A CANADIAN STUDY OF SMOKING AND HEALTH

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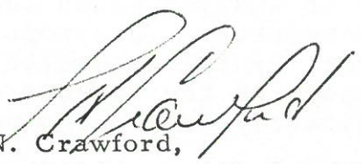
FOREWORD

In 1955, a long-term study was initiated by the Department of National Health and Welfare, with the cooperation of the Department of Veterans Affairs, to investigate the relationships between residence, occupation, and smoking habits, and mortality from chronic diseases, particularly lung cancer. Many people assisted in the planning, conduct and completion of this study, making possible this final report. I am grateful for their help, and there is further acknowledgement in the report.

The outstanding finding of this study is that cigarette smokers, compared to non-smokers, had excessive mortality, particularly from heart disease, lung cancer, bronchitis and emphysema. This is consistent with findings of other related studies. These findings are compelling reasons to continue and develop measures to reduce or eliminate the hazard to health attributable to cigarette smoking.



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ACKNOWLEDGEMENTS

This report brings to completion a long-term study based upon the recipients of veterans' pensions in Canada. The study was initiated in 1955-56 by Dr. E.H. Lossing then Chief of the Epidemiology Division. Later, in 1959 Dr. E.W.R. Best succeeded Dr. Lossing and took over responsibility for continuation of the study. Mr. J.T. McGregor, of the Epidemiology Division, was responsible for setting up and maintaining the various record systems during the study.

Dr. G.H. Josie, at that time Principal Research Officer of the Biostatistics Section of the Research and Statistics Division undertook the initial responsibility for the statistical work involved in this study. Mr. C.B. Walker, who succeeded Dr. Josie in 1962, was responsible for planning the overall statistical analysis of the data. Miss F.M. Delaquis was responsible for the day-to-day supervision of the editing and coding of the basic data and for much of the statistical analysis of the data. Mr. P.M. Baker was responsible for developing the statistical analysis and the supporting text presented in this report; he also undertook the overall editing of the report. Mr. A.C. McKenzie assisted in developing the statistical analysis of the data and advised on some of the technical aspects of the report. In addition, many other persons on the staffs of the Epidemiology and Biostatistics Divisions participated in the detailed work of the study.

The Cheque Distribution Division of the Canadian Pension Commission was responsible for sending out the questionnaires. The Research and Statistics Division of the Department of Veterans Affairs assisted by compiling and coding quarterly lists of deaths of pension recipients. The Dominion Bureau of Statistics assisted by routing searches for cause of death information for dependent pensioners to Provincial Vital Statistics Registrars.

Following the presentation of a second progress report to the Canadian Public Health Association in May 1964, a committee was set up to develop this final report. In particular, the need was recognized to assess the environmental factors investigated in the study as well as the relationships of mortality to smoking which had been covered in previously published reports. This report as presented represents a joint effort by this committee to review the basic methodology and to report on the various statistical findings which may be derived directly from the study.

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PART 1 - INTRODUCTION

This study was initiated in 1955 to investigate the relationships between residence, occupation and smoking habits, and mortality from chronic diseases particularly lung cancer. An earlier study by Winfield and Wellwood (1) of deaths among Department of Veterans Affairs pensioners in Canada had drawn attention to the growing number of deaths due to bronchogenic carcinoma between 1941 and 1953. Information regarding smoking habits was however insufficient for any conclusions to be formed in that respect. The Hammond and Horn Study of 1954 (2), and the Stocks and Campbell Study published in 1955 (3), had drawn attention to the effects of smoking on health, particularly the hazard of lung cancer. Also, Phillips had drawn attention to the rising death rates from lung cancer in Canada (4).

In 1955, therefore, the Epidemiology Division and the Research and Statistics Division of the Department of National Health and Welfare with the support of the Department of Veterans Affairs undertook a questionnaire study of the effects of smoking on the health of Canadian war veteran pension recipients. The questionnaires were mailed by the Cheque Disbursement Branch of the Canadian Pension Commission who also provided a list of the persons to whom the questionnaires were addressed. Listings of all deaths of veteran pensioners and their dependents together with the causes of death throughout the six year follow-up period, July 1956 to June 1962, were provided by the Department of Veterans Affairs.

The evidence of the effects of smoking on health became apparent from this study with a very early analysis of the data. At the same time, it also became equally apparent that evidence of any effects on health resulting from residence or occupation, even though data on these factors were collected on the basis of lifetime histories rather than on current residence and occupation at the time of the survey, could only be considered to be quite secondary to evidence of the detrimental effects of smoking, particularly cigarette smoking. In 1961, a preliminary report (5) was prepared based on a three year follow-up of the World War I pensioner group, providing data on the effects of smoking habits on the death rates and causes of death of pension recipients. Attention was drawn to the excess death rates from heart disease and lung cancer among smokers. In 1964, a second preliminary report (6) was prepared based on the full six year follow-up, extending the previous findings regarding the smoking aspects of the study and covering the full population of the study. At the time the second report was being prepared, the U.S. Public Health Service requested that a number of tabulations be prepared from the basic data collected in this Canadian Study. These tabulations, in which the data were converted to person-years of exposure to risk, and, as a consequence may not be matched exactly with the tabulations contained in this present report, were prepared and incorporated into the Surgeon-General's Report on Smoking and Health (7).

The inclusion of data from the Canadian Smoking and Health Study in the Surgeon-General's Report provided a particularly effective assessment of the results. Not only were the data found to be generally consistent with the findings of other studies, but also the pooling of data from several studies permitted a more definitive analysis to be undertaken of the effects of specific smoking habits on health.

PART 2 - SUMMARY

The following summary gives a brief description of the purpose of the study, the population studied, the method of study and the results.

The purpose of the study was to investigate the relationships between residence, occupation and smoking habits, and mortality from chronic diseases particularly lung cancer. It was initiated by a questionnaire which was sent to Canadian veteran pension recipients during the period September 1955 through June 1956. Returns from 78,000 men, and 14,000 women, mostly widows, were analyzed. The men were mainly World War I and World War II veterans, but some Boer War and Korean War veterans, as well as some non-veteran pension recipients were included. The age of most of the men at the beginning of the study ranged from 30 to 90 years and the distribution was characterized by the ages of men eligible for service in the two World Wars.

For each respondent dying between July 1, 1956 and June 30, 1962 the cause of death was related to information on his questionnaire about age, history of smoking habits, residence and occupation. Among the respondents during the six years of follow-up there were 9,491 deaths of males, and 1,794 deaths of females which were analyzed.

For each group of smokers, the number of deaths that could have been expected if they had never smoked was calculated from the corresponding age specific death rates of non-smokers. This "expected" number of deaths was compared in two ways with the number of deaths actually observed. First, the number of "excess" deaths of smokers was determined by subtracting the "expected" number of deaths from the observed number of deaths in the various groups of smokers. Secondly, the mortality ratio was determined by dividing the observed number of deaths by the "expected" number of deaths. This mortality ratio is essentially a comparison of age specific death rates of smokers and non-smokers; the higher the ratio, the greater the risk of death to individuals within a smoking category compared to non-smokers.

Other terms used in this summary are defined as follows;

OVERALL MORTALITY - the total number of deaths from all causes among all age groups

NON-SMOKERS - respondents who had never smoked

EVER SMOKED - respondents who during their lifetime smoked at least a total of 100 cigarettes and/or 10 cigars and/or 20 pipefuls of tobacco

CURRENT SMOKERS - respondents who smoked at the start of the survey

EX-SMOKERS - respondents who previously smoked but had stopped smoking at the start of the survey

URBAN DWELLERS - respondents with a history of 5 years or more of city residence

Data on overall mortality among current male smokers (Table 2.1) and data on causes of death among current male cigarette smokers (Table 2.2) are presented at the end of this summary.

A - SMOKING - ALL TYPES

1. Smoking and Overall Mortality (excess deaths)

Among the respondents, during the six years of study, there were 8,858 deaths of male and female current smokers and ex-smokers with all types of smoking habits, and there were 2,427 deaths of male and female non-smokers. If the smokers had never smoked, 6,799 deaths could have been expected in this group. On this basis, there were, therefore, 2,059 excess deaths of smokers. This excess was mainly associated with cigarette smoking in males, and exclusively so in females. Thus individuals who smoked had a greater risk of death than persons who had never smoked.

Overall Mortality of Male and Female Smokers

	Male	Female	Total
Observed Deaths	8638	220	8858
Expected Deaths	6611	188	6799
Excess Deaths	2027	32	2059

2. Cigarette, Pipe and Cigar Smoking and Overall Mortality Among Males - Table 2.1

The death rates for overall mortality of male cigarette smokers were substantially higher than those of non-smokers. Men smoking "cigarettes only" at the start of the survey, (current cigarette smokers) had a death rate for overall mortality 54% higher than that of non-smokers. There were 4,153 deaths in this group, whereas 2,701 (or 1,452 fewer deaths) could have been expected during the six years, had they not smoked.

Men smoking combinations of cigarettes plus cigars and/or pipe, also had elevated death rates for overall mortality, but these were not elevated to the same extent as those of men smoking only cigarettes.

The death rates for overall mortality of pipe smokers and cigar smokers were not appreciably different from those of non-smokers.

B - CIGARETTE SMOKING - MALES

1. Cigarette Smoking and Cause of Death (excess deaths and rates) - Table 2.2

(a) Excess Deaths

Among men who smoked "cigarettes only" at the start of the survey (current cigarette smokers), the main cause of excess deaths was coronary heart disease, 36% of the excess deaths being attributed to this condition. Other heart and circulatory diseases accounted for 22% of the excess deaths. Therefore, heart and circulatory diseases combined accounted for 58% of the excess deaths of cigarette smokers.

The other major causes of excess deaths among current cigarette smokers were lung cancer, 21% of the total, and bronchitis and emphysema combined, 7% of the total. Thus, the major lung diseases - lung cancer, chronic bronchitis and emphysema combined accounted for 28% of the excess deaths. There was also an excess of deaths for cancers of all other sites combined, 7% of the total.

Therefore, the foregoing causes accounted for 93% of the excess deaths of smokers over non-smokers.

(b) Rates

For "heart and circulatory diseases" which was the principal cause of death in this study for both smokers and non-smokers, the death rate was 68% higher among cigarette smokers than among non-smokers. Among cigarette smokers the death rate for coronary heart disease was 60% higher, and for other heart and circulatory diseases, 87% higher than the death rates for these diseases among non-smokers.

For lung cancer, cigarette smokers had a death rate almost 1400% higher than that of non-smokers. There was also a very strong association of cigarette smoking with deaths from bronchitis and emphysema. For these diseases combined, the death rate of cigarette smokers was over 700% higher than that of non-smokers.

2. Amount of Cigarette Smoking

Death rates among men who smoked "cigarettes only" at the start of the survey (current cigarette smokers) increased with the quantities of cigarettes smoked as follows:

Cigarettes ever smoked per day	Percentage elevation of death rates for cigarette smokers over non-smokers			
	Overall Mortality	Coronary Heart Disease	Lung Cancer	Bronchitis and Emphysema
Less than 10	43%	55%	900%	506%
10 - 20	55%	58%	1541%	897%
More than 20	63%	78%	1631%	938%

The greatest increment in death rates for overall mortality was noted to be between non-smokers and those smoking fewer than 10 cigarettes per day - 43%. Successive increments in death rates for overall mortality were 12% and 8%.

The death rates from coronary heart disease, lung cancer, and bronchitis and emphysema also increased with the number of cigarettes smoked per day.

3. Years of Cigarette Smoking During Lifetime

For cigarette smokers as compared to non-smokers, overall mortality ratios were elevated after five years of smoking at any time in their life and remained elevated as long as they continued to smoke cigarettes.

This is illustrated as follows:

Duration of Cigarette Smoking (Years)	Mortality Ratio			
	Overall Mortality	Heart and Circulatory Diseases	Lung Cancer	Bronchitis and Emphysema
Less than 5	1.1	1.4	1.6*	4.2*
5 - 9	1.4	1.7	2.6*	16.7*
10 - 14	1.3	1.8	2.3	6.2*
15 - 19	1.3	1.7	3.2	7.1*
20 - 29	1.3	1.5	4.1	8.7
30 - 39	1.5	1.5	13.9	12.9
40 and over	1.7	1.7	14.2	7.5
Total	1.5	1.6	8.9	9.3
Total observed deaths	3,060	1,505	233	92

* Based on less than five observed deaths

For heart and circulatory diseases as shown above, the mortality ratios for cigarette smokers were elevated even in the group smoking less than 5 years. Thereafter the higher risk of dying from heart and circulatory diseases remained relatively constant as long as they continued to smoke.

Respecting lung cancer however, the data above indicate that, the mortality ratios for cigarette smokers, while elevated even in the lowest duration grouping "less than 5 years", increased as the duration of the cigarette smoking habit increased particularly after 30 years of smoking cigarettes. For bronchitis and emphysema, the mortality ratios tended to be relatively constant as long as men continued to smoke.

4. Inhalation of Cigarette Smoke

Male current cigarette smokers who inhaled had a death rate for overall mortality 52% higher than that of those who did not inhale.

5. Cessation of Cigarette Smoking

Current cigarette smokers had a death rate for overall mortality 54% higher than that of non-smokers, (Table 2.1). Ex-cigarette smokers had a comparatively lower rate, but, based on 478 observed and 351 "expected" deaths among ex-smokers, this was still 36% above the rates for non-smokers. Thus, men who had stopped smoking cigarettes had a lower death rate for overall mortality than that for current cigarette smokers.

The death rates from heart and circulatory disease and lung cancer were lower for ex-cigarette smokers than for current cigarette smokers. Bronchitis and emphysema death rates of ex-cigarette smokers were not lower than those of current cigarette smokers.

C - RESIDENCE - MALES

An urban/rural comparison was made between males of equivalent cigarette smoking habits and non-smokers. It was found that the death rate for overall mortality of urban dwellers (persons with a history of 5 years or more of city residence) was 12% higher than that for rural dwellers of comparable smoking habits.

D - OCCUPATION - MALES

Respondents were classified into occupational groups based on their history of occupation.

No evidence was found in this study of clear cut associations between cause of death and occupation. Further, occupation did not appear to modify the established association of cigarette smokers with death rates in excess of those of non-smokers.

TABLE 2.1

EXCESS DEATHS AND PERCENTAGE ELEVATION OF DEATH RATES FOR OVERALL MORTALITY OF MALES BY CURRENT SMOKING HABIT COMPARED TO MALES WHO NEVER SMOKED

Current Smoking Habit (Smoking Habit at Start of Survey)	Populations at Risk	Observed Deaths	Expected Deaths*	Number of Excess Deaths (Observed Minus Expected)	Mortality Ratio (Observed Divided by Expected)	Percentage Elevation of Death Rate Compared to Non-Smokers
Never Smoked	7,014	853	853	0	1.00	0
Cigarettes only	35,199	4,153	2,700.8	1,452	$\frac{4153}{2700.8} = 1.54$	54%
Cigarettes plus cigars	5,733	506	414.3	92	$\frac{506}{414.3} = 1.22$	22%
Cigarettes plus pipes	4,551	613	487.9	125	$\frac{613}{487.9} = 1.26$	26%
Cigarettes plus pipes and cigars	6,725	646	570.7	75	$\frac{646}{570.7} = 1.13$	13%
Cigars only	1,594	196	184.4	12	$\frac{196}{184.4} = 1.06$	6%
Pipes only	3,319	723	685.4	38	$\frac{723}{685.4} = 1.05$	5%
Cigars plus pipes	2,253	365	373.5	-9	$\frac{365}{373.5} = 0.98$	-2%
TOTAL (Smokers only)	59,374	7,202	5,417.0	1,785	$\frac{7202}{5417.0} = 1.33$	33%

* Based on the age-specific death rates of men who never smoked.

