

CASE HISTORY AND COHORT STUDIES

Laboratory Exercise IV

A case history study was undertaken to determine whether patients with lung cancer differed from other persons in respect to their smoking habits. Patients thought to have cancer of the lung and subjects without cancer of the lung were interviewed to find out the number of cigarettes smoked. It was a "blind" study, meaning that the interviewer did not know whether the respondent was a lung cancer patient or a control. The following table gives the proportions of subjects, with and without lung cancer, according to the quantity of cigarettes smoked.

Table 1: Most Recent Amount Smoked by Patients With and Without Cancer of the Lung (Response of Patients at Interview)

	No. of Cigarettes Smoked Daily				
	0	1-4	5-14	14-24	25+
Subjects with cancer of lung	3.0	5.6	37.9	28.9	24.5
Subjects without cancer of lung	22.0	10.3	37.3	20.7	9.6

What associations are shown in Table 1?

What biases related to case history studies could have occurred in this study?

In an attempt to see if such a bias was operating, the definitive diagnosis of patients after operation was determined. Some patients previously diagnosed as lung cancer were found out not to have this disease.

During the previous interview, these incorrectly classified patients reported their smoking habits as follows:

Table 2: Most Recent Amount Smoked by Patients Incorrectly Diagnosed (Response of Patients at Interview)

	No. of Cigarettes Smoked Daily				
	0	1-4	5-14	14-24	25+
Subjects incorrectly thought to have cancer of lung	16.7	12.0	39.7	23.9	7.6

What are possible interpretations of these results?

In studies of the possible effects of socio-economic pressure and stress in the pathogenesis of coronary heart disease, the interrelationship of different behavior patterns and the occurrence of coronary heart disease have been investigated. A Type A behavior pattern is defined as a person manifesting an intense, sustained drive for achievement and as being continually involved in competition and deadlines. Type B are persons with the opposite sort of behavior pattern.

Table 2: Coronary Heart Disease by Age and Behavior Pattern. Case History Study

Behavior Pattern Basis	39-49 Years		50-59 Years		Total Subjects	
	CHD Pres	CHD Abs	CHD Pres	CHD Abs	CHD Pres	CHD Abs
Type A	41	1196	39	577	80	1773
Type B	19	1220	14	418	33	1636
Total	60	2416	53	995	113	3411

For a case history study, Table 2 shows the number of cases and non-cases of coronary heart disease by behavior pattern.

Table 3: Coronary Heart Disease by Age and Behavior Pattern. Cohort Study

Behavior Pattern Basis	39-49 Years		50-59 Years		Total Subjects	
	CHD Pres	CHD Abs	CHD Pres	CHD Abs	CHD Pres	CHD Abs
Type A	45	1072	49	530	94	1602
Type B	18	1186	21	394	39	1580
Total	63	2258	70	924	133	3182

Table 3 gives the number of cases and non-cases by behavior patterns for a cohort study.

Compute the appropriate rates to determine the relationship for each of these types of studies.

Table 4: Coronary Heart Disease. Age-Standardized Death Rates, by Type of Smoking (lifetime history) and Age at Start of Study - Cohort Study

Type of smoking (lifetime history)	Age				
	35-44	45-54	55-64	65-74	75-84
CHD Death Rates per 100,000 Persons-Years					
<u>Men</u>					
Never smoked regularly	*	150	542	1,400	3,132
Pipe only	*	141	647	1,396	3,005
Pipe and cigar	*	200	560	1,362	3,594
Cigar only	*	173	734	1,300	3,439
Cigarette and other	*	363	854	1,839	3,627
Cigarette only	148	422	996	2,025	3,871
Total	122	336	822	1,662	3,404
<u>Women</u>					
Never smoked regularly	*	33	163	653	1,973
Cigarette	*	66	275	941	2,349
Total	15	45	188	686	1,987

Table 4 gives the age-standardized death rates of coronary heart disease by type of smoking and age.

Calculate the relative risk of coronary heart disease for males and females in the cigarette only category as compared to the never smoked regularly category.

- a) for ages 45 - 54
- b) for ages 75 - 84

Calculate the attributable risk of coronary heart disease for the cigarette only category as compared to the never smoked category.

