Trends in Cancer Incidence in Allegheny County, Pa.

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TO PROVIDE information on the size and nature of the cancer problem, the National Cancer Institute of the Public Health Service, with the cooperation of State and county medical societies, surveyed the extent of cancer illness in 10 metropolitan areas of the United States in 1937 and resurveyed those areas in 1947–48. Although the institute will not resurvey all 10 areas until after an interval of 20 years (about 1967–68), it selected Allegheny County (Pittsburgh), Pa., for a third study on the incidence of cancer covering the years 1957–58. Thus, there was an opportunity to observe changes in the incidence of cancer that may have occurred over the intervening decade. The initial findings are presented here. More extensive analyses will be published later.

Material and Methods

Data were collected from records of the Allegheny County Cancer Registry, the Pennsylvania State Office of Vital Statistics, and a special survey conducted by the National Cancer Institute in cooperation with the registry, the Allegheny County Medical Society, and the department of biostatistics at the University of Pittsburgh Graduate School of Public Health.

The Allegheny County Cancer Registry receives reports of cancer patients from 37 hospital record rooms or tumor clinics as well as from supplementary sources. The hospital sources represent all hospitals in Allegheny County. To insure complete enumeration of cancer patients, a special study was undertaken within the framework of the registry with the morbidity survey techniques developed by the National Cancer Institute (*1*). Sources of medical records not reporting routinely to the registry were canvassed. These included all physicians in the county as well as departments that maintain their own record systems within the reporting hospitals. Mortality records of the State office of vital statistics were searched for information concerning deaths from cancer as a partial check on completeness of the data. It is likely that the study technique has resulted in obtaining information for nearly all cases of cancer first diagnosed among residents of Allegheny County in 1957 and 1958.

A total of 10,460 new cases of cancer were recorded for the 2 years. The number of case reports obtained from hospitals and other sources is shown in table 1. Eighteen percent of the cases were recorded from sources other than hospitals, and medical certification of cancer as the cause of death was the only source of information on the first diagnosis of cancer in 10 percent of the cases for the 2-year period. A subsequent discussion on trends includes the latter group, which are referred to as "death certificate only" cases.

Table 2 gives the number and percentage of cases with definite microscopic confirmation of

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cancer. Eighty-seven percent of the cases diagnosed among Allegheny County residents in 1957 and 1958 were microscopically confirmed, excluding leukemias, lymphomas, and death-certificate-only cases. This percentage is considerably higher than the 71 percent reported with a microscopically confirmed diagnosis in the Allegheny County portion of the 10-city survey in 1947. Some variation by cancer site occurred in the percentage of cases with microscopic confirmation. For example, 79.5 percent of the records for patients with diagnosed respiratory cancer in 1957–58 indicated a microscopic confirmation compared with 94.2 percent for women patients with cancer of the genital organs. The percentage of cases confirmed for each of the site groups has increased substantially since 1947 (table 2).

Table 1. Number of cases of cancer first diagnosed among residents of Allegheny County, Pa., by primary site and source of report, 1957–58

Primary site	International List No. (6th revision)	Total	Hospital	Physician	Death certificate	Other
All sites		10,460	8,601	601	1,052	206
Buccal cavity and pharynx	140–148	342	305	9	25	3
Digestive system	150–159	2,802	2,214	119	413	56
Respiratory system	160–164	978	868	48	36	26
Breast	170	1,182	1,029	51	82	20
Female genital organs	171–176	1,032	906	36	74	16
Male genital organs	177–179	618	501	31	75	11
Urinary organs	180–181	573	519	14	36	4
Skin	190–191	1,092	868	190	10	24
Brain and nervous system	193	167	135	10	19	3
Endocrine glands	194–195	101	90	5	5	1
Bone	196	44	35	4	5	0
Soft tissue	197	74	67	5	1	1
Leukemias	204	265	206	26	30	3
Lymphomas	200–203, 205	391	334	28	26	3
Other sites	192, 199	799	524	25	215	35

Table 2. Number of cases of cancer first diagnosed among residents of Allegheny County, Pa., by primary site, with number and percent microscopically confirmed, 1947 and 1957–58