TABLE 2.2

EXCESS DEATHS AND PERCENTAGE ELEVATION OF DEATH RATES OF MALE CURRENT CIGARETTE SMOKERS COMPARED TO MALES WHO NEVER SMOKED

Cause of Death and I.C.D. Number	Observed Deaths Among Current Cigarette Smokers	Expected Deaths*	Number of Excess Deaths (Observed Minus Expected)	Percentage of Excess Deaths Due to Specified Cause	Mortality Ratio (Observed Divided by Expected)	Percentage Elevation of Death Rate Compared to Non-Smokers
HEART & CIRCULATORY DISEASES 400-468	2,054	1,219.7	834	57.4%	$\frac{2054}{1219.7} = 1.68$	68%
Coronary Heart Diseases - 420.1	1,380	860.0	520	35.8%	$\frac{1380}{860.0} = 1.60$	60%
Other Heart and Circulatory Diseases - 400-468 (excl. 420.1)	674	359.7	314	21.6%	$\frac{674}{359.7} = 1.87$	87%
MAJOR LUNG DISEASES 162,163,500-502,527.1	440	35.0	405	27.9%	$\frac{440}{35.0} = 12.57$	1,157%
Lung Cancer - 162-163	325	21.8	303	20.9%	$\frac{325}{21.8} = 14.91$	1,391%
Bronchitis & Emphysema 500-502, 527.1	115	13.2	102	7.0%	$\frac{115}{13.2} = 8.71$	771%
ALL OTHER CAUSES	1,659	1,446.1	213	14.7%	$\frac{1659}{1446.1} = 1.15$	15%
TOTAL - ALL CAUSES	4,153	2,700.8	1,452	100.0%	$\frac{4153}{2700.8} = 1.54$	54%

* Based on the age-specific death rates of men who never smoked.

PART 3 - STUDY AND EVALUATION METHODS

Methods Available

There are basically two types of statistical approaches which may be used to study the effects of smoking upon health, namely, the retrospective and the prospective approaches.

The Retrospective Method

In general, the retrospective method involves selecting a study group of persons with a certain disease condition, or, persons who have died from a particular cause of death, and a control group. The most desirable control group is one which is similar to the study group in as many ways as possible, for example having the same age distribution etc., and differing only in the fact that persons in that group do not have the disease in question. Information is then gathered on the suspected agent or causal mechanism and a comparative analysis is made of this information derived from the two groups. It is a method which is useful in the preliminary stages of an investigation, or, alternatively it is useful for investigating rare diseases as it has the advantages of being carried out relatively quickly and economically because it does not involve large "at risk" populations.

One of the most serious disadvantages of the restrospective study lies in the manner in which the information on the suspected causal agent is collected. If the study population consists of persons who have died it often entails gathering information from other persons e.g. relatives, while, if the study population has a certain disease this may have modified the original pattern of behaviour with respect to the suspected causal agent. The retrospective method is usually used for investigating single disease conditions. It is at a particular disadvantage in studying the effects of disease associations of smoking as smoking is considered to be associated with a number of diseases to the extent that the death rate from any one disease may not be considered entirely independent of the others. The results of 29 retrospective studies into the associations between tobacco smoking and lung cancer have been summarized. (8).

The Prospective Method

The prospective type of study involves selecting a group of persons, i.e., a study population, determining their characteristics in respect to the suspected causative agent in question, in this case their smoking habits, and then "following" that population through a study period gathering data on their illnesses and/or deaths. It therefore overcomes the disadvantage of gathering data on the causative agents in retrospect. The population at risk is known.

When using the prospective method as outlined above, for the purpose of analysis of the results, the data are usually considered by age groups. Thus for instance the population at risk, and deaths or illnesses within that population, may be considered by 5 or 10 year age groups. It is recognized that where the agent is suspected of being responsible for large numbers of deaths then, in the older age groups, the population consists of persons who have withstood the effects of the causative agents through the younger age groups. This disadvantage however is also shared by the retrospective method. In these older age groups a comparison between those persons who have been exposed to the agent and those who have not, usually has to be made without consideration of the effects of this previous exposure.

A special type of prospective study which does take these effects into account is the cohort method. There, identifiable population groups e.g. non-smokers, cigarette smokers, cigar smokers etc., all of one age group, say 30-34, are taken and traced through to the end of the study, say to age 70-74 in 40 years time. However, a long time may elapse before the results are known, and persons may, over this long period of time change their habits. It is also expensive and difficult to keep in contact with a study population for 30 or 40 years.

Method Used

The decision was made in this study to use the prospective method though not the cohort method. This decision was based upon the following practical considerations in addition to the fact that, as indicated above, the prospective method appeared to be in general the better method. A large potential study population was available. These were persons with known names and current addresses, who were receiving pension cheques from the Federal Department of Veterans Affairs. The group was considered large enough for the purposes of the study and deaths in the group were reported to the Department of Veterans Affairs. Further, the cause of death of a veteran could be accurately determined on the basis of an autopsy while in most cases the cause of death of a widow or other dependent who had been receiving a pension cheque could be obtained from provincial vital statistics records.

Examples of Other Similar Studies

Examples of six other large-scale prospective studies and their relationship to this study with respect to size are given below in tabular form.

Study	Reference	Population at Risk*	Deaths$^{\Delta}$
Hammond	(9)	448,000	11,600
Dorn	(10)	248,000	24,500
Hammond and Horn	(11) (12)	188,000	11,900
Canadian Veterans	This study	92,000	11,300
Dunn, Linden and Breslow	(13)	67,000	1,700
Dunn, Buell and Breslow	(14)	60,000	1,700
Doll and Hill	(15)	34,000	4,500

* Usable questionnaires returned. To nearest 1,000.

$^{\Delta}$ To nearest hundred.

The Advisory Committee to the Surgeon General, Public Health Services, United States Department of Health, Education and Welfare, conducted an extensive review of all available information on the relationship between smoking and health, including data from the seven prospective studies listed in the tabulation appearing above. In the case of this Canadian Study, the material included both published and previously unpublished results. The Advisory Committee also examined different kinds of data from many sources and undertook an extensive survey of the literature. The committee's well known 387-page report (7) has become one of the standard references in this field.

Although each of the prospective studies mentioned above and included in the Advisory Committee's Report differed in some details, the data from the study populations on smoking habits and personal histories, such as age, occupation, residence, etc., in each case were obtained by questionnaire.

Critical Role of Questionnaire

In prospective studies, the questionnaire is of great importance. All the data used in this study were derived from the answers placed on the questionnaires with the single exception of the cause of death. Needless to say therefore most of the differences which one may find between the prospective studies which have been carried out may be traced ultimately to differences between the questionnaires. A reproduction of the questionnaire used in this survey may be found as Appendix A 4.1. Where a difference does exist between two studies it may happen that the difference arose, not because a certain question was asked or not asked, but as a result of the manner in which it was asked. For example, if data are required on duration of smoking habit, one may ask, "How long have you smoked?" or "How old were you when you started smoking?", in the latter case the answer would be deduced by subtracting the age given from the respondent's present age. In the first instance, if the persons responds with the word "lifetime", an arbitrary age for commencing to smoke must be established. Where, in this report, the data collected bear characteristics which are considered to be particular to the manner in which a certain question was asked, it is discussed in the appropriate part of the text.

In this study, the intensity i.e., the amount of smoking, is based on the lifetime history of smoking rather than on the smoking habit at the time of the survey.

A smoker may smoke tobacco in different ways, in a pipe, or in cigars or cigarettes, each perhaps for a varying number of years and each with a varying intensity and inhalation habit. The possibility exists that each has separate immediate and/or delayed effects and that this is also true of the various combined smoking habits, e.g., cigarettes plus cigars. Of importance is the fact that, as the lifetime history of smoking has been recorded in this study, it is possible to make an overall assessment of the effects of cigar and pipe smoking completely without the influence of cigarette smoking. No attempt is made to explore all of the hypotheses which present themselves as in many cases the numbers of persons available for study are so small that the investigations could be expected to be unproductive or to produce marginal results only.

In general, the more factors which are taken into consideration in any study the more difficult it becomes to both classify and explore the effects of all the factors in their entirety because of the relatively small number of persons in each sub-class. Further, there may be multiple causes for certain diseases. It is recognized, therefore, that no one study can assess all factors which may act independently or in conjunction with smoking to effect the health of the individual. In this context it is noted that variables such as weight, diet, ethnic origin, and specific environmental hazards, are not considered in this study.

Length of Prospective Studies

In all prospective studies the longer the follow-up period i.e. the interval between the beginning and the end of a study, the more distortion there will be when grouping deaths by age class. For example, a man who was 65 at the beginning of the study would be assigned that age for the purpose of the study even though he subsequently died aged 70. Further, the probability of the original data collected on smoking habits

and other environmental factors having changed between the beginning of the study and the death of a person in the study also increases as the length of the follow-up period increases. In this Canadian Study the 'age' of an individual was taken as the age given on the questionnaire at the beginning of the study. It was impracticable to age the population and the deaths in this study for analysis of all the variables considered in this report. The interval of six years over which deaths occurred is not however considered excessive in relation to the age of the population at risk and the duration of their habits.

It should be noted here that there will be some differences in the death ratios presented in this report for particular smoking habits as compared to similar ratios presented in the Report of the Advisory Committee to the Surgeon General of the U.S. Public Health Service entitled "Smoking and Health". In this latter report the aging of the Canadian Study population was performed in computing the death rates for the six year period based on person-years of exposure to risk.

Follow-Up

In any questionnaire survey, it is desirable to follow-up the non-respondents with a second questionnaire or to employ some other alternative method to gain information on them as it cannot be assumed that the response group have the same characteristics as the non-response group. For example, persons who were ill may have less of a tendency to answer the questionnaire than those who were in good health, or vice versa. It has, in fact, been suggested that differences in the death rates of these two groups do exist (16). The non-respondent population was not investigated further after the first questionnaire in this study, however, information concerning the ages and causes of death of decedents among the non-respondents was available and is discussed in Part 5.

Basis of Analysis of Data

The basis of the analysis of the data in this and other prospective studies revolves essentially around a comparison of the age-specific death rates of the various types of smokers with the age-specific death rates of non-smokers. The mortality ratios are derived by comparing the age specific death rates of smokers with those of non-smokers. To be more precise, mortality ratios are obtained by dividing the age specific death rates of smokers by those of non-smokers. If, therefore, a mortality ratio is 1.0 it would indicate that the death rates of the smokers and non-smokers concerned are the same; if it is greater than unity, the smokers have a higher death rate than the non-smokers, whereas if it is less than unity, the opposite is true. The mortality ratio is then the first basis of comparison in most prospective studies including this one. The mortality ratio is often quoted accompanied by the deaths "observed" in the smoking group and the "expected" deaths to give an indication of the reliability of the mortality ratio by showing the size of the quantities upon which it is based. In this case the "expected" deaths are derived by applying the age-specific death rates of the non-smokers to the corresponding age-specific population of the smoking categories under study. By a simple algebraic manipulation, it may be shown that if the mortality ratio is defined as being equal to the age-specific death rate of the smoking population divided by the corresponding age specific death rate of non-smoking population, then it is also equal to the deaths "observed" divided by the deaths "expected" when calculated as described above.

"Excess deaths", being the difference between the "observed" and the "expected" deaths for any smoking population, are used occasionally to illustrate the magnitude of the effects of smoking totally, but more particularly, in respect to the various causes of deaths under consideration.

Estimates of the deaths expected among persons of differing smoking habits in populations of the same size and having the same particular standard age distribution were calculated and are presented in this report for comparative and illustrative purposes. The use of quantities based upon a standard population was deemed necessary because certain diseases tend to be age-specific while the age distribution of the study population may not be considered to be "typical". Further, the age distribution of most groups of smokers in the study differs appreciably from the age distribution of the non-smokers.

In the section in which the effects of occupation were considered, because of the fact that in some occupations small populations and numbers of deaths were involved, a special comparison was employed in which the age distributions were ignored and the deaths observed in any one occupation were compared with those in the whole population given the same smoking habit. See Part 11.

Scope and Limitations

It is appropriate at this stage to consider the scope and limitations of the results which may be obtained from this survey.

In order to derive inference - to be able to assume that smoking directly or indirectly causes, incites or otherwise affects the progress of various maladies from the results of a statistical study such as this - it would be necessary to be able to specify and apply smoking "treatments" to individuals in the population selected at random or on the basis of chance alone. In a human society this is obviously impossible. Such studies can only be undertaken in animal populations.

It is possible to state however from this type of survey, that, where it is established that a certain disease or group of diseases occurs with greater frequency among persons having a particular smoking habit as compared to a group of non-smokers, then, an "association" exists between the disease condition(s) and the smoking habit in question. While this type of study may establish "associations" only, in no instance does it overrule the possibility or probability that smoking is in fact the causative agent of one or more fatal conditions, or, that it has a direct effect upon a subclinical or established disease condition. When a large body of evidence points to a factor as being harmful to the health of any section of the community, the assumption is justified that it is harmful until proof to the contrary is established.

Lack of Morbidity Data

For a complete assessment of the associations of the various smoking habits with health or disease conditions, it would be necessary to gather and analyze, in relation to the various smoking habits, data on both morbidity and mortality. The absence of morbidity data is particularly important in those areas in which the mortality data indicate no association or only a marginal association. For instance, in the age groups below the age of fifty the associations of higher death rates among cigarette smokers than among non-smokers are less pronounced than in the age groups older than 50 years. Without morbidity data in this situation one may be tempted to deduce that cigarette smoking is not associated with any ill-effects before the age of 50 in males, whereas, in fact it is

quite possible that certain diseases, for instance bronchitis, are more prevalent in this age group among smokers than non-smokers. A complementary study concerning the incidence of bronchitis in smokers and non-smokers is now being conducted.

Applicability of Findings

The results of this survey while strictly applicable only to the population under study may be considered, nevertheless, applicable to the Canadian Population or any other population to the extent that the disability pensioners and their dependents upon which the study is based are representative of that population. A comparison of the deaths expected by cause of death of male veteran pensioners aged 35 - 79 with those of all Canadian males aged 35 - 79 is made in Part 5, and indicates that the death rates by cause of death are in general consistent with each other.

Competing Risks and Selective Survival

As indicated previously in this Section the primary method of analysis used in this study is to compare the age-specific death rates of non-smokers with those of smokers of the various smoking habits by means of the mortality ratio. While this is probably the best method available, the use of the mortality ratio is somewhat limited in its usefulness when used upon populations in the older age groups, say 75 and over, because of the effects of both selective deaths on surviving populations and competing risks of death. While, as in all instances, the mortality ratio describes accurately the relationships of the death rates of smokers to non-smokers as they actually exist, it does not, in such instances, give an unbiased estimate of the true effects of smoking on equivalent populations. The probable effects of selective deaths and competing risks of death upon the mortality ratios quoted in this study are discussed in detail where they are considered to have been affected by the two factors in question. The principal discussions may be found in Parts 7 and 8. In general, both these factors tend to minimize the differences between the death rates of smokers as compared to non-smokers and therefore to minimize the mortality ratios.

Tests of Statistical Significance

Statistical tests of significance are not routinely applied in this study to determine whether differences in the death rates of two groups of persons are significantly different. The principal reason is that they cannot be applied consistently and for that reason may be misleading. For instance, in the younger age classes it may not be possible to demonstrate a significant effect of smoking on the death rate, even though the death rates may be higher for smokers than non-smokers, simply because of the mathematical implications of the fact that fewer persons die in the younger than in the older age groups considered in this study. Also as mentioned previously, the effects of smoking may, in the younger stages of life manifest themselves principally in disease conditions rather than increased mortality. Likewise, in the older age groups, because of the effects of selectivity and competing risks a test may not indicate significance and again be misleading. Where however it is stated or implied in the text of this report that one death rate is significantly higher than another the 0.05 level of significance is implied, or, in general terms, the chance of the difference being due to chance is 1 in 20 or less.

