lung	Male	58	37.3	1.56	*	1.18 - 2.01
	Female	19	21.0	0.91		0.55 - 1.42
Non-Hodgkin's Lymphoma	Male	18	23.3	0.77		0.46 - 1.22
	Female	16	19.0	0.84		0.48 - 1.37
Pancreas	Male	10	7.2	1.39		0.66 - 2.55
	Female	9	7.1	1.27		0.58 - 2.41
Stomach	Male	22	12.3	1.79	*	1.12 - 2.71
	Female	10	7.2	1.38		0.66 - 2.54

[1] Note: *=statistically high, **= statistically low, NR= not reported because observed <5.

Data from the New Jersey Department of Health and Senior Services' State Cancer Registry with analysis by the Department's Consumer and Environmental Health Services (March 2003).

Figure 1. 3-Year Average Annual Age-Standardized Lung Cancer Incidence Rates: Males (Using the 2000 U.S. Standard Population)

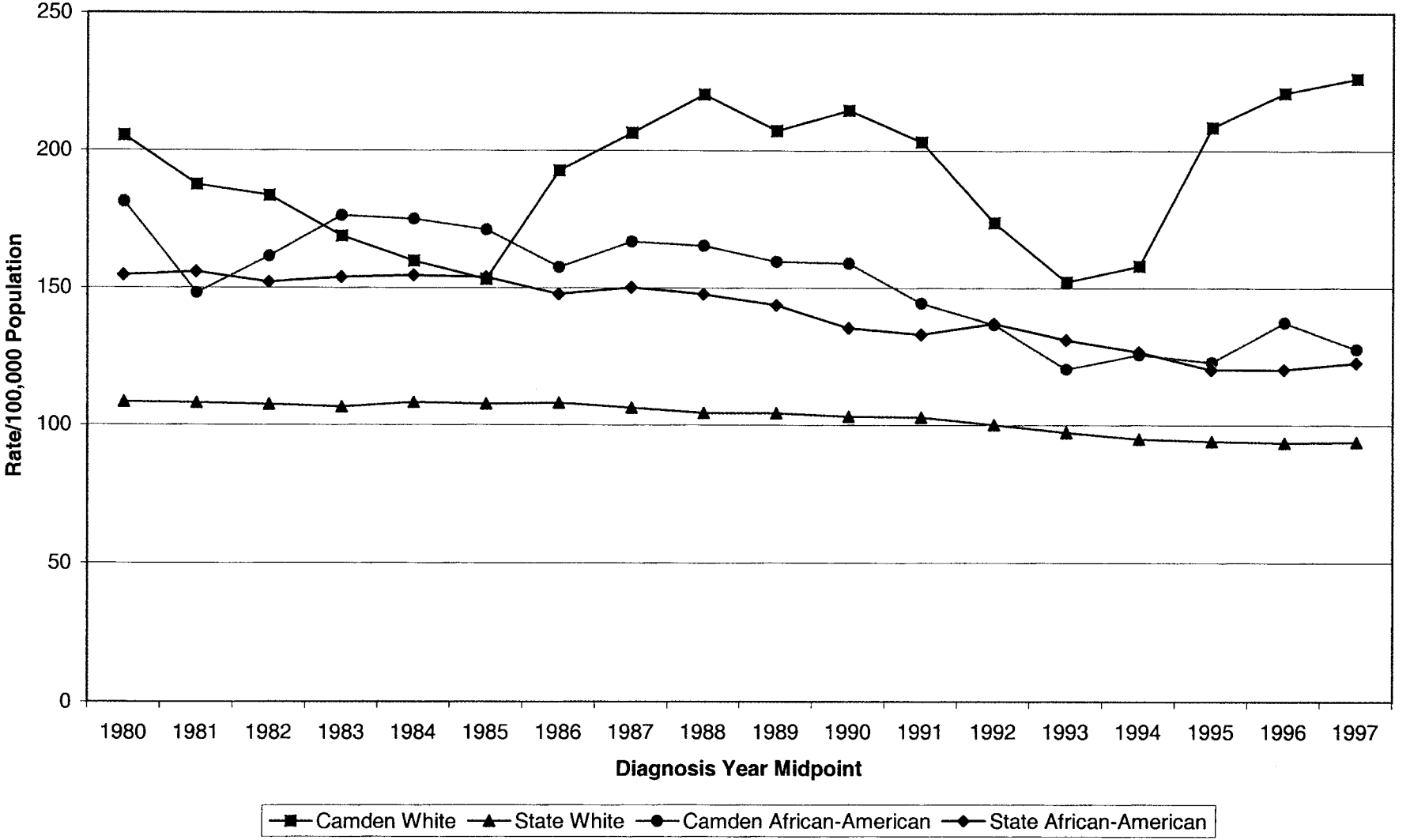

Figure 2. 3-Year Average Annual Age-Standardized Lung Cancer Incidence Rates: Females (Using the 2000 U.S. Standard Population)