Primary site	International List No. (6th revision)	Total cases [1] 1947	Confirmed		Total cases [1] 1957–58	Confirmed	
			Number	Percent		Number	Percent
All sites		3,474	2,455	70.7	8,808	7,675	87.1
All sites excluding skin		2,979	2,055	69.0	7,726	6,635	85.9
Buccal cavity and pharynx	140–148	150	119	79.3	317	292	92.1
Digestive system	150–159	1,018	621	61.0	2,389	1,957	81.9
Respiratory system	160–164	265	153	57.7	942	749	79.5
Breast	170	394	339	86.0	1,100	1,023	93.0
Female genital organs	171–176	470	390	83.0	958	903	94.2
Male genital organs	177–179	178	100	56.1	543	447	82.3
Urinary organs	180–181	194	143	73.7	537	494	92.0
Skin	190–191	495	400	80.8	1,082	1,040	96.1
Brain and nervous system	193	56	37	66.1	148	135	91.2
Endocrine glands	194–195	40	29	72.5	96	91	94.8
Bone	196	31	18	58.1	39	32	82.1
Soft tissue	197	21	19	90.5	73	71	97.3
Other sites	192, 199	162	87	53.7	584	441	75.5

[1] Excludes leukemias, lymphomas, and death-certificate-only cases.

The conventional method of combining data on clinically diagnosed cases of cancer with data on microscopically confirmed cases has been followed. It seems likely that if cases with only a clinical diagnosis were excluded, the incidence would be underestimated to a much greater degree than overestimated by including them. There is some indirect evidence that these cases should be included. Zimmerer and Chiazze (*2*) and Axtell and associates (*3*) have found that survival rates for cases with only a clinical diagnosis are considerably lower than for microscopically confirmed cases. This suggests that the group of patients with clinical diagnoses only includes cancer patients for whom biopsy was considered medically inadvisable or unnecessary for the purpose of establishing a diagnosis.

Trends in Cancer Incidence

Age-adjusted cancer incidence rates among men and women in Allegheny County for 1947 and 1957–58 are shown in tables 3 and 4. Population estimates by sex and age were obtained by linear interpolation between appropriate census frequencies. Rates have been adjusted by the direct method to the age distribution for men and women in the 1950 U.S. population to account for changes in the age distribution of the population of Allegheny County from 1947 to 1957–58. Tables 3 and 4 also include rates for upstate New York for a comparable timespan (*4*). The New York State rates for men and women have been adjusted to the same standards as the Allegheny County rates so that spatial comparisons are possible.

The age-adjusted incidence rate for all forms

Table 3. Age-adjusted cancer-incidence rates per 100,000 men, by primary site, Allegheny County, Pa., 1947 and 1957–58, and New York State (excluding New York City), 1949–51 and 1958–60