PART 4 - HANDLING OF THE DATA

Pilot Study

As previously stated the study took the form of a questionnaire survey. A preliminary questionnaire was set up and a pilot study carried out in September 1955. For this trial run 5,078 forms out of a total of 211,305 were sent out to veteran pensioners and/or their dependents. Upon completion and return, these were examined to determine whether or not the data from the questionnaires could be usefully tabulated. Based on a study of approximately 200 returns, changes were made to improve reporting of intensity of smoking, changes in smoking habit and length of residence.

Questionnaire Mailing

By the beginning of 1956 the questionnaire was in its final form. A copy of this document is included as Appendix A 4.1. The names and addresses of persons who were receiving monthly cheques had been made available and comprised 54,409 World War I, 109,533 World War II and Korean War Veteran pensioners and/or their dependents, as well as 47,363 recipients of Veterans' and Widows' allowances. Persons hospitalized on a long-term basis, those receiving a pension semi-annually and those with assigned pensions under the Veterans Land Act and a few others were not included in the survey, since their names did not appear on the list provided by the Canadian Pension Commission. It is estimated that approximately 19,000 were thus excluded from the survey. From the listed 211,305 names, 3,397 were excluded to avoid duplication and 511 were excluded as they were addressed to children of veterans. Questionnaires were mailed to the remainder (207,397) with return addressed envelopes during the period February to July 1956. Most of the recipients of pensions were veterans.

Return of Questionnaires - Editing

The completed questionnaires were checked by pension number, and the respondents' names identified on the mailing list. It was realized then that some pensioners received more than one questionnaire since their names appeared more than once; in addition, a section of the mailing list had been duplicated by error. All those double forms were eliminated upon return. Generally the first one completed and returned was kept, and the second one removed. However, sometimes the second form gave information that did not appear on the previously completed one, and use was made of this information to complete the original questionnaire. Several hundred forms were returned blank, and were discarded.

Editing and coding were then done simultaneously. It was necessary to discard some questionnaires because the information given did not pertain to the pensioner but to some relative or guardian for whom no information on the cause of death would be available. These records, and a few forms which had inadvertently been mailed to persons under 21 years of age, were also removed. In all, approximately 118,000 forms or about 57 per cent of the forms sent out were returned, the response rate of the World War I group being somewhat higher at 65 per cent than that of the World War II and Korean groups. However, after removal of duplicates, unusable forms and returns from recipients of Veterans' and Widows' allowances who were not pensioners, some 92,000 usable forms remained to form the basis of this study.

Sex and Age Coding

Sex was coded according to the first name of the respondent; in a very few cases supporting information had to be obtained from Department of Veterans Affairs records as the sex of the respondent was not specifically asked on the questionnaire.

Age was coded as stated, except where the year of birth only was given, in which case the age was calculated using a conversion table based on April 1, 1956, as a response date. A substantial number of respondents did not specify their age, and others gave contradictory information when answering other questions. In such cases age was ascertained from Department of Veterans Affairs records.

Occupation Coding

Occupation was coded according to the Classification of Occupations, Ninth Census of Canada, 1951, with a few adaptations. Informants were asked the following questions:

2. What occupation AND type of work have you done MOST of your life?_____
   Examples:
   mechanic - garage
   plumber - self-employed
   clerk - office
   farmer - mixed farming

3. For How Many Years?
   For_____Years

4. What other occupations AND types of work have you done?

   _____ 5. For_____Years

   _____ For_____Years

   _____ For_____Years

The answer to the first question was to be considered as the primary occupation, that is, the one of longest duration. The occupation(s) listed in answer to the second question was intended to be the secondary occupation(s), that is, the one(s) of shorter duration. Occupations of less than five years duration were disregarded either as primary, or as secondary occupations. A considerable amount of editing was required when coding this section, as some respondents tended to fill in their present occupation as the primary one, while occupations of much longer duration were listed in answer to the second query. Each questionnaire was therefore examined closely and coded according to the criteria indicated for a primary and a secondary occupation. Although information regarding secondary occupation(s) was available for the respondents of both wars, it was coded only for World War I pensioners. The decision was made to omit secondary occupation(s) when dealing with World War II pensioners, as it was felt that the space on the punch card could be used more advantageously for an inhalation code which was applied only to World War II.

Residence Coding

Information concerning lifetime place of residence was requested, and a space provided for answers for the number of years residence in: cities with 20,000 or more population, in suburbs of cities, in towns or villages with a population less than 20,000, and in the country. Here again, a considerable amount of editing had to be done. It was obvious from the answers received that some persons were confused when filling in this section. Often, for instance, the same

number of years, or the word "lifetime" was shown for both city and suburb residence. It may be that in such instances the person lived in suburbs, but worked in cities, or vice versa. In such cases city residence only was coded. The same type of situation occurred when completing the section for town and country residence. Here residence was coded to "town" rather than to "country". There was also some confusion between the "city" with over 20,000 population and "towns" with less than 20,000 population. Some informants pointed out they had lived all their life in a particular town, which was in the less than 20,000 population category for part of the time, but that the same town had now grown to be a city with a population of over 20,000. Such cases were coded to city residence. Other respondents living in smaller places having the status of a city, indicated they lived in a city rather than in a town. Another point sometimes misunderstood was the section "in the country" which was interpreted as meaning "in Canada" rather than in rural areas. In cases where the residence was not given, it was possible, particularly for farmers, to use the occupation to determine the residence. Where the name of the place of residence was written out, the population size was verified in the current Canadian Railway Guide and coded appropriately.

A discrepancy code had to be developed to take care of the poorly completed forms. This code was used to indicate the difference between the total number of years of residence in cities, suburbs, towns and country added together, and the age of the respondent. When the difference was exactly equal to the years in the Armed Services, a special code was used.

Lifetime Smoking History

A general question was asked to identify the individual as a smoker or a non-smoker. The reported smoking of a total of 100 cigarettes, and/or 10 cigars, and/or 20 pipefuls of tobacco during the lifetime, qualified the respondent as a smoker. Where some respondents indicated they had been smoking, or were smoking, but did not specify what they smoked, a code classifying them as "smokers unspecified" was used. In addition, a few World War I pensioners reported a "chewing only" tobacco habit. They were given the same code as the smokers unspecified, and the two groups together form the "Tobacco users unspecified" category. There are 145 such cases included in the male population, as well as 34 deaths.

Before classifying a pensioner as a smoker or a non-smoker, it was necessary to consult the back of the form, as very often incomplete information was given in Section 8, (see questionnaire), whereas quite complete details were supplied concerning intensity and duration of each smoking habit over his lifetime.

For those qualifying as smokers, the back of the questionnaire provided space for recording separately and independently, details concerning their smoking history for cigarettes, cigars, and pipe. For each smoking habit, the respondent was asked to specify the intensity of smoking at the time of the survey, and the intensity and duration of the smoking habit over his lifetime. He was also requested to specify whether or not he inhaled each particular type of smoke.

Questions regarding cigarette smoking were as follows:

At the PRESENT TIME, how many cigarettes a day do you smoke on the average? (check one)	During your LIFETIME, how many years did you smoke at any of these rates?
None ☐	
Under 10 a day ☐	..... For _____ years
10 - 20 a day ☐	..... For _____ years
Over 20 a day ☐	..... For _____ years
Do you inhale? Yes ☐ No ☐	

The same question was asked of cigar and of pipe smokers, with the same choice of answers provided for pipe smokers, but a different breakdown given for cigar smokers regarding the number of cigars smoked per day (under 3 a day, 3 - 10 a day, over 10 a day).

The majority of the respondents did not follow the instructions to "check one item", but put check marks in two or three boxes in an attempt to indicate changes in their smoking habits over their lifetime. Consequently, the information on Present Time habit, with regard to the intensity of smoking was confused with the record of smoking history and could no longer be separately determined. Therefore the lifetime smoking history of the respondent was coded. However, one could generally judge whether or not the person smoked at the time of the survey. If a check mark appeared in the box opposite "none" in a record with a smoking history, it was taken to mean that the person had stopped smoking. Moreover, there was often an accompanying statement confirming this.

Intensity of Smoking

For the lifetime intensity of smoking, the highest intensity checked off, was coded. It was found that a considerable number of persons who purchased bulk tobacco reported their tobacco habits in terms of the weight of tobacco consumed. A conversion table was prepared for converting tobacco weights into cigarettes or pipefuls and is included in this report as Appendix A 4.2.

In the case of cigar smokers, a large number of whom were occasional smokers, some checked the box opposite "none", and wrote beside it "Only occasionally". Others checked "Under 3 cigars a day", and wrote "But not every day". Still others indicated they had smoked 10 or 20 cigars in their lifetime. It was evident from these remarks that the majority of the cigar smokers in the category "Under 3 cigars a day" were occasional cigar smokers.

Duration of the Smoking Habit

Duration entries for single intensities of smoking were coded, but in cases where the number of years of smoking for more than one intensity of smoking was given for a particular habit, these entries were added to obtain the total duration. Where the smoking habit was reported to have been of a lifetime duration, it was agreed to measure duration from the age of 16. This decision was made since informants had not been asked to indicate the age at which they had started to smoke, and 16 was considered a reasonable average age to assume a lifetime habit to have started.

Inhalation

Although information on inhalation was requested from the entire population at risk, it was coded only for World War II and Korean War pensioners. The question for each habit was worded to obtain information regarding the "present" habit. Since the question asked was "Do you inhale?", those who reported that they had discontinued a particular habit were not coded for inhalation for that habit. Cigarette-only smokers, cigar-only smokers, and pipe-only smokers were coded to "yes", and "no", or "unspecified", according to their answer. In the case of mixed smokers, however, those who indicated inhaling one or more types of smoke (e.g. cigarette smoke, and/or cigar smoke, and/or pipe smoke), and either claimed they did not inhale other type(s) of smoke, or else did not specify whether they inhaled or not, were coded as inhalers only for the type(s) of smoke they did inhale. Mixed "no" or "unspecified" answers were considered unspecified as to inhalation habit. Only the single habit smokers who indicated they did not inhale, or else the mixed smokers who indicated a non-inhaling habit for all smoking habits, were coded as non-inhalers.

Dominant Smoking Habit

For the mixed smokers, a dominance code was designed. It took into account the duration and intensity of each smoking habit to determine the dominant habit. A specific habit had to represent at least 1/10 of the duration of the smoking history before it was considered as a dominant habit, and a regular daily habit took precedence over any occasional or broken habit.

Deaths

During the six year follow-up period as deaths of pensioners were reported, quarterly lists of the deaths were made available by the Department of Veterans Affairs to the Epidemiology Division. These lists showed the pension number, the name, age at death, and the cause of death coded according to the International Statistical Classification of Diseases, Injuries and Cause of Death, 1955 Revision, (17). In most cases the causes of death were confirmed by autopsies. The dependent pensioners' deaths were also listed, but no cause of death was given. This information was subsequently obtained, for most females, through the Dominion Bureau of Statistics, by arrangements with Provincial Registrars of Vital Statistics. Sixty male dependent pensioners, for World War I, however, were classified under "Unspecified Cause of Death" and were included under "Other", in the preliminary reports (5) (6) but are included in "Residual" cause of death in this final report.

As the lists of deaths were received, the matching questionnaires were drawn, and the cause of death code added on it, as well as the code for the quarter in which the death occurred, and the age at death.

Code Checking

The coded questionnaires were sorted into groups according to the "Lifetime" smoking habit and a quick visual check of each group, permitted the elimination of the bulk of coding errors relating to smoking habits. Sub-sorts were also done where indicated, for the purpose of checking such items as the "Present Time" smoking habit, inhalation, and the dominant smoking habit.

Card Punching and Verifying, and Tabulating

The information on male World War I respondents derived from the questionnaires and from the lists of deaths ending December 31, 1959 was punched into Samas Underwood 40 column cards.

The World War II and Korean War pensioners' questionnaires were subsequently coded using the same coding system as for World War I except that secondary occupations were disregarded and an inhalation code included.

A decision was made at this stage not to use questionnaire returns from recipients of Veterans and Widows' allowances who were not pensioners due to the transient nature of this group and the difficulty in obtaining notification of death and information on the cause of death.

In 1963 the data processing equipment of the Biostatistics Section was changed to Remington Rand equipment. Information already punched on Samas Underwood 40 column cards (the World War I male population at risk, and deaths in that population for the period ending December 31, 1959, as well as part of the World War II male population at risk) was transferred to Remington Rand 90 column cards. The remainder of the World War I male deaths, World War II, and Korean War male populations at risk and death cards were then punched and verified. The female records were subsequently treated in a similar manner.

All deaths which occurred during the period July 1, 1956, to June 30, 1962, and for which a completed questionnaire had been returned were included in the survey. Also included were some 170 World War I male deaths which had occurred prior to July 1956, and which had been incorporated in the preliminary report although they were omitted from the Canadian data in the U.S. Surgeon-General's Report. It was felt that their inclusion would not constitute a bias, and removing them as well as the matching cards from the population at risk would have been time consuming. The total number of male deaths included in this study was 9,532.

Female

The coding and tabulating of the data were greatly simplified due to the fact that the great majority of females were either non-smokers, or cigarettes-only smokers. The very few cases of female mixed-smokers were excluded. Occupation was coded, although it was realized that a large proportion of the respondents would be classified as housewives. As previously mentioned, the female population in this survey consists mostly of widows of pensioners and other dependents, for whom no causes of death were given in the listings received from the Department of Veterans Affairs. This information was later obtained for most of them through the Dominion Bureau of Statistics by a search of the provincial death records. There was a total of 1,794 female deaths between July 1, 1956 and June 30, 1962, there being 190 for whom the cause of death could not be determined.

PART 5 - CHARACTERISTICS OF THE RESPONSE AND NON-RESPONSE POPULATIONS

Population Sample and Response

The total study population to whom the survey questionnaires were addressed included disability pensioners from the South African Boer War, World War I, World War II and the Korean War. The disability pensioners as a group, however, are composed almost entirely of World War I and World War II pension recipients since very few South African or Korean War pensioners are included. The forms were also sent to widows and/or dependents of deceased pensioners. In addition, questionnaires were sent to Veterans' Allowance and Widows' Allowance recipients.

It is of interest to examine the response of this total study population to the questionnaire survey. Table 5.1 shows the response to the questionnaire survey by five-year age groups of the total study population of male disability pension recipients upon record in 1956 as reported by the Canadian Pension Commission.

It will be noted from this table that the population response of 77,541 among disability pensioners was only 50.1%. However, this does not include those pensioners who were sick or in hospital at the time and who did not, therefore, receive a questionnaire. This largely accounts for the difference between the 50% pensioner response stated above as opposed to the 57% overall response among persons actually receiving a questionnaire as previously mentioned in Part 4, "Handling of the Data". It is of interest to note that the variation in response by individual age groups is small and does not seem to vary systematically. There is, however, a slightly lower response rate than average, approximately 45%, among the pensioners in the age group 35-55 which is composed principally of World War II veterans, while there is a slightly better than average response to the study questionnaire, approximately 55% from pensioners aged 55 and over, this latter group being composed mainly of World War I pensioners. In general, however, it would appear that there was not a serious differential response by age group to the questionnaire.

Variation of Smoking Habits Within Age Groups

It is of considerable interest to examine the distribution of the male respondents as they differ considerably with respect to smoking habits within age groups. Table 5.2 contains percentage distributions of the male respondents by lifetime smoking habits within individual five-year groups. This Table reveals that the percentage distribution for all age groups combined differs markedly from the distribution within individual five-year age groups. The most striking observation is that the cigarette smoking categories are over represented in the younger age groups but are considerably under-represented in the older age groups relative to the percentage distribution for all ages combined and that this tendency is noted to be more pronounced as the quantities of cigarettes consumed increases. For example, although approximately twenty per cent (19.4%) of the population are in the 10-20 cigarettes per day smoking category, the proportion drops rapidly in each age group over 60 years of age from 17.4% in the 60-64 age group to 3.1% in the 80 plus age group. Conversely it is found that the proportion of non-smokers and non-cigarette smokers is less than the All Age groups average, up to and including age group 55-59. Thus, while non-smokers and persons who had a history of not having smoked cigarettes comprised 15.4% of the total male population they comprised only 10.3% and 11.2% of the populations age 30-34 and 55-59 respectively but 62.5% of the population aged 80 and over.