- a) for ages 45 - 54
- b) for ages 75 - 84

Table 5: Incidence vs. Prevalence Estimates: Coronary Heart Disease According to Serum Cholesterol. Men 30-59 at Entry: Framingham Heart Study

Cholesterol quartile	10-year incidence study				Exam I prevalence study				Exam VI prevalence study			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
Population at risk	544	536	547	547	555	545	558	563	380	493	504	409
Observed cases	28	38	50	85	11	9	11	16	33	32	48	38
10-year incidence per 10,000	514	708	914	1553								
Prevalence per 10,000					198	165	197	298	868	649	952	929

The Framingham Heart Study is a longitudinal prospective study, employing a series of biennial examinations to assess attributes and detect the occurrence of coronary heart disease in a population sample.

The incidence study involved persons free of coronary heart disease at entry to the study. The rate of incidence of new cases in the next ten years were observed.

Exam I prevalence study consisted of persons who had coronary heart disease at the time of the first examination.

Exam VI prevalence study used the observations on persons who returned to the clinic for their sixth biennial examination. This included some persons who had revealed coronary heart disease at their first examination and some persons who were diagnosed during the ten year follow-up.

Compare and interpret the results from the incidence and prevalence studies shown in Table 5.

Table 6: Ten-Year Experience of Prospective Study of Cardiovascular Disease

Year	New Entries	Alive and Normal at End of Year	CHD at Intake	Cases of CHD	Deaths From CHD	Deaths From Other Causes	Lost to Observation
1953	1013	948	41	0	0	2	22
1954	900	1811	23	3	0	1	10
1955	0	1784	0	6	2	5	14
1956	0	1751	0	10	2	9	12
1957	0	1717	0	12	3	8	11
1958	0	1677	0	16	5	6	13
1959	0	1637	0	7	3	5	5
1960	0	1628	0	15	5	5	4
1961	0	1610	0	9	2	4	3
1962	0	1592	0	11	2	2	3
Totals	1913		64	89	24	47	97

Describe the difficulties involved in analyzing the data from this prospective study. (Table 6) if possible, make suggestions for the methods of analysis.

A ten-year cohort study is to be started to investigate the deaths from lung cancer among smokers and non-smokers, ages 35 to 75. A substantial number of persons must be followed for ten years to obtain a representative number of deaths from the population.

Table 8 gives the age-sex distribution of a total urban population. A one in five sample was taken from this total population. The results of this sampling is given in Table 9. Using Table 10 and 11, calculate the number of deaths from lung cancer and among smokers and non-smokers by age which would be expected to occur in the sample in 10 years if there was no difference in the mortality rates for smokers and non-smokers.

Table 7: Distribution of the Total White Urban Population by Age, and Sex

Age	Male	Female
35-44	20,000	24,000
45-54	23,000	31,000
55-64	21,000	28,000
65-74	12,000	20,000

Table 8: Distribution of the Sample Population for Whites by Age and Sex

Age	Male	Female
35-44	4,000	4,800
45-54	4,600	6,200
55-64	4,200	5,600
65-74	2,400	4,000

Table 9: The Percent of White Smokers and Non-Smokers in Urban U. S. Population by Sex and Age

Age	Male		Female	
	Smokers	Non-Smokers	Smokers	Non-Smokers
35-44	80.5	19.5	43.5	56.5
45-54	78.4	21.6	31.5	68.5
55-64	76.1	23.9	18.2	81.8
65+	65.5	34.5	9.4	90.6

Table 10: 10-Year Mortality Rates from Cancer of the Lung per 100,000: United States by Age, and Sex

Age	White Male	White Female
35-44	82.0	23.0
45-54	433.0	62.0
55-64	1152.0	136.0
65-74	1584.0	246.0

Recommended Reading:

McMahon, Brian; Thomas Pugh and Johannes Ipsen. Epidemiologic Methods. Little Brown & Co., 1960 (Chapters 2, 13, and 14).

McMahon, Brian and Duncan Clark. Preventive Medicine. Little Brown & Co, 1967. (Chapter 7).