Primary site	International List No. (7th revision)	Allegheny County					New York State		
		Number of patients		Age-adjusted rate			Age-adjusted rate		
		1947	1957–58	1947	1957–58	Percent change	1949–51	1958–60	Percent change
All sites		2, 107	5, 313	285. 5	313. 9	+9. 9	232. 9	261. 3	+12. 2
Buccal cavity and pharynx	140–148	123	267	16. 6	15. 7	−5. 4	14. 1	12. 7	−9. 9
Digestive system	150–159	746	1, 542	103. 7	90. 3	−12. 9	75. 1	74. 8	−. 4
Esophagus	150	48	133	6. 7	7. 7	+14. 9	5. 1	4. 7	−7. 8
Stomach	151	225	354	31. 5	20. 6	−34. 6	21. 1	15. 9	−24. 6
Large intestine	153	202	459	27. 6	26. 9	−2. 5	19. 7	22. 7	+15. 2
Rectum	154	149	308	20. 6	18. 0	−12. 6	15. 6	15. 3	−1. 9
Respiratory system	160–164	265	874	34. 7	51. 4	+48. 1	30. 7	46. 0	+49. 8
Larynx	161	59	140	7. 9	8. 2	+3. 8	4. 5	5. 0	+11. 1
Lung and bronchus	162	191	711	24. 9	41. 8	+67. 9	24. 3	38. 5	+58. 4
Breast	170	3	15	. 4	. 9	+125. 0	. 5	. 5	-------
Genital organs	177–179	220	618	31. 9	36. 4	+14. 1	28. 4	28. 0	−1. 4
Prostate	177	195	544	28. 5	31. 7	+11. 2	24. 9	24. 9	-------
Urinary organs	180–181	151	384	20. 9	22. 6	+8. 1	16. 2	20. 6	+27. 2
Kidney	180	30	80	4. 1	4. 7	+14. 6	4. 1	5. 4	+31. 7
Bladder	181. 0	118	304	16. 3	17. 9	+9. 8	11. 9	14. 9	+25. 2
Skin	190–191	286	624	36. 2	36. 9	+1. 9	33. 3	41. 8	+25. 5
Eye	192	[1]	9	[1]	. 5	-------	. 5	. 5	-------
Brain and nervous system	193	46	88	6. 0	5. 4	−10. 0	3. 6	4. 7	+30. 6
Endocrine glands	194–195	15	27	1. 8	1. 6	−11. 1	1. 2	1. 6	+33. 3
Bone	196	24	27	3. 3	1. 6	−51. 5	1. 3	1. 2	−7. 7
Soft tissue	197	9	36	1. 1	2. 2	+100. 0	1. 2	1. 5	+25. 0
Leukemias	204	44	160	6. 3	9. 5	+50. 8	7. 7	9. 2	+19. 5
Lymphomas	200–203, 205	77	234	9. 8	14. 2	+44. 9	8. 8	11. 4	+29. 5
Hodgkin's disease	201	20	57	2. 4	3. 5	+45. 8	2. 8	3. 2	+14. 3
Other and unspecified	199	98	408	12. 5	24. 1	+92. 8	9. 2	5. 1	−44. 6

[1] Not available.

of cancer among men in Allegheny County has increased 10 percent from 286 to 314 per 100,000, and this increase is comparable with the increase in incidence rate for cancer in men in New York State. Among Allegheny County women, however, the incidence rate for all forms of cancer has decreased from 302 to 288 per 100,000. Rates for New York State women, on the other hand, increased slightly.

Available data for the State of Connecticut indicate that age-adjusted rates of cancer incidence have increased about 27 percent for men and 17 percent for women from 1949–51 to 1961 (*5*, *6*). These increases are somewhat greater than those for either Allegheny County or upstate New York.

Some variation occurred in the changes that took place in incidence rates for specific cancer sites although the changes in either direction were minor for most sites. The most substantial changes in incidence rates from 1947 to 1957–58 among men in Allegheny County were the decrease in cancers of the digestive system (attributable primarily to the drop in incidence of stomach cancer from 32 to 21 per 100,000) and the increase in the incidence of lung cancer (25 to 42 per 100,000). Among women, important decreases occurred during the decade in the incidence rates for cancers of the digestive system, again reflecting mainly the drop in the incidence of stomach cancer (19 to 12 per 100,000), in cancers of the uterine cervix (31 to 20 per 100,000), and in cancers of the corpus and other uterus (24 to 22 per 100,000).

Table 4. Age-adjusted cancer-incidence rates per 100,000 women, by primary site, Allegheny County, Pa., 1947 and 1957–58, and New York State (excluding New York City), 1949–51 and 1958–60