In the individual categories of non-cigarette smokers, non-smokers represent more than one-fifth (21.6%) of the response group aged 80 and over; more than double the percentage of men who never smoked in all age groups combined (9.1%). Men with a history of having smoked pipes only constitute more than one-quarter of the response group aged 80 and over (25.2%) although they represent only a token sector (3.1%) of the total respondents all ages combined and less than 1% in each age group under the age of 55.

Average Ages of Males Within Smoking Categories

While the average age of the male respondents as a whole was 52.5 years, non-smokers and persons who had not smoked cigarettes had average ages which were higher than the overall average. For example the average age of those who had smoked pipes only was 68.7 years. Those who had smoked cigarettes tended to be younger than the average. For instance those who had smoked more than 20 cigarettes per day had an average age of 48.3 years.

Comparability with Other Studies and the General Population

These differences in smoking habit according to age in this response population are found also to pertain to the populations studied by others. For example, the search of the literature reveals that the study populations of Hammond and Horn (2) and Dorn (10) exhibit the same general characteristics as mentioned in the previous paragraph. The similarity between the smoking habits within age groups of the respondents of these studies is certainly more than casual and reflects the fact that the smoking habits of successive cohorts of smokers has changed. This latter statement and the supposition that the respondents to this smoking study and those mentioned above are representative of the smoking habits of the male populations of Canada and the United States by age is supported by the findings of two surveys of smoking habits. A survey of the smoking habits of Canadians (19) and a survey of the smoking habits of men and women in the U.S.A. by Hammond and Garfinkel (20) both illustrate the fact that, among males there was a general tendency for the percentages of non-smokers, cigar smokers and pipe smokers to increase with age while similarly, the percentages of cigarette smokers in the same populations to decrease with age.

Changes in Pattern of Tobacco Consumption

The change in the smoking habits of successive cohorts of smokers is indicated by data on the quantities and types of tobacco consumed in Canada. In Canada, over the past forty years, adult consumption of cigarettes has increased 740% from 430 per capita in 1920 to 3184 per capita in 1964. During the same period adult per capita consumption of cut and plug tobacco has decreased by 97.7% from 5.7 to 0.13 pounds, in this country (18). These trends are also reflected by the very high acceptance of the cigarette by young men and their slight acceptance of the pipe smoking habit (19).

Differential Mortality by Smoking Habit has Influenced Survival Within Specific Smoking Habit Groups

As is demonstrated in Part 7 where the death rates for specific smoking habit groups are applied to a standard population, it is found that non-smokers have the better chance of survival. Taking account of these factors, there is little reason to doubt that the sizeable excesses in the proportion of non-smokers and pipe smokers over age sixty in the sample populations is at least partially due to the lower death rates which favour survival among such persons relative to cigarette smokers.

Non-Responding Section of the Study Population

With the resources available, it was not possible to mail a second questionnaire or to otherwise sample the non-respondents to determine in which ways or to what extent differences in age distributions, smoking habits, occupation, etc., existed. However, information on the cause of death and age at death of non-respondents was made available by the Department of Veterans Affairs along with the causes of death of the respondents. It was therefore possible to calculate the ages of decedents among the non-respondents as of 1st April 1956 and compare deaths by cause of death among respondents with deaths by cause of death of non-respondents within age groups. As was explained in Part 4, persons hospitalized on a long-term basis and some other relatively small groups of pensioners were not sent a questionnaire.

There are therefore essentially two types of pensioners who are not included in the main body of this report - those who were not sent questionnaires and those who were sent questionnaires but did not reply. Table 5.3 contains a comparison of the age distributions of decedents among these three types of pensioners who died in the period 1st July 1956 to 30 June 1962. From this Table one observes that there were relatively more deaths among the younger non-respondents than among the respondents. If one were to assume that the death rates of the respondents and the non-respondents were not substantially dissimilar this difference would be expected on the basis of the fact that, as has been noted previously, the response rate was higher among World War I than among World War II pensioners. One may observe also from Table 5.3 that deaths in the eldest age groups, 70-74, 75-79 and 80 plus, were relatively most frequent among the pensioners who did not receive a questionnaire. This is as may be expected since it is the elder pensioners who were most likely to be hospitalized and therefore not receive a questionnaire.

A more detailed comparison of the deaths of non-respondents with the deaths of respondents is found in Tables A 5.1 to A 5.6. In Tables A 5.1 to A 5.3 each set of deaths is tabulated by cause of death within five year age groups, while in Tables A 5.4 to A 5.6 percentage breakdowns of these deaths are given within five year age groups. These Appendix tables indicate that the distributions of the percentages of deaths by cause within five year age groups are not dissimilar. The evidence available does not therefore suggest that marked differences in health status existed between the respondents and the non-respondents.

Comparison of the Deaths of Male Respondents and Death Rates of the Male Population of Canada Aged 35-79 in 1959

In order to obtain an indication as to whether the overall death rates and the death rates of certain causes of death of male respondents to this study were similar to those of Canadians of equivalent ages, the expected deaths of Male Canadians in 1959 were calculated on the basis of the age-specific death rates of the respondents. The estimates arrived at as the result of these calculations may only be regarded as rough estimates because they are based upon deaths occurring over a six year period rather than a one year period and, further, an exact comparison between the age groupings as used in the "Vital Statistics" Reports of the Dominion Bureau of Statistics against which the expected deaths are compared could not be obtained for the year 1959, the year in the middle of the follow-up period. In fact, the "expected" numbers of deaths are based on a population between one and two years younger than that quoted i.e., the expected deaths are based upon a population aged approximately 34-78. A summary of the results of these calculations are given in Table 5.4.

From this table it may be observed that the overall "expected" deaths are somewhat fewer than the observed deaths. When comparing deaths by cause one has to take into consideration the fact that as a general rule autopsies are carried out on pensioners whereas only about a quarter of all deaths in Canada are subjected to autopsies. Thus a greater precision in recording cause of death may be expected for pensioners. Bearing this in mind one notes that there are more "expected" deaths from coronary heart disease than actually occurred. However, if one considers all heart and circulatory diseases there were 24,464 deaths observed compared to 22,156 deaths "expected" on the basis of the age-specific death rates of the male respondents to this survey. The "expected" bronchitis and lung cancer deaths are noted to be somewhat more frequent than those observed. There were substantially more deaths due to vascular lesions than were "expected" based upon the results of this study. With these exceptions the "expected" deaths were generally fewer, but not substantially fewer, than the deaths observed. Readers who are particularly interested may extend this comparison by age groups using the data contained in Appendix Tables A 5.7 and A 5.8.

Implications for this Study

The above analysis does not suggest that the age distributions or the health status of the responding pensioners differed greatly from the non-respondents.

The analysis did suggest that the male respondents tended to have somewhat lower death rates than a male population of equivalent age in Canada in 1959.

For the reasons stated above one would not consider the respondents to comprise an unsatisfactory population for a study of the effects of smoking upon health.

TABLE 5.1

A COMPARISON OF THE MALE DISABILITY PENSIONER POPULATION(1) AND THE DISABILITY PENSIONERS RESPONDING TO THE SMOKING AND HEALTH STUDY QUESTIONNAIRE(2) BY AGE AND PERCENT RESPONSE

Age Group at Time of Survey	Disability Pensioners		Percent Distribution by Age		Study Population as a Percent of Total Pensioner Population
	Total Pensioner Population (1)	Study Population (2) Response	Total Pensioner Population (1)	Study Population (2) Response	
30-34	15401	8689	10.0	11.2	56.4
35-39	28188	12594	18.2	16.2	44.7
40-44	19007	8746	12.3	11.3	46.0
45-49	12386	5733	8.0	7.4	46.3
50-54	9573	4469	6.2	5.8	46.7
55-59	15785	8966	10.2	11.6	56.8
60-64	23827	11786	15.4	15.2	49.5
65-69	15053	8182	9.7	10.6	54.4
70-74	8777	4740	5.7	6.1	54.0
75-79	4340	2356	2.8	3.0	54.3
80+	2388	1280	1.5	1.6	53.6
TOTAL	154725	77541	100.0	100.0	50.1

(1) As at March 31st, 1956. Data supplied by the Canadian Pension Commission.

(2) Between October 1955 and July 1956.

TABLE 5.2

PERCENTAGE DISTRIBUTIONS WITHIN AGE GROUPS OF THE MALE STUDY POPULATION BY LIFETIME SMOKING HISTORY.
ALSO AVERAGE AGES OF MALES BY LIFETIME SMOKING HISTORY

Age Group at Time of Survey	Never Smoked	Percentage Distributions of the Male Study Population by Lifetime Smoking History										
		Cigarettes Only				Cigarettes plus Cigars	Cigarettes plus Pipe	Cigarettes plus Pipe plus Cigars	Cigars Only	Pipe Only	Cigars plus Pipe	Total
		*Less than 10 per Day	*10-20 per Day	*More than 20 per Day	Total							
30 - 34	8.5	6.2	22.1	7.8	36.7	10.4	7.6	35.0	0.7	0.5	0.6	100.
35 - 39	8.8	6.6	22.3	7.5	36.8	10.3	7.0	35.5	0.5	0.4	0.6	100.
40 - 44	7.5	7.0	22.8	8.7	39.0	8.2	7.3	36.4	0.5	0.4	0.7	100.
45 - 49	6.3	6.9	22.8	8.8	39.1	8.0	8.2	36.7	0.4	0.7	0.7	100.
50 - 54	5.6	7.9	24.4	8.8	41.5	8.6	7.9	34.4	0.5	0.7	1.1	100.
55 - 59	7.1	8.2	20.6	7.0	36.5	7.4	8.3	36.6	0.8	1.5	1.8	100.
60 - 64	9.1	9.1	17.4	5.0	32.4	6.0	10.0	35.7	1.0	3.4	2.8	100.
65 - 69	11.0	10.3	15.0	3.7	29.7	5.3	9.2	33.1	1.2	6.2	4.3	100.
70 - 74	14.2	10.7	11.4	2.5	25.3	4.3	10.2	28.6	1.2	9.9	6.3	100.
75 - 79	15.5	9.0	7.5	1.8	18.7	3.6	9.5	24.2	1.2	17.2	10.1	100.
80+	21.6	4.5	3.1	0.6	8.9	2.4	6.7	18.0	1.0	25.2	14.7	100.
All Ages	9.1	7.9	19.4	6.4	34.3	7.6	8.3	34.4	0.8	3.1	2.4	100.
Average Age (Years)	55.1	54.6	49.7	48.3	50.6	48.6	54.0	51.6	57.5	68.7	65.7	52.5

* Between 1% and 2% of the males who had a lifetime history of smoking cigarettes only did not specify the number they smoked per day.

TABLE 5.3

DISTRIBUTIONS OF DEATHS AND PERCENTAGE OF TOTAL DEATHS BY AGE GROUP FOR RESPONDENTS, NON-RESPONDENTS AND NON-SURVEYED PENSION RECIPIENTS

Age Group at Time of Survey	Respondents		Non-Respondents		Non-Surveyed Pension Recipients	
	Deaths	Percentage of Total Deaths	Deaths	Percentage of Total Deaths	Deaths	Percentage of Total Deaths
30-34	129	1.4	188	2.7	66	1.6
35-39	224	2.4	283	4.0	121	2.9
40-44	293	3.1	343	4.9	131	3.1
45-49	335	3.5	387	5.5	142	3.4
50-54	401	4.2	469	6.6	155	3.7
55-59	1183	12.5	1136	16.1	429	10.2
60-64	2009	21.2	1470	20.8	789	18.7
65-69	1933	20.4	1127	15.9	767	18.2
70-74	1436	15.1	803	11.4	707	16.8
75-79	914	9.6	540	7.6	528	12.5
80+	633	6.7	325	4.6	375	8.9
TOTAL	9490	100.	7071	100.	4210	100.

TABLE 5.4

TOTAL DEATHS AMONG MALES IN CANADA AGED 35-79 FOR SELECTED CAUSES OF DEATH COMPARED WITH EXPECTED DEATHS BASED UPON THE AGE-SPECIFIC DEATH RATES OF MALE RESPONDENTS

Cause of Death	I.S.C. No.	Deaths in Canada in 1959	Expected Deaths in 1959 Based Upon Death Rates of Respondents
All Causes		52,090	45,606
Lung Cancer	162+163	1,965	2,415
Total Neoplasms less Lung Cancer	140-239 Less 162+163	7,659	5,887
Vascular Lesions	330-334	5,068	3,567
Coronary Heart Disease	420.1	15,406	15,815
All Heart and Circulatory Diseases Less C.H.D.	400-468 Less 420.1	9,058	6,341
Pneumonia and Influenza	480-493	1,638	1,479
Bronchitis	500-502	448	673
Accidents	800-999	3,493	2,966

PART 6 - OVERALL EFFECTS OF SMOKING ON MORTALITY - MALES

Smoking History Compared to Current Habit

Essentially two sets of basic data on smoking were collected by this survey; one on lifetime smoking habits and the other on current smoking habits. These two sets of data, together with a special set derived from the two principal sets of data, namely, those who had a history of smoking but who had stopped smoking at the time of survey are considered in this chapter. In all cases, as mentioned previously, the criterion used in the analysis of this data lies in a comparison of the death rates of persons in the various smoking categories with persons of the same age class who have a history of having never smoked. Each of the two principal sets of data has its advantages and disadvantages when used to determine the effects of smoking. The data collected on smoking history are the most comprehensive. Since each and every category of smoking indulged in within the lifetime is recorded single smoking habits may be studied without fear of the results being affected by other smoking habits, delayed or otherwise. On the other hand, the data collected on smoking history include those persons who had stopped smoking. Also, those persons who, at the time of the survey had a single smoking habit but who at some previous time had had another smoking habit, are included in one of the mixed smoking categories. In contrast to the smoking history, the data collected on the current smoking habits include in the single smoking habits persons who have had more than one smoking habit during their lifetime but does not include those persons who have stopped smoking.

The relative values of these two sets of data depend to a large extent upon the length of the period of time which may elapse before the effects, possibly differential, of the various smoking habits are expressed in increased death rates. Because knowledge of such time lags is minimal, and because the relationships involved are assumed to be complex, the data collected for both lifetime history of smoking and current history of smoking are recorded in this section together with the data collected on those persons who have stopped smoking.

All three sets of data - current, lifetime and stopped smoking - are subject to possible inaccuracies of reporting, and, again, all three sets of data could be affected by changes in smoking habits which may have occurred in the six years' study period. No information is available in this study on the latter question.

The data collected on the persons who stopped smoking have a further limitation to their usefulness. Some respondents stated on the questionnaire that they stopped smoking because of ill health while others indicated that they had been ordered to stop by their physicians on this account. The distinct possibility exists that a portion of those persons who stopped smoking were influenced to do so by ill health or poor physical condition.

Description of Mortality Ratios

Tables 6.1 and 6.2 contain mortality ratios derived from data collected on life histories of smoking and current smoking habits respectively, for three types of smoking habits and their four possible combinations. The mortality ratios were obtained by dividing the age-specific death rates of persons in the various smoking categories by the age specific death rates of persons who had a history of never having smoked. Table 6.3 contains mortality ratios for persons who

had stopped smoking at the time the data were collected but, because of the small populations at risk, those who had smoked cigarettes plus cigars, and cigarettes plus pipes, were combined with those who had smoked cigarettes plus cigars plus pipes. The supporting basic data giving deaths, populations at risk, death rates per 1000 population and expected deaths may be found as Appendix Tables A 6.1 to A 6.12 for these three tables.

In Tables 6.1, 6.2 and 6.3 the overall ratios quoted are meant to be used as guides only. They are not strictly comparable as the age distributions of the populations at risk in the various smoking categories are not necessarily the same.