Primary site	International List No. (7th revision)	Allegheny County					New York State		
		Number of patients		Age-adjusted rate			Age-adjusted rate		
		1947	1957–58	1947	1957–58	Percent change	1949–51	1958–60	Percent change
All sites		2, 270	5, 147	301. 8	288. 3	−4. 5	238. 6	244. 7	+2. 6
Buccal cavity and pharynx	140–148	42	75	5. 2	4. 2	−19. 2	3. 6	3. 3	−8. 3
Digestive system	150–159	597	1, 260	82. 7	69. 3	−16. 2	59. 8	57. 3	−4. 2
Esophagus	150	13	24	1. 8	1. 3	−27. 8	1. 2	1. 1	−8. 3
Stomach	151	131	214	18. 5	11. 7	−36. 8	11. 0	8. 4	−23. 6
Large intestine	153	221	525	30. 6	28. 9	−5. 6	23. 6	23. 8	+. 8
Rectum	154	107	243	14. 4	13. 4	−6. 9	11. 1	10. 4	−6. 3
Respiratory system	160–164	56	104	7. 4	5. 8	−21. 6	4. 8	6. 6	+37. 5
Larynx	161	6	9	. 8	. 5	−37. 5	. 3	. 5	+66. 7
Lung and bronchus	162	42	88	5. 6	4. 9	−12. 5	3. 3	4. 8	+45. 5
Breast	170	460	1, 167	61. 6	65. 6	+6. 5	55. 0	55. 9	+1. 6
Genital organs	171–176	522	1, 032	68. 7	58. 0	−15. 6	56. 1	55. 6	−. 9
Cervix	171	238	361	31. 0	20. 4	−34. 2	25. 2	25. 8	+2. 4
Corpus and other uterus	172–174	179	392	24. 0	21. 9	−8. 8	17. 6	15. 9	−9. 7
Ovary	175	79	199	10. 3	11. 3	+9. 7	10. 8	11. 5	+6. 5
Urinary organs	180–181	82	189	11. 3	10. 4	−8. 0	6. 9	7. 6	+10. 1
Kidney	180	15	53	1. 9	3. 0	+57. 9	2. 5	3. 1	+24. 0
Bladder	181. 0	65	133	9. 0	7. 3	−18. 9	4. 2	4. 4	+4. 8
Skin	190–191	216	468	27. 7	26. 3	−5. 1	23. 4	29. 2	+24. 8
Eye	192	[1]	10	[1]	. 6		. 3	. 3	
Brain and nervous system	193	30	79	3. 4	4. 7	+38. 2	2. 3	3. 5	+52. 2
Endocrine glands	194–195	29	74	3. 6	4. 3	+19. 4	2. 2	3. 2	+45. 5
Bone	196	16	17	2. 0	. 9	−55. 0	1. 0	. 7	−30. 0
Soft tissue	197	12	38	1. 3	2. 2	+69. 2	1. 4	1. 5	+7. 1
Leukemias	204	37	105	4. 9	5. 9	+20. 4	5. 5	6. 0	+9. 1
Lymphomas	200–203, 205	54	157	7. 2	9. 0	+25. 0	6. 5	8. 2	+26. 2
Hodgkin's disease	201	10	49	1. 2	2. 9	+141. 7	2. 1	2. 2	+4. 8
Other and unspecified	199	117	372	14. 4	20. 6	+43. 1	9. 1	4. 9	−46. 2

[1] Not available.

Among the other numerically important sites showing increases in the incidence rate for cancer among women, cancer of the breast showed the largest increase.

Cancers of the digestive system continued to account for a major proportion of all cancers in Allegheny County despite the drop in incidence rates from 1947 to 1957–58. This decline is greater than that observed for New York State but is generally consistent with the reduction in mortality from cancers of the digestive organs that has been observed in the total United States (*7*).

Examination of the age-specific rates for stomach cancer indicates that the incidence rate decreased from 1947 to 1957–58 for each age group. These results are consistent with the decline in incidence of stomach cancer in New York State as well as the reduction in mortality in the total United States. To interpret the decline in risk for any specific organ within the digestive system, one should consider whether such a decline may be the result of changes in diagnostic criteria. Although the magnitude of the change for a single site may be affected by misclassification, it is unlikely that the rate for the total digestive system would be affected. Therefore, the total decrease in the Allegheny County rate for digestive cancer is undoubtedly real.

The decline in incidence rate for cancer of the genital organs among women in Allegheny County is of the same order of magnitude as that for cancers of the digestive organs—about 16 percent. This decrease is due primarily to the reduction in invasive cancer of the uterine cervix, which in 1957–58 accounted for 35 percent of the cancers in the female genital organs as compared with 46 percent in 1947.