Discussion of Data Concerning Cigarette Smoking

If one considers smokers of "cigarettes only" in Tables 6.1 and 6.2, it can be seen that, in all but one age group, mortality ratios are greater than unity. It is however in the groups aged 35-44 and the groups over the age of 55 that the ratios are substantially above unity, and are based upon data collected from relatively large populations. The ratios for the smaller populations in the intervening age groups are less consistent. The mortality ratios in all age groups and especially in the age groups 55-59 and older should be considered minimum estimates. This is so because, in these age groups, no account has been taken of the effects on the populations at risk of the incremental death rates associated with cigarette smoking in the preceding age groups. It is quite possible that the increased death rates of the cigarette smokers act in a selective manner, for example, those cigarette smokers who survive say to the age of 75, could comprise a population at risk which is constitutionally more hardy than a population of lifetime non-smokers at that age. In this respect it should be noticed from Tables 6.1 and 6.2 that the mortality ratios tend to rise in the smoking "cigarette only" category to a peak in age groups 55-59 and 60-64 and then to decline progressively in the older age groups, although in absolute terms the death rates of cigarette smokers are still considerably higher than those of non-smokers in these age groups.

A comparison of the mortality ratios of smokers of "cigarettes only" between Table 6.1 and 6.2 reveals that the ratios are very closely related and follow the same trends. This is as may be expected because the data on many of the respondents is included in both tables. However, it will be observed that in 6 of the 7 age groups over the age of 50 the ratio is higher among the current "cigarette only" smokers than those persons having a life history of smoking "cigarettes only". Table 6.3 which contains the mortality ratios of those persons who had stopped smoking at the time of the survey, but, who had previously smoked "cigarettes only", indicates that in the age groups 55-59 and over the death rates of these persons while being greater than those of persons who had never smoked was at the same time lower than both the current cigarette smokers and those with a history of smoking cigarettes only.

In summary, the data presented in Tables 6.1, 6.2 and 6.3 concerning the smoking of "cigarettes only" demonstrate that smoking is associated with death rates higher than those of non-smokers and this increment in the death rate becomes pronounced at approximately 50 years of age and remains so in the older age groups. Further, above the age of 50 the death rates of current cigarette smokers appear to be marginally higher than those persons classified as having a history of having smoked cigarettes only. The data also indicate that those persons who stopped smoking cigarettes, while being

associated with higher death rates than those who had never smoked in the age groups 55-59 and over, were associated with death rates lower than those of the current cigarette smokers or those persons having a history of cigarette smoking.

The mortality ratios concerning cigarette smoking in combination with the other smoking habits, namely, "cigarettes and cigars", "cigarettes and pipe", and "cigarettes, cigars and pipe" contained in Tables 6.1 and 6.2 are, like those of "cigarettes only", in most cases greater than zero. These mortality ratios also tend to follow the same relationship to age as do the mortality ratios of the "cigarettes only" smoking categories except, that their numerical values are somewhat lower in the age groups 55-59 and older.

Discussion of Data Concerning Cigar Smoking and Pipe Smoking

The data contained in Tables 6.1, 6.2 and 6.3 would appear to indicate that cigar smoking had, if anything, only a marginal effect upon the mortality rates of cigar smokers as compared to persons who had never smoked. It is noted that the overall mortality ratio of persons who had stopped smoking "cigars only" and who had stopped smoking pipes and cigars at the time of survey are at 1.15, not only greater than unity but also greater than the over mortality ratios of persons who currently smoked "cigars only" (M.R. = 1.06) and those who had a lifetime history of smoking cigars only (M.R. = 1.10) at the time of the survey. The data available in respect to pipe smoking in the three tables under study do not indicate that the age-specific death rates of pipe smokers vary substantially from those of non-smokers. It is noted in this instance that the mortality ratios of those persons who had stopped smoking pipes at the time of survey do not exhibit a general tendency to be greater than unity.

In the combination pipe and cigar smoking category, the ratios of deaths observed to deaths expected for current smokers and those having a history of having smoked only cigars and pipe do not appear to differ markedly from unity. In the "stopped smoking" category however the overall ratio is seen to be greater than unity.

Considering in summary the data presented in Tables 6.1, 6.2 and 6.3 on the overall effects of smoking on mortality in males, it becomes apparent that cigarette smoking is the habit which is associated to the greatest extent with death rates higher than those of non-smokers. Where cigarette smoking is carried on in combination with another smoking habit, or stopped, the mortality rates lessen accordingly. On an overall basis, the associations of cigar smoking and/or pipe smoking with death rates in excess of those of persons who have never smoked appear to be weak.

TABLE 6.1

MORTALITY RATIOS△ OF MALES OF SEVEN TYPES OF LIFETIME SMOKING HISTORIES BY AGE GROUP

Age Group at Time of Survey	Mortality Ratios△ by Lifetime Smoking Histories						
	Cigarettes Only	Cigarettes plus Cigars	Cigarettes plus Pipe	Cigarettes plus Cigars plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	1.08	0.96	0.37	0.87	-*	-*	-*
35-39	1.51	1.35	1.62	1.44	-*	1.59*	-*
40-44	1.33	1.53	0.91	1.18	-*	0.99*	0.61*
45-49	1.02	0.82	0.93	0.92	0.68*	0.80*	0.42*
50-54	1.32	1.03	0.97	1.17	0.62*	0.44*	0.28*
55-59	1.84	1.40	1.63	1.40	1.60*	1.28	0.94
60-64	1.87	1.48	1.80	1.43	1.60	1.23	1.10
65-69	1.50	1.22	1.47	1.16	1.11	0.91	1.00
70-74	1.35	1.08	1.22	1.10	0.84	0.87	1.12
75-79	1.48	1.15	1.21	1.15	1.25	1.10	1.08
80+	1.19	1.11	1.18	1.18	0.93	1.03	0.98
Overall□	1.53	1.23	1.38	1.22	1.10	1.01	1.03

* Based on less than five "expected" deaths.

△ Based upon the age-specific death rates of non-smokers.

□ Based on the observed and "expected" deaths each summed over all age groups.

See Appendix Tables A 6.1 - A 6.4.

TABLE 6.2

MORTALITY RATIOS△ OF MALES OF SEVEN TYPES OF CURRENT SMOKING HABITS BY AGE GROUP

Age Group at Time of Survey	Mortality Ratios△ by Current Smoking Habit						
	Cigarettes Only	Cigarettes plus Cigars	Cigarettes plus Pipe	Cigarettes plus Cigars plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	0.89	1.16	0.45	1.18	0.77*	-*	1.58*
35-39	1.56	1.20	2.19	1.44	1.11*	0.59*	0.59*
40-44	1.30	1.58	1.42	1.33	0.27*	0.38*	0.94*
45-49	1.03	0.72	1.00	1.00	0.80	0.85	0.59
50-54	1.35	1.05	1.37	1.01	0.33	0.53	0.62
55-59	1.90	1.36	1.25	1.11	1.29	1.67	0.67
60-64	1.88	1.35	1.61	1.37	1.58	1.17	1.08
65-69	1.52	1.22	1.23	1.11	0.93	0.95	0.92
70-74	1.40	1.19	1.01	0.92	0.83	0.98	1.08
75-79	1.45	1.20	1.18	0.96	1.11	1.08	1.01
80+	1.21	1.16	1.12	1.19	1.07	1.10	0.98
Overall□	1.54	1.22	1.26	1.13	1.06	1.05	0.98

* Based upon less than five "expected" deaths.

△ Based upon the age-specific death rates of non-smokers.

□ Based on the observed and "expected" deaths each summed over all age groups.

See Appendix Tables A 6.5 - A 6.8.

TABLE 6.3

MORTALITY RATIOS◊ OF MALES OF FIVE TYPES OF LIFETIME SMOKING HISTORY BUT WHO WERE NON-SMOKERS AT THE TIME OF SURVEY BY AGE GROUP

Age Group at Time of Survey	Mortality Ratios◊ of Current Non-Smokers by Lifetime Smoking History				
	Cigarettes Only	Cigarettes,△ Cigars, Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	1.19	0.45	-*	-*	-*
35-39	1.64	0.83	-*	5.00*	-*
40-44	0.99	0.71	-*	-*	-*
45-49	0.88	0.70	-*	-*	-*
50-54	1.36	0.66	-*	-*	-*
55-59	1.45	1.26	1.25*	1.33	2.10*
60-64	1.73	1.38	1.29*	0.76	1.90*
65-69	1.29	1.19	1.67*	1.19	0.88*
70-74	1.23	1.00	0.57*	0.80	1.11
75-79	1.37	1.21	3.08*	1.11	1.35
80+	1.04	1.21	0.61*	0.88	0.87
Overall□	1.36	1.15	1.15	0.97	1.15

* Based upon less than five "expected" deaths.

△ Includes cigarettes plus cigars, cigarettes plus pipe, cigarettes plus cigars plus pipe.

◊ Based upon the age-specific death rates of non-smokers.

□ Based on the observed and "expected" deaths each summed over all age groups.

See Appendix Tables A 6.9 - A 6.12.

PART 7 - ANALYSIS OF THE EFFECTS OF CIGARETTE SMOKING - INTENSITY

The association of cigarette smokers with death rates in excess of those of persons who have never smoked was established in our study population in the preceding Section.

It is natural that the first variable to be studied in detail should be the intensity of smoking. One usually expects that, other things being equal, if a substance causes a certain effect then the greater the exposure the quicker and greater the effect. While this is often true, it is not necessarily so. In this context, any increase in the death rates which can be associated with cigarette smoking relative to non-smokers may be in direct proportion to the numbers of cigarettes smoked but again this is not necessarily so.

Mortality Ratios, Three Cigarette Smoking Intensities

Tables 7.1 and 7.2 provide comparisons between cigarette smokers of three intensities and persons who had never smoked using mortality ratios based upon the death rates of non-smokers.

From Table 7.1, which contains the data based upon life-time histories of smoking cigarettes only, it may be observed that the mortality ratios tend to increase from the less than 10 cigarettes per day category, through the intermediate category to the 20 plus cigarettes per day category, this trend being reflected in the total or overall mortality ratios of the three smoking categories. Table 7.2, containing the data on the current cigarette smoking habit by intensity, displays the same trends.

On the basis of these data contained in Tables 7.1 and 7.2, it will be considered as established in our study population that age-specific death rates increase incrementally with intensity of smoking; the lowest death rates being associated with non-smokers and the highest with those who smoke more than 20 cigarettes per day, it being borne in mind that the biggest single increment is between non-smokers and smokers of less than 10 cigarettes per day.

Methods of Illustration and Comparison

While the results presented so far in this study on cigarette smoking are useful for establishing relationships or associations, they are not necessarily the best for illustrating the magnitudes of those associations as they apply to the population at large. Before proceeding further with the investigational aspects of this study we will therefore compare the effects of the differences between the death rates of non-smokers and persons who, at the time of the survey, currently smoked cigarettes only. There are various ways in which one may illustrate the effects of the death rates associated with the four smoking categories under consideration. Here, two methods will be used which are based directly on the actual age-specific death rates. One, commencing with the 30-34 age group traces a population through the succeeding older age groups and illustrates the number of survivors through each age. The other applies the age-specific death rates of the four smoking categories to a standard population and estimates the number of deaths for each smoking habit and age group such that the numbers and total numbers of estimated deaths may be compared directly.

Comparison of Survivors

Following the first method, Table 7.3 contains estimates of the numbers of persons expected to survive through the various age classes starting with an initial population of 1,000 at age 32.5 for non-smokers and current cigarette smokers of three intensities. It may be seen that, for example, for each thousand non-smokers of age 32.5 one would expect 155 to reach the age of approximately 90 whereas the equivalent number reaching that age among the smokers of 20 or more cigarettes per day could be expected to be 35. Or, one could say that of the 905 non-smokers of age 52.5 one would expect 602 or approximately 2/3 to reach the age of 72.5 years as compared to 422 or less than half of the 882 smokers of more than 20 cigarettes per day at age 52.5.

This first method probably provides the nearest estimate that can be obtained of the effects of smoking upon the survival of a population at risk. It compensates to a large degree for selective effects on the surviving populations that may be caused by the excess mortality associated with smokers as compared to non-smokers, or, in fact, between heavy smokers as compared to light smokers, which may severely bias a direct comparison of death rates in older or succeeding age classes, as applied to the standard population in Table 7.4. Another consideration, though of a more theoretical nature, is the fact that the estimates of life expectancy are based on a series of 11 populations (the 11 age groups) rather than following one population through from the age of 30. In neither case is it expected that the figures calculated apply exactly to the Canadian population, as the study population of veteran pensioners may not be assumed to be completely representative of the Canadian population, and further, because there was an incomplete response to the questionnaire, among the veteran pensioners. However it is considered that they illustrate realistically the effects of the mortality rates of cigarette smokers as compared to non-smokers in the male population.

The estimates quoted in Table 7.3 were calculated using the death rates given in Appendix Tables A 6.3 and A 7.7 making the assumptions that the average age of the persons in each age group was the central point of that age group, e.g., the average age of persons in the age group 30 to 34 at the time of survey was 32.5 years. Also it was assumed that the average age at the time of survey of persons classified as 80 years and over was 84.3 years and that the death rates over each five year period were 5/6 of the death rates derived from the six year period of the survey.

Comparison of Deaths in Standard Populations

Death rates vary greatly with age. As mentioned previously, the distribution of the population at risk is not that of a typical population in that its character was determined principally by eligibility for participation in the two World Wars. Further, the age distribution of non-smokers varies widely from that of cigarette smokers. In order therefore to make a general assessment of the deaths or excess deaths associated with smoking, one is obliged to estimate those deaths on a single or standard population. In this study the standard population chosen was a population of 100,000 males over the age of 30 distributed by age as was the male population aged 30 and over in Canada at the time of the 1961 census. This population is displayed in Table 7.4 together with the deaths by single age class which one could expect in one year of "exposure to risk" on the

basis of the death rates contained in Appendix Tables A 6.3 and A 7.7 for non-smokers and current cigarette smokers of three intensities of smoking. Thus, referring again to Table 7.4, it is evident that in a "typical" male population over the age 30 one would expect in one year, that, for each 1429 deaths among non-smokers, there would be 2202 or an extra 54% of deaths among those persons who smoked more than 20 cigarettes a day. Also, for example, in the age range 50-69 years, the range in which the effects of smoking may be considered to be the most pronounced, the number of calculated deaths for non-smokers total 576 as compared to 991 for smokers of more than 20 cigarettes per day which is equivalent to a death rate of 172% of that of the non-smokers.

TABLE 7.1

RATIOS OF OBSERVED TO EXPECTED* DEATHS: MALES HAVING A LIFETIME HISTORY OF HAVING SMOKED CIGARETTES ONLY BY INTENSITY OF SMOKING AND AGE GROUP

Age Group at Time of Survey	Ratios of Observed to Expected* Deaths: Males Having a Lifetime History of Having Smoked Cigarettes Only by Intensity		
	Less than 10 Cigarettes per day	10-20 Cigarettes per day	More than 20 Cigarettes per day
30-34	0.69	1.22	1.00
35-39	1.72	1.45	1.27
40-44	1.08	1.35	1.43
45-49	0.79	1.07	1.10
50-54	1.30	1.30	1.41
55-59	1.43	1.84	2.28
60-64	1.55	2.01	2.04
65-69	1.46	1.53	1.49
70-74	1.40	1.31	1.43
75-79	1.51	1.42	1.54
80+	1.16	1.26	1.34
Overall	1.41	1.56	1.65

* Based upon the age-specific death rates of non-smokers.

TABLE 7.2

RATIOS OF OBSERVED TO EXPECTED* DEATHS OF MALES WHO CURRENTLY SMOKED CIGARETTES ONLY BY INTENSITY OF SMOKING AND AGE GROUP

Age Group at Time of Survey	Ratios of Observed to Expected* Deaths of Males Who Currently Smoked Cigarettes Only by Intensity of Smoking		
	Less than 10 Cigarettes per day	10-20 Cigarettes per day	More than 20 Cigarettes per day
30-34	0.62	0.88	1.02
35-39	1.58	1.62	1.40
40-44	0.95	1.22	1.66
45-49	0.86	1.05	1.10
50-54	1.34	1.36	1.32
55-59	1.53	1.94	2.11
60-64	1.64	1.94	1.97
65-69	1.45	1.55	1.59
70-74	1.48	1.32	1.50
75-79	1.45	1.46	1.40
80+	1.07	1.22	1.57
Overall	1.43	1.55	1.63

* Based upon the age-specific death rates of non-smokers.

TABLE 7.3

ESTIMATED SURVIVORS* OF FOUR POPULATIONS OF A THOUSAND MALES EACH AT AGE 32.5; NON-SMOKERS, AND CURRENT CIGARETTE SMOKERS OF THREE INTENSITIES THROUGH ELEVEN SUCCEEDING AGES

Age	Estimated Population Surviving for Males of Four Smoking Categories			
	Never Smoked	Currently Smoke Cigarettes Only		
		Less than 10 per day	10-20 per day	More than 20 per day
32.5	1,000.0	1,000.0	1,000.0	1,000.0
37.5	986.5	991.6	988.0	986.2
42.5	976.1	975.2	971.3	971.7
47.5	953.8	954.0	944.1	934.8
52.5	905.1	911.8	893.6	882.5
57.5	847.6	834.4	816.1	808.4
62.5	787.1	743.6	703.3	686.6
67.5	715.2	631.9	578.4	563.2
72.5	602.3	487.6	437.2	422.2
77.5	467.8	326.3	308.0	280.6
84.3	291.6	148.1	139.1	132.9
90.3	155.4	74.1	59.6	35.4

* Based upon the age-specific death rates of non-smokers and persons of three cigarette smoking categories.

TABLE 7.4

ESTIMATED DEATHS (ALL CAUSES) FOR 100,000 MALES IN ONE YEAR BASED UPON THE DEATH RATES OF MALES WHO HAD NEVER SMOKED AND THE DEATH RATES OF CURRENT CIGARETTE SMOKERS OF THREE INTENSITIES BY AGE GROUP

Age Group at Time of Survey	Population* at Risk	Estimated Deaths (All Causes) for 100,000 Males in One Year for Four Smoking Categories			
		Never Smoked	Currently Smoke Cigarettes Only		
			Less than 10 per day	10-20 per day	More than 20 per day
30-34	15630	42	26	37	43
35-39	15310	32	51	52	45
40-44	13580	62	59	76	103
45-49	12500	128	110	134	140
50-54	10740	137	183	186	180
55-59	8780	125	191	243	265
60-64	7100	130	213	252	255
65-69	5810	184	265	284	291
70-74	4760	213	315	282	319
75-79	3250	180	261	262	252
80+	2530	197	211	241	309
Total	100,000	1429	1885	2048	2202

* Distribution by age group based upon the distribution of males aged 30 and over in Canada as enumerated by the 1961 Census of Canada.

PART 8 - CAUSE OF DEATH, NON-SMOKERS AND CIGARETTE SMOKERS

Competing Causes of Death

In Part 6 where the overall effects of smoking on mortality rates were discussed, it was noted that the death rates of smokers and non-smokers in the older age groups could not be considered to be strictly comparable.

Now that, in this Section, the death rates of single or grouped causes of death are to be considered, it must also be recognized that those causes of death associated with smoking may not necessarily be considered to be independent of each other. If each cause of death is considered as a risk, then in fact a series of competing and interdependent risks exist and, if smoking augments one or more of these risks or alters the balance between them, then those persons who survive a period of cigarette smoking can be expected to be selected in terms of resistance to disease in relation to a population equal in all respects except that they are non-smokers. As a limited numerical illustration of the effects of these considerations, let us suppose that, in a certain population there is an excess of say 500 deaths due to coronary heart disease among a population of smokers as compared to an equal population of non-smokers of the same age. If we were to assume that these 500 deaths were caused by smoking then the population at risk has effectively been reduced by 500 and, consequently, the probability of dying of all other primary causes of death has been reduced in that particular age group. The survivors are therefore selected, smokers in relation to non-smokers, as they enter each succeeding age group.

In this study however no adjustments have been attempted even within individual age groups as smoking is associated with increased death rates of more than one disease and one would need to make many assumptions. For example, one would have to decide which cause of death associated with cigarette smoking was primary.

The total numbers of persons at risk therefore have been used in the calculation of all death rates, but, because no such attempts are made to compensate for the factors mentioned above, it should be borne in mind when examining the tables in this Part, that, in those age groups in which the overall mortality ratio of cigarette smokers as compared to non-smokers is greater than unity, all those death rates or mortality ratios for individual or grouped causes of death should be considered to be minimum estimates. Certainly it would not be correct to assume under such conditions that, if a certain cause of death had a mortality ratio equal to or even lower than unity, cigarette smoking was not associated with or had no influence upon the death rates of smokers as compared to non-smokers for that cause of death.

Presentation of Data in "Lifetime" and "Current" Form

A summary of the data collected on cause of death for cigarette smokers is contained in Table 8.1. It contains the total observed deaths for persons having a lifetime history of having smoked cigarettes only, persons who, at the time of the survey currently smoked cigarettes only, and persons with a history of smoking cigarettes only but who had stopped smoking at the time of the survey. It should be noted that the first category of smokers, i.e. those having a "lifetime history of smoking cigarettes only" are presented a second time within the category of persons who "currently smoke cigarettes only". One may observe from this table that the

mortality ratios of those persons classified as having had a lifetime history of smoking cigarettes only are very similar to those of the current cigarette smokers. Thus it would appear that having had more than one smoking habit in a lifetime, i.e., having at some stage smoked pipes or cigars singly or in combination with cigarettes does not have a marked effect upon the distribution of deaths and death rates by cause of death if the person proceeds to smoke only cigarettes thereafter.

It is not considered necessary, therefore, to trace through the causes of death of both smoking categories in detail here, and, principally because of the fact that the categories "current cigarette smokers" have the larger populations, they have been selected for more detailed study.

Before considering a further breakdown of these data however, it is noted that the mortality ratio is greater than unity for all twelve selected cause of death groupings with the single exception of "vascular lesions" within the "current cigarette smokers". Also of interest is the fact that, while in general, those persons who had stopped smoking have lower overall mortality ratios than the current cigarette smokers, certain causes of death have increased mortality ratios, in particular the mortality ratios for both bronchitis and emphysema are 12.50, the highest overall mortality ratios recorded in Table 8.1. The fact that the death rate from bronchitis and emphysema is more than twelve times as high among discontinued smokers as among non-smokers is strong evidence for implicating smoking as a cause of these diseases. It is also further evidence that persons who stop smoking often do so for medical reasons.

Presentation of Mortality Ratios by Age Group and Intensity of Smoking

Table 8.2 contains mortality ratios by cause of death for current cigarette smokers, classified by the quantity of cigarettes smoked and by age class. Three broad age classes only were used in order to avoid, as far as possible, the use of very small numbers. Even so it will be observed that small numbers could not be avoided altogether. One should therefore consider the mortality ratios presented with confidence varying in accordance with the size of both the numbers of the deaths "observed" and "expected" upon which each mortality ratio is based.

The most logical method of examining the data contained in Table 8.2 is probably by age class.

Age Group 30-49

In the age group 30-49 the death rates of those persons who smoked less than 10 cigarettes per day appear to be approximately equal to those of non-smokers. However, the overall mortality ratio does increase to 1.17 and 1.29 for the smokers of 10-20 and 20 plus cigarettes per day respectively. This increase in the overall mortality ratios is seen to be, on closer examination of the table, largely a reflection of increased death rates due to "Coronary Heart Disease" (420.1) and "Other Heart and Circulatory Diseases" (400-468) of smokers of more than 10 cigarettes per day relative to non-smokers. Lung Cancer also has a mortality ratio above unity although one is obliged to note that these mortality ratios are based upon small figures. The other two respiratory diseases which have very high mortality ratios in the older age groups, namely, bronchitis and emphysema are almost nonexistent as causes of death among both smokers and non-smokers in this age group.

Age Group 50-69

It is in the age group 50-69 years that the differences between the death rates of smokers and non-smokers reach their maxima. Probably this is because the effects of the selective survival of cigarette smokers in relation to non-smokers has not become sufficiently pronounced to reduce the mortality ratios, it being noted that while the death rates of smokers as a group in the age group 30-49 were higher than non-smokers, the numbers of excess deaths actually involved were not large. In actual fact, in Table 8.2, the total EXCESS deaths in age group 30-49 are 83 based upon 558 observed deaths and a population of 18,915 current cigarette smokers whereas, in age group 50-69 there are 1,120 EXCESS deaths based upon 2,722 observed deaths and a population of 14,157. The age group 50-69 is therefore probably the most important age group for determining the effects of smoking.

Upon examining the mortality ratios for the age group 50-69 in Table 8.2, it is quite remarkable to notice that, considering all causes of death, including "residual", only 2 of the 36 mortality ratios are less than unity; further, the overall mortality ratios increase from 1.51 for smokers of less than 10 cigarettes per day to 1.81 for smokers of more than 20 cigarettes per day respectively.

Turning from the consideration of overall mortality ratios it is found that diseases affecting the respiratory system have the highest mortality ratios. The probability of dying from lung cancer or bronchitis is more than twenty-five times as high for heavy smokers as for non-smokers while deaths from emphysema occur more than seven times as frequently. Deaths from pneumonia and influenza are also more frequent among smokers than non-smokers in this age group.

Deaths from heart and circulatory diseases (I.S.C. Nos. 400-468) are more than fifty per cent more frequent among cigarette smokers than among non-smokers. Because deaths from this group of diseases are frequent in relation to deaths from other causes in this age group they account for the bulk of the excess deaths among smokers relative to non-smokers in this age group.

In addition to cancer of the lung, the mortality ratios of "All Other Cancers" are above unity at all intensities of cigarette smoking in this age group while cancer of the pancreas occurs six times as frequently among heavy smokers as among non-smokers. If considered together the excess deaths from all cancers account for approximately one-third of the excess deaths among cigarette smokers who smoked more than 20 cigarettes per day in the age group 50-69.

It is in this age group that deaths due to accidents, poisoning and violence are greatest for cigarette smokers relative to non-smokers.

Age Group 70 and Over

Age group 70 and over is the age group in which the effects of selective survival are the most evident in that the mortality ratios, in general, are lower than those in the age group 50-69 and also in that there is little or no tendency for the mortality ratios to increase in magnitude as the quantity of cigarettes smoked increases.

In age group 70 plus, the mortality ratios of "Coronary Heart Disease" and "Other Heart and Circulatory Diseases" remain consistently above unity at approximately the same magnitude as in the 50-69 age group, and, as in the other age groups, they account for a large proportion of the excess deaths. Further the respiratory diseases, lung cancer,

bronchitis and emphysema have high mortality ratios although they are in some instances based upon small numbers of deaths and expected deaths. For cancers other than lung cancer the mortality ratios are above unity and are essentially the same as in the 50-59 age group. The mortality ratios of pneumonia and influenza are less than unity.

Expected Deaths Based Upon "Standard" Populations

Table 8.2 summarizes the data collected on cause of death for current cigarette smokers in comparison to non-smokers in as much detail as is justified considering the numbers of deaths observed and size of the population at risk. From Columns 12-14 it may be seen that the mortality ratios quoted for all ages combined, while being a guide to the overall situation, are somewhat arbitrary depending upon the age distribution of the current cigarette smokers in this particular study. In Part 7, the overall death rates of cigarette smokers were applied to a population of 100,000 males distributed as the male population of Canada aged 30 and over in 1961 in order to illustrate, in a realistic perspective, the effects of the differential age-specific death rates of smokers and non-smokers. Similarly in this Part the age-specific death rates for the various causes of death have been applied to a population of 100,000 males distributed by age as the male population aged 30 and over was in Canada at the time of the 1961 Census.

Table 8.3a contains in Columns 3-6 the calculated numbers of deaths of non-smokers and cigarette smokers of three intensities for such a standard population during a six year period. Also this table contains in Columns 7-9 the numbers of deaths by cause of death for cigarette smokers of three intensities which are in excess of those of non-smokers. Table 8.3b, in Columns 3-5, then displays the percentage distribution of the excess deaths recorded in Columns 7-9 of Table 8.3a together with the mortality ratios for each cause of death within the three cigarette smoking intensities in Columns 6-8.

From the estimated deaths by cause for cigarette smokers and non-smokers in Columns 3-6 of Table 8.3a, one may obtain a perspective of the cause of death pattern for a typical male population aged thirty and over. It is seen for instance that among non-smokers the principal causes of death are the combined heart and circulatory system diseases.

Comparison of Quantities of Excess Deaths with Mortality Ratio Magnitudes

Turning to the percentage distributions of the excess death among cigarette smokers in Columns 3-5 of Table 8.3b, one notes that the three distributions representing the three intensities of cigarette smoking are very similar and that coronary heart disease accounts for the largest proportions of the excess deaths, and, together with other heart and circulatory diseases, constitute in the region of two-thirds of all the excess deaths. In terms of numbers of excess deaths, those deaths caused by lung cancer are ranked third in frequency of occurrence while bronchitis is ranked lower, twice in rank 4 and once in rank 6. When the mortality ratios in Columns 6-8 of Table 8.3b are considered however, then bronchitis and lung cancer are ranked first and second whereas heart and circulatory diseases are found to be ranked generally fifth, sixth and seventh.

Summary Patterns of Multiple Disease Associations

Table 8.3b provides a summary of the pattern of diseases found to be associated with cigarette smoking in this study based upon Canadian veteran pensioners. It is interesting to note from this table that the three groups of diseases which account for the largest numbers of excess deaths, namely, "coronary circulatory diseases", "other heart and circulatory diseases" and "lung cancer" also have mortality ratios which have an overall tendency to increase with the quantity of cigarettes smoked. Also, as was noted when considering Table 8.2, these three groups of diseases were the ones with mortality ratios greater than unity for cigarette smokers as compared to non-smokers in the youngest age group 30-49 years.

TABLE 8.1

OBSERVED AND EXPECTED* DEATHS OF MALES WITH MORTALITY RATIOS, ALL AGES COMBINED, BY CAUSE OF DEATH FOR THREE CATEGORIES OF CIGARETTE SMOKERS

Cause of Death	I.S.C. Code Number	Observed and Expected* Deaths with Mortality Ratios, All Ages Combined, for Three Categories of Cigarette Smokers								
		Lifetime History of Smoking Cigarettes Only			Currently△ Smoke Cigarettes Only			Stopped Smoking Cigarettes with Lifetime History of Having Smoked Cigarettes Only		
		Observed Deaths	Expected* Deaths	Mortality Ratio	Observed Deaths	Expected* Deaths	Mortality Ratio	Observed Deaths	Expected* Deaths	Mortality Ratio
Cancer of Pancreas	157	23	10.94	2.10	28	14.18	1.97	7	1.72	4.07
Lung Cancer □	162,163	245	17.25	14.20	325	21.80	14.91	18	2.97	6.06
Genito-Urinary Cancer	170-181	79	59.26	1.33	101	71.95	1.40	14	10.56	1.33
All Other Cancers		296	220.73	1.34	339	277.22	1.22	47	35.67	1.32
Vascular Lesions	330-334	213	254.63	0.84	280	318.25	0.88	41	41.95	0.98
Coronary Heart Disease	420.1	1070	686.76	1.56	1380	859.98	1.60	161	110.17	1.46
Other Heart & Circulatory Diseases	400-468 less 420.1	536	292.96	1.83	674	359.74	1.87	81	50.02	1.62
Pneumonia & Influenza	480-493	148	109.50	1.35	166	134.94	1.23	22	19.92	1.10
Bronchitis	500-502	64	5.69	11.25	78	6.83	11.42	13	1.04	12.50
Emphysema	527.1	40	5.18	7.72	37	6.32	5.85	12	0.96	12.50
Accidents, Poisonings and Violence	800.999	154	119.89	1.28	211	158.49	1.33	11	16.70	0.66
Residual		418	372.91	1.12	534	471.06	1.13	51	58.86	0.87
All Causes		3286	2155.70	1.52	4153	2700.75	1.54	478	350.54	1.36

* Based upon the age-specific death rates of non-smokers.

△ Includes persons who have at some time smoked cigars and/or pipes.

□ Appendix 8.5 combines all the data available on the seven male non-smokers who died from lung cancer presented for each individual case.

TABLE 8.2

OBSERVED AND EXPECTED* DEATHS OF MALES WITH MORTALITY RATIOS, BY CAUSE OF DEATH, FOR CURRENT CIGARETTE SMOKERS OF THREE SMOKING INTENSITIES, IN THREE AGE GROUPS AND ALL AGES COMBINED

Cause of Death	I.S.C. Code Number	Observed and Expected* Deaths with Mortality Ratios of Current Cigarette Smokers of Three Intensities in Three Age Groups					
		Age 30 - 49			Age 50 - 69		
		Less than 10 per day	10 - 20 per day	More than 20 per day	Less than 10 per day	10 - 20 per day	More than 20 per day
		Obs. Exp. M.R.	Obs. Exp. M.R.	Obs. Exp. M.R.	Obs. Exp. M.R.	Obs. Exp. M.R.	Obs. Exp. M.R.
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8
Cancer of Pancreas	157	0 1.52 -	2 4.30 0.47	0 1.86 -	3 1.04 2.88	11 2.54 4.33	5 0.80 6.25
Lung Cancer □	162,163	2 0.81 2.47	16 3.86 4.15	6 1.47 4.08	33 3.08 10.71	165 6.13 26.92	44 1.64 26.83
Genito-Urinary Cancer	170-181	0 0.00 -	3 0.00 -	0 0.00 -	21 14.56 1.44	33 30.15 1.09	10 8.44 1.18
All Other Cancers		8 8.06 0.99	22 35.09 0.63	7 15.05 0.47	50 40.81 1.23	129 91.94 1.40	61 27.97 2.18
Vascular Lesions	330-334	3 8.05 0.37	18 35.30 0.51	1 15.09 0.07	30 39.27 0.76	129 87.88 1.47	36 26.83 1.34
Coronary Heart Disease	420.1	18 18.50 0.97	115 79.28 1.45	65 35.05 1.85	220 141.37 1.56	557 332.65 1.67	184 104.76 1.76
Other Heart & Circulatroy Diseases	400-468 Less 420.1	3 3.41 0.88	33 14.47 2.28	12 6.51 1.84	99 53.39 1.85	242 128.08 1.89	63 40.83 1.54
Pneumonia & Influenza	480-493	0 2.62 -	8 11.64 0.69	4 4.73 0.85	24 14.56 1.65	61 30.15 2.02	16 8.44 1.90
Bronchitis	500-502	0 0.00 -	0 0.00 -	0 0.00 -	8 1.02 7.84	36 1.78 20.22	11 0.42 26.19
Emphysema	527.1	0 0.00 -	1 0.00 -	0 0.00 -	5 1.04 4.81	15 2.54 5.91	6 0.80 7.50
Accidents, Poisonings, Violence	800-999	13 11.88 1.09	55 53.37 1.03	27 21.89 1.23	19 12.27 1.55	53 29.33 1.81	29 9.46 3.07
Residual		17 11.26 1.51	63 49.80 1.26	36 20.80 1.73	81 69.56 1.16	173 177.19 0.98	60 59.27 1.01
All Causes		64 66.11 0.97	336 287.11 1.17	158 122.45 1.29	593 391.97 1.51	1604 920.36 1.74	525 289.66 1.81

* Based upon the age-specific death rates of non-smokers.

□ Appendix 8.5 combines all the data available on the seven male non-smokers who died from lung cancer presented for each individual case.

TABLE 8.2 (Cont'd)

OBSERVED AND EXPECTED* DEATHS OF MALES WITH MORTALITY RATIOS, BY CAUSE OF DEATH, FOR CURRENT CIGARETTE SMOKERS OF THREE SMOKING INTENSITIES IN THREE AGE GROUPS AND ALL AGES COMBINED

Cause of Death	I.S.C. Code Number	Observed and Expected* Deaths with Mortality Ratios of Current Cigarette Smokers of Three Intensities in Three Age Groups					
		Ages 70 and over			All Ages Combined		
		Less than 10 per day	10 - 20 per day	More than 20 per day	Less than 10 per day	10 - 20 per day	More than 20 per day
		Obs. Exp. M.R.	Obs. Exp. M.R.	Obs. Exp. M.R.	Obs. Exp. M.R.	Obs. Exp. M.R.	Obs. Exp. M.R.
		Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
Cancer of Pancreas	157	2 1.98 1.01	3 2.27 1.32	2 6.90 0.29	5 1.40 3.57	16 1.96 8.16	7 2.37 2.95
Lung Cancer □	162,163	22 12.15 1.81	23 9.43 2.44	13 24.53 0.53	57 10.00 5.70	204 16.41 12.43	63 17.31 3.64
Genito-Urinary Cancer	170-181	8 1.10 7.24	21 2.24 9.38	5 2.43 2.06	29 1.33 21.80	57 1.44 39.53	15 1.43 10.50
All Other Cancers		19 0.84 22.54	32 1.10 29.04	9 1.41 6.38	77 1.08 71.41	183 1.17 156.07	77 1.56 49.40
Vascular Lesions	330-334	27 0.66 40.75	28 0.53 53.05	8 0.69 11.59	60 0.68 88.07	175 0.99 176.23	45 0.84 53.51
Coronary Heart Disease	420.1	99 1.71 57.92	94 1.29 73.12	28 1.73 16.17	337 1.55 217.79	766 1.58 485.05	277 1.78 155.98
Other Heart & Circulatory Diseases	400-468 less 420.1	93 2.09 44.49	103 1.85 55.60	22 1.78 12.35	195 1.93 101.29	378 1.91 198.15	97 1.62 59.69
Pneumonia & Influenza	480-493	24 0.97 24.66	26 0.84 31.01	3 0.44 6.89	48 1.15 41.84	95 1.30 72.80	23 1.15 20.06
Bronchitis	500-502	9 6.43 1.40	13 7.18 1.81	1 2.50 0.40	17 7.02 2.42	49 13.65 3.59	12 14.63 0.82
Emphysema	527.1	4 4.82 0.83	5 5.62 0.89	1 4.76 0.21	9 4.81 1.87	21 6.12 3.43	7 6.93 1.01
Accidents, Poisonings, Violence	800-999	4 0.51 7.80	8 0.79 10.14	3 1.36 2.21	36 1.13 31.95	116 1.25 92.84	59 1.76 33.56
Residual		35 1.08 32.46	61 1.49 40.96	6 0.66 9.14	133 1.17 113.28	297 1.11 267.95	102 1.14 89.21
All Causes		346 1.42 242.91	417 1.35 308.77	101 1.48 68.23	1003 1.43 700.99	2357 1.55 1516.23	784 1.63 480.33

* Based upon the age-specific death rates of non-smokers.

□ Appendix 8.5 combines all the data available on the seven male non-smokers who died from lung cancer presented for each individual case.

TABLE 8.3a

ESTIMATED DEATHS OF NON-SMOKERS AND CURRENT CIGARETTE SMOKERS OF THREE SMOKING INTENSITIES, AND EXCESS DEATHS OF SMOKERS COMPARED TO NON-SMOKERS BY CAUSE OF DEATH DURING A SIX YEAR PERIOD IN A MALE POPULATION OF 100,000 AGED 30 AND OVER, DISTRIBUTED BY AGE AS MALES IN CANADA AT THE 1961 CENSUS

Cause of Death	I.S.C. Code Number	Estimated Deaths of Non-Smokers and Current Cigarette Smokers of Three Intensities				Excess Deaths of Current Cigarette Smokers of Three Intensities Over Non-Smokers		
		Non-Smokers	Less than 10/day	10-20/day	More than 20/day	Less than 10/day	10-20/day	More than 20/day
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
Cancer of Pancreas	157	44	80	82	121	36	38	77
Lung Cancer	162,163	64	611	1,013	1,107	547	949	1,043
Genito-Urinary Cancers	170-181	196	318	355	249	122	159	53
All Other Cancers		849	990	912	1,201	141	63	352
Vascular Lesions	330-334	1,093	709	862	711	-384	-231	-382
Coronary Heart Disease	420.1	2,546	3,622	3,659	4,704	1,076	1,113	2,158
Other Heart & Circulatory Diseases	400-468 less 420.1	1,217	2,192	2,186	2,265	975	969	1,048
Pneumonia and Influenza	480-493	524	479	577	371	-45	53	-153
Bronchitis	500-502	23	186	265	161	163	242	138
Emphysema	527.1	25	79	133	98	54	108	73
Accidents, Poisonings, Violence	800-999	489	507	571	775	18	82	286
Residual		1,503	1,543	1,681	1,453	40	178	-50
		8,573	11,316	12,296	13,216	2,743	3,723	4,643

TABLE 8.3b

PERCENTAGE DISTRIBUTIONS OF EXCESS DEATHS AND MORTALITY RATIOS BY CAUSE OF DEATH, OF CURRENT CIGARETTE SMOKERS OF THREE INTENSITIES, BASED UPON THE ESTIMATED DEATHS OF NON-SMOKERS AND CURRENT CIGARETTE SMOKERS DURING A SIX YEAR PERIOD IN A MALE POPULATION OF 100,000 AGED 30 AND OVER, DISTRIBUTED BY AGE AS MALES IN CANADA AT THE 1961 CENSUS

Cause of Death	I.S.C. Code Number	Percentage Distributions of Excess Deaths of Current Cigarette Smokers of Three Intensities						Mortality Ratios of Current Cigarette Smokers of Three Intensities					
		Less than 10/day		10-20/day		More than 20/day		Less than 10/day		10-20/day		More than 20/day	
Col. 1	Col. 2	Col. 3		Col. 4		Col. 5		Col. 6		Col. 7		Col. 8	
		Percent	Rank	Percent	Rank	Percent	Rank	Percent	Rank	Percent	Rank	Percent	Rank
Cancer of Pancreas	157	1.31	9	1.02	11	1.66	7	1.8	5	1.9	4	2.8	4
Lung Cancer	162,163	19.94	3	25.49	3	22.46	3	9.5	1	15.8	1	17.3	1
Genito-Urinary Cancers	170-181	4.45	6	4.27	6	1.14	9	1.6	7	1.8	5	1.3	9
All Other Cancers		5.14	5	1.69	9	7.58	4	1.2	9	1.1	9	1.4	8
Vascular Lesions	330-334	-14.00	12	-6.20	12	-8.23	12	0.6	12	0.8	12	0.6	12
Coronary Heart Disease	420.1	39.23	1	29.90	1	46.48	1	1.4	8	1.4	8	1.8	6
Other Heart & Circulatory Diseases	400-468 Less 420.1	35.54	2	26.03	2	22.57	2	1.8	5	1.8	5	1.9	5
Pneumonia & Influenza	480-493	-1.64	11	1.42	10	-3.30	11	0.9	11	1.1	9	0.7	11
Bronchitis	500-502	5.94	4	6.50	4	2.97	6	8.2	2	11.7	2	7.1	2
Emphysema	527.1	1.97	7	2.90	7	1.57	8	3.2	3	5.3	3	3.9	3
Accidents, Poisonings, Violence	800-999	0.66	10	2.20	8	6.16	5	1.0	10	1.2	7	1.6	7
Residual		1.46	8	4.78	5	-1.08	10	1.9	4	1.1	9	1.0	10
		100.		100.		100.		1.3		1.4		1.5	

PART 9 - DURATION

Considerations Respecting Analysis of Data

In order to compare properly the age-specific death rates of cigarette smokers by duration of smoking with the age-specific death rates of non-smokers, consideration would need to be given to the effects of selectivity of death among survivors and competing risks of death as has been noted previously. The survival of cigarette smokers relative to non-smokers is considered to be selective, in this instance; the effects of selective survival are also expected to become more important or pronounced as duration of the cigarette smoking habit increases. However, these effects can be expected to be negligible for the first short period directly after commencement of the smoking habit.

The data presented here for the study of the effects of duration of cigarette smoking are based upon persons having a lifetime history of having smoked "cigarettes only" rather than those persons who smoked "cigarettes only" at the time of survey. This is principally because it would have been difficult to measure the duration of the cigarette smoking habit if it had at the same stage been discontinued in favour of, or compounded with, cigar or pipe smoking. Therefore, in this particular instance the smaller numbers in the "smoking history of cigarettes only" group have to be accepted.

In considering the effects of cigarette smoking in relationship to the duration of the cigarette smoking habit, it is reasonable to expect that a period of time may elapse between commencement of cigarette smoking and the time at which death rates in excess of those of non-smokers become apparent. The length of this period of time may further be expected to vary with intensity of smoking, inhalation, age, etc. Finally, cigarette smoking may require longer periods of time to induce some diseases or disease conditions than other diseases and the magnitudes of the mortality ratios of individual causes of death may each be expected to bear a different relationship to the duration of the smoking habit.

The small numbers of persons under study for duration do not permit the examination of all possible factors independently in relationship to duration of smoking. Because of this limitation, the relationship of only one factor to duration of cigarette smoking is considered at one time.

Relationship to Intensity of Smoking

The data in Table 9.1 concerning the effects of duration of smoking in relationship to intensity of smoking suggest that, after a period of approximately five years of cigarette smoking, regardless of intensity of smoking, there is an effect as measured by the mortality ratio and that this effect increases through the longer duration periods. However there would not appear to be any obvious mortality peaks or points of inflexion.

Relationship to Age of Smokers

In order to gain an indication of the effects of cigarette smoking by duration of smoking in relation to the age of the smokers, the data were arranged into three principal age groups and are presented in Table 9.2. It should be noted here that it is not possible to derive from this table estimates of the ages at which smoking was commenced because total smoking durations were measured with allowances being made for any intermediate periods in which the persons under study may have stopped smoking. Also, where a person indicated a "lifetime" history of smoking, it was assumed that smoking was commenced at the age of 16.

From Table 9.2 it will be noted that the mortality ratios are essentially greater than unity for all persons who had smoked for 10 years or more. For persons who had smoked cigarettes for less than 10 years, the data are less definitive. One interesting observation which may be made from this table is the fact that the mortality ratios in age group 50-69 are, with one exception, the highest of the three age groups for all durations of smoking. One point however should be made. Since there is an association between age and duration of smoking, we have controlled this factor in considering duration in relation to intensity of smoking and cause of death by only using expected deaths based on comparisons of smokers and non-smokers in comparable age groups.

Relationship to Cause of Death

Because one may not assume that the latent or induction period is the same for all diseases associated with cigarette smoking, Table 9.3 which contains the mortality ratios of the various causes of death by duration of smoking was prepared. On referring to this table, one notices that, for most causes of death, the numbers of observed and expected deaths upon which the mortality ratios are based are too small to justify comment. Two causes of death do however appear to justify comment. The death rate from coronary heart disease, the disease which accounts for the largest numbers of deaths in all duration categories, appears to be directly affected, that is, it appears to be affected in less than five years of cigarette smoking, and further, the mortality ratio remains quite constant thereafter. On the other hand, the mortality ratios for lung cancer show a definite tendency to increase with duration, especially in the period between 15 and 40 years of cigarette smoking. The same tendency is noted for two other respiratory diseases, bronchitis and emphysema, the latter being based however on very small numbers.

TABLE 9.1

OBSERVED AND EXPECTED* DEATHS WITH MORTALITY RATIOS, BY DURATION OF SMOKING, FOR MALES WITH A HISTORY OF HAVING SMOKED CIGARETTES ONLY, FOR THREE INTENSITIES OF SMOKING.
ALL AGE GROUPS COMBINED

Duration of Smoking (Years) At Time of Survey	Observed and Expected* Deaths with Mortality Ratios for Males with a History of Having Smoked Cigarettes Only, for Three Intensities of Smoking							
	Less than 10 per day		10 - 20 per day		More than 20 per day		Total	
	Obs. / Exp.	M. Ratio	Obs. / Exp.	M. Ratio	Obs. / Exp.	M. Ratio	Obs. / Exp.	M. Ratio
Less than 5	34 / 34.17	1.00	9 / 9.14	0.98	6 / 3.22	1.86	49 / 46.53	1.05
5 - 9	34 / 25.72	1.32	19 / 13.31	1.43	7 / 4.07	1.72	60 / 43.10	1.39
10 - 14	56 / 43.36	1.29	58 / 44.79	1.29	13 / 13.01	1.00	127 / 101.16	1.25
15 - 19	44 / 35.67	1.23	85 / 61.14	1.39	31 / 22.37	1.39	160 / 119.18	1.34
20 - 29	130 / 93.24	1.39	243 / 181.43	1.34	70 / 60.53	1.16	443 / 335.20	1.32
30 - 39	138 / 102.28	1.35	383 / 252.60	1.52	142 / 79.59	1.78	663 / 434.47	1.53
40 and more	405 / 263.74	1.54	899 / 534.04	1.68	254 / 137.98	1.84	1558 / 935.76	1.66
Total	841 / 598.18	1.41	1696 / 1096.45	1.55	523 / 320.77	1.63	3060 / 2015.40	1.52

* Based upon the age-specific death rate of non-smokers.

TABLE 9.2

OBSERVED AND EXPECTED DEATHS WITH MORTALITY RATIOS, BY DURATION OF SMOKING, FOR MALES WITH A HISTORY OF HAVING SMOKED CIGARETTES ONLY, IN THREE AGE GROUPS. ALL SMOKING INTENSITIES COMBINED

Duration of Smoking (Years) At Time of Survey	Observed and Expected Deaths with Mortality Ratios for Males with a History of Having Smoked Cigarettes Only, in Three Age Groups							
	Age 30 - 49		Age 50 - 69		Age 70 and Over		Total	
	Deaths Obs. Exp.	Mortality Ratio	Deaths Obs. Exp.	Mortality Ratio	Deaths Obs. Exp.	Mortality Ratio	Deaths Obs. Exp.	Mortality Ratio
Less than 5	7 9.38	0.75	34 24.56	1.38	8 12.59	0.64	49 46.53	1.05
5 - 9	10 11.23	0.89	30 21.53	1.39	20 10.34	1.93	60 43.10	1.39
10 - 14	53 43.49	1.22	58 42.41	1.37	16 15.26	1.05	127 101.16	1.25
15 - 19	85 69.00	1.23	60 37.59	1.60	15 12.59	1.19	160 119.18	1.34
20 - 29	177 148.90	1.19	224 148.62	1.51	42 37.68	1.11	443 335.20	1.32
30 - 39	55 46.47	1.18	544 337.99	1.61	64 50.01	1.28	663 434.47	1.53
40 and more	1 1.39	0.72	1099 615.09	1.79	458 319.28	1.43	1558 935.76	1.66
Total	388 329.86	1.18	2049 1227.79	1.67	623 457.75	1.36	3060 2015.40	1.52

TABLE 9.3

OBSERVED AND EXPECTED DEATHS, WITH MORTALITY RATIOS, BY DURATION OF SMOKING AND CAUSE OF DEATH OF MALES WITH A HISTORY OF HAVING SMOKED CIGARETTES ONLY. ALL AGE GROUPS AND INTENSITIES OF SMOKING COMBINED.

Cause of Death	I.S.C. Code Number	Observed and Expected Deaths with Mortality Ratios by Duration of Smoking (Years) and Cause of Deaths of Males with a History of Having Smoked Cigarettes Only.															
		Less than 5 Years Duration		5 - 9 Years Duration		10 - 14 Years Duration		15 - 19 Years Duration		20 - 29 Years Duration		30 - 39 Years Duration		40 and more years Duration		Total	
		Deaths		Deaths		Deaths		Deaths		Deaths		Deaths		Deaths		Deaths	
		Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.
Cancer of Pancreas	157	1 0.13	7.7	0 0.10	-	1 0.18	5.6	2 0.16	12.5	1 0.52	1.9	4 0.93	4.3	12 3.31	3.6	21 5.33	3.9
Lung Cancer	162,163	1 0.62	1.6	2 0.76	2.6	6 2.63	2.3	10 3.09	3.2	22 5.36	4.1	55 3.97	13.9	137 9.65	14.2	233 26.08	8.9
Genito-Urinary Cancers	170-181	2 1.24	1.6	2 1.09	1.8	1 1.88	0.5	4 1.48	2.7	6 5.33	1.1	13 10.08	1.3	46 33.90	1.4	74 55.00	1.3
All Other Cancers		5 4.87	1.0	4 4.47	0.9	8 10.55	0.8	14 12.95	1.1	38 36.98	1.0	75 42.75	1.8	131 94.45	1.4	275 207.02	1.3
Vascular Lesions	330-334	2 5.62	0.4	6 5.22	1.1	6 12.49	0.5	7 14.06	0.5	23 39.06	0.6	42 47.61	0.9	102 113.33	0.9	188 237.39	0.8
Coronary Heart Disease	420.1	20 14.26	1.4	22 12.66	1.7	41 26.84	1.5	50 29.29	1.7	168 108.37	1.6	228 152.84	1.5	491 300.11	1.6	1020 644.37	1.6
Other Heart and Circulatory Diseases	400-468 Less 420.1	8 6.05	1.3	8 5.26	1.5	23 9.70	2.4	16 9.00	1.8	47 35.88	1.3	96 59.48	1.6	287 144.79	2.0	485 270.22	1.8
Pneumonia and Influenza	480-493	3 2.60	1.2	4 2.34	1.7	5 4.74	1.1	5 6.37	0.8	11 14.26	0.8	27 13.90	1.9	78 56.49	1.4	133 100.70	1.3
Bronchitis	500-502	1 0.12	8.3	2 0.09	22.2	1 0.16	6.2	1 0.12	8.3	4 0.46	8.7	9 0.73	12.3	41 4.50	11.7	59 5.18	11.4
Emphysema	527.1	0 0.12	-	1 0.09	11.1	1 0.16	6.2	1 0.16	6.2	4 0.46	8.7	12 0.90	13.3	14 2.87	4.9	33 4.76	6.9
Accidents, Poisonings, Violence	800-999	3 3.11	0.9	5 3.71	1.3	14 13.83	1.0	21 19.08	1.1	39 27.62	1.4	26 18.05	1.4	40 28.68	1.4	148 114.08	1.3
Residual		3 7.79	0.4	4 7.31	0.5	20 17.94	1.1	29 23.42	1.2	80 60.90	1.3	76 83.23	0.9	179 144.68	1.2	391 345.27	1.1
Total		49 46.53	1.1	60 43.10	1.4	127 101.16	1.3	160 119.18	1.3	443 335.20	1.3	663 434.47	1.5	1558 935.76	1.7	3060 2015.40	1.5

PART 10 - INHALATION

Definition of an "Inhaler"

The effects or conditions associated with inhalation are difficult to determine because inhalation, or rather degree of inhalation, is hard to define and to measure objectively. Smoking habits are personal and an experience in smoking or a type of smoking which one person may consider as inhalation another may not.

Correspondingly, respondents to the questionnaire were simply requested to check "Yes" or "No" in answer to the question, "Do you inhale?", with reference to their current smoking. One may therefore expect a certain degree of overlap or ambiguity in reporting which would tend to reduce the prominence of any effects which may be associated with inhalation.

Characteristics of Study Population

The data examined here concerning inhalation were compiled from the questionnaires returned by veterans of World War II only who smoked cigarettes. More than 90 per cent of those questionnaires contained an answer to the question regarding inhalation during cigarette smoking. From Table 10.1, it may be seen that inhalation status as reported in this study cannot be considered independently of either age class or amount smoked. The ratio of inhalers to non-inhalers generally increases with the amount of cigarettes smoked within single age groups, the differences in the ratios generally being greater between those who smoked less than 10 cigarettes per day and those who smoked 10-20 per day than between those who smoked 10-20 and those who smoked more than 20 cigarettes per day. In general, with respect to age, the ratio of inhalers to non-inhalers decreases with advancing age within each of the three "amount smoked" categories.

It is worth noting in this respect that this trend for less inhalation in the older age groups applied only to their present smoking habits. The change may represent differences in smoking habits of successive cohorts; or it may on the other hand reflect shifts in smoking habits in old age which favour survival.

Comparison of Death Rates of Inhalers vs Non-inhalers

Because of these two associations comparisons in the death rates between inhalers and non-inhalers may only be made properly within individual "amount smoked" and age classifications. These comparisons are presented as mortality ratios in Table 10.2 and as death rates in Table 10.3.

Study of Table 10.2 reveals that in 22 of the 30 comparisons the mortality ratios are greater than unity, i.e. the observed deaths among inhalers are greater than the numbers of deaths expected on the basis of the age-specific death rates of non-inhalers of otherwise equivalent smoking habits. Further, in five such instances, which are indicated by a sign in Table 10.2, the observed deaths of inhalers are significantly greater than the expected deaths while in none of the eight cases in which the observed deaths were less than the expected deaths is the difference significant; the small numbers of non-inhalers contribute to the erratic fluctuations found among the mortality ratios in Table 10.2.

Comparison of Death Rates with Non-smokers

Table 10.3 contains the death rates of current cigarette smokers by inhalation habit in direct comparison with the death rates of persons who have never smoked. One notes from this table that the death rates of inhalers are, with the exception of one rate based upon exceedingly small numbers in age group 75 and over, consistently higher than those of non-smokers at and over the age of 45. By comparison, the death rates of non-inhalers are generally higher than those of non-smokers at and over the age of 55.

On the basis of these data it is considered justifiable to conclude that those cigarette smokers who consider themselves to be "inhalers" have death rates higher than "non-inhalers" of otherwise equivalent cigarette smoking habits.

TABLE 10.1

INHALERS, NON-INHALERS, AND PERCENTAGE INHALERS OF MALES* WHO SMOKED CIGARETTES ONLY AT THE TIME OF SURVEY BY INTENSITY OF SMOKING AND BY AGE GROUP. ALSO, MALE* NON-SMOKERS BY AGE GROUP.

Smoking Intensity	Inhalation Habit	Current Smokers of Cigarettes Only and Percentage of Inhalers by Age Group. Also Non-Smokers by Age Group									
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+
		Smokers % inhalers	Smokers % inhalers	Smokers % inhalers	Smokers % inhalers	Smokers % inhalers	Smokers % inhalers	Smokers % inhalers	Smokers % inhalers	Smokers % inhalers	Smokers % inhalers
Less than 10 Cigarettes per day	Inhale	474	666	484	306	262	199	126	66	34	13
		84.0	78.4	79.2	76.7	72.6	64.4	62.7	52.8	53.1	50.0
	Do not inhale	72	183	127	93	99	110	75	59	30	13
10-20 Cigarettes per day	Inhale	2628	3728	2532	1603	1177	876	452	215	64	20
		95.7	95.1	94.0	92.1	88.3	85.0	80.7	74.9	68.8	71.4
	Do not inhale	118	193	162	138	156	155	108	72	29	8
More than 20 Cigarettes per day	Inhale	1021	1495	1144	756	518	388	175	54	11	4
		95.7	96.1	96.0	93.2	90.1	88.8	79.9	76.1	57.9	66.7
	Do not inhale	46	61	48	55	57	49	44	17	8	2
Non-Smokers		739	1113	656	359	242	218	201	153	120	143

* Veterans of World War II only.

TABLE 10.2

OBSERVED DEATHS AND EXPECTED□ DEATHS OF INHALERS, OBSERVED DEATHS OF NON-INHALERS AND MORTALITY RATIOS OF INHALERS TO NON-INHALERS OF MALES* WHO SMOKED CIGARETTES ONLY AT THE TIME OF SURVEY, BY INTENSITY OF SMOKING AND AGE GROUP. ALSO, OBSERVED DEATHS OF MALE* NON-SMOKERS

Smoking Intensity	Inhalation Habit	Deaths and Mortality Ratios of Inhalers to Non-Inhalers of Current Smokers of Cigarettes Only by Age Group									
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+
		Deaths M.R.	Deaths M.R.	Deaths M.R.	Deaths M.R.	Deaths M.R.	Deaths M.R.	Deaths M.R.	Deaths M.R.	Deaths M.R.	Deaths M.R.
Less than 10 Cigarettes per day	Inhale	Obs. 6 Exp. 0.0 -	17 0.0 -Δ	10 11.4 0.88	19 9.8 1.94	29 15.9 1.82	24 27.1 0.88	22 18.5 1.19	24 17.9 1.34	4 4.5 0.89	0 1.0 -
	Do not inhale	Obs. 0	0	3	3	6	15	11	16	4	1
10-20 Cigarettes per day	Inhale	Obs. 37 Exp. 22.3 1.66	74 96.6 0.77	88 Δ 15.7 5.61	100 127.8 0.78	128 75.4 1.70	164 113.0 1.45	104 Δ 41.9 2.47	50 47.8 1.05	6 15.4 0.39	3 2.5 1.20
	Do not inhale	Obs. 1	5	1	11	10	20	10	16	7	1
More than 20 Cigarettes per day	Inhale	Obs. 18 Exp. 0.0 -	27 24.5 1.10	54 23.8 2.27	54 Δ 0.0 -	52 27.2 1.91	62 39.6 1.57	45 Δ 8.0 5.62	19 31.8 0.60	3 1.4 2.18	1 0.0 -
	Do not inhale	Obs. 0	1	1	0	3	5	2	10	1	0
Non-Smokers		Obs. 12	13	18	22	19	19	21	23	11	3

* Veterans of World War II only.

Δ Mortality ratio (inhalers/non-inhalers) significantly above unity.

□ Deaths expected on the basis of the age specific death rates of non-inhalers of otherwise similar cigarette smoking habits.

TABLE 10.3

DEATH RATES◊ PER 1,000 MALES WHO SMOKED CIGARETTES ONLY AT THE TIME OF SURVEY FOR THREE SMOKING INTENSITIES BY INHALATION HABIT AND AGE GROUP. ALSO FOR MALE* NON-SMOKERS.

Smoking Intensity	Inhalation Habit	Death Rates◊ per 1,000 Males by Age Group									
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75 and over
Less than 10 cigarettes per day	Inhale	12.7	25.5	20.7	62.1	110.7	120.6	174.6	363.6	117.6	0.0
	Do not inhale	0.0	0.0	23.6	32.3	60.6	136.4	146.7	271.2	133.3	76.9
10 - 20 cigarettes per day	Inhale	14.1	19.8	34.8	62.4	108.8	187.2	230.1	232.6	93.8	150.0
	Do not inhale	8.5	25.9	6.2	79.7	64.1	129.0	92.6	222.2	241.4	125.0
More than 20 cigarettes per day	Inhale	17.6	18.1	47.2	71.4	100.4	159.8	257.1	351.9	272.7	250.0
	Do not inhale	0.0	16.4	20.8	0.0	52.6	102.0	45.5	588.2	125.0	0.0
NON-SMOKERS		16.2	11.7	27.4	61.3	78.5	87.2	104.5	150.3	91.7	38.5

* Veterans of World War II only.

◊ Over a six year period.

PART 11 - OCCUPATION

Occupation as a Factor of Selection

In a series of populations of the same sex, ages and smoking habits but of different occupations, one would expect to find a difference in the death rates between the occupational groups. There are two principal reasons why such differences may be expected. In the first instance, there is a certain degree of selection based upon personal attributes. For instance, one would generally expect persons occupied as farmers, fishermen, or miners, to be physically fit at least when entering into those occupations, whereas alternatively, persons employed as clerks, salesmen, etc., may have been obliged to enter those occupations because of poor health. Other factors which may influence choice of occupation include intelligence, economic status of parents, etc. The second category of factors include those associated with the occupation itself. The death rates in some occupations may