Although the data for New York State show an increase in the incidence of cervical cancer, an unspecified number of carcinomas in situ are included. Carcinomas in situ have been omitted from the Allegheny County data in order to maintain comparability over time. The later time period for the New York State data includes relatively more in situ cases than the earlier period, and rates for invasive carcinoma of the cervix have also declined in New York State (*8*).

The major increase in incidence of cancer among men in Allegheny County was that in cancer of the lung. The rate increased nearly 68 percent (25 per 100,000 in 1947 to 42 per 100,000 in 1957–58). This increase was not restricted to any particular age group but reflected the increase in age-specific rates from 1947 to 1957–58 for each successive 5-year age group beginning with age 45.

A substantial increase in the mortality from respiratory cancer in the United States has been noted for some time (*7*). The evidence suggests that such an increase in risk is a true one although some part of the rise may not be real because of misclassification of tumors. Fifty-eight percent of all respiratory tumors among residents of Allegheny County enumerated in the 1947 survey were microscopically confirmed compared with 80 percent in 1957–58. Although some room for error exists in assignments of cancer to the respiratory system, the evidence seems to indicate that a real and substantial rise in the rate for respiratory cancer among men has taken place.

The increase in the rate for breast cancer among women in Allegheny County is somewhat greater than that observed in New York State. It appears to be greater than that expected on the basis of trends in U.S. mortality, although somewhat smaller than that which may have taken place in Connecticut (*5*, *6*). The data on incidence of breast cancer in Allegheny County may be considered reliable for both time periods, since 86 percent of all breast cancer cases were microscopically confirmed in the 1947 survey and 93 percent were similarly confirmed in the present study.

Excluding the possibility of misclassification, the reasons for the increase in incidence are unclear. Examination of the age-specific rates discloses that all increases occurred among women under 60 years old, with one exception. Rates generally declined from 1947 to 1957–58 at ages over 60 years. This may suggest significant changes in factors such as size of family, breast feeding practices, or other factors that may have a bearing on the incidence of breast cancer (*9*). Observations on these factors are not available but may provide the basis for further study.

Although changes in incidence rates for most of the remaining sites are relatively minor

among both men and women in Allegheny County and generally consistent with changes occurring in New York State, a few exceptions are worth noting. The incidence rate for cancer of the prostate in Allegheny County has increased 11 percent (29 to 32 per 100,000 population). In New York State, on the other hand, the incidence of cancer of the prostate remained unchanged from 1949–51 to 1958–60. The 11 percent increase in Allegheny County is only suggestive at this time, and it remains to be determined whether this increase is a true reflection of greater incidence rather than changes in diagnostic practices.

Among women, the incidence rate for cancer of the lung and bronchus slightly declined between 1947 and 1957–58. Actually, the incidence of lung cancer in women in the 1957–58 period was not much different from that in 1937, when the first 10-city morbidity survey was made (*10*). Unlike the data for other areas, there is no evidence that the data provide any indication of a rise in the incidence of lung cancer among women in Allegheny County.

Summary

Relatively few striking changes were observed in the cancer-incidence rates for specific primary sites among either men or women in Allegheny County, Pa., from 1947 to 1957–58. The following changes are of particular interest:

A decline in the incidence rates for cancer of the stomach among both men (32 to 21 per 100,000) and women (19 to 12 per 100,000).

A decline in the incidence rates for cancer of the uterine cervix (31 to 20 per 100,000) and for cancer of the corpus and other uterus (24 to 22 per 100,000).

An increase in the incidence rate (25 to 42 per 100,000) for lung cancer among men.

An increase in the incidence rate (62 to 66 per 100,000) for breast cancer among women.

Shifts observed in the incidence of cancer in Allegheny County are generally consistent with those reported for New York State, both in magnitude and direction. Relatively little change occurred in incidence except for the sites mentioned. There are some encouraging aspects, particularly the decline in stomach cancer for both men and women and the drop in the incidence rates for uterine cancer. However, the total decrease in incidence of cancer among women for all sites combined was relatively small. The incidence of lung cancer among men would appear to be a problem of increasing magnitude. The search for factors associated with site-specific changes in the incidence of cancer will continue to provide direction for further study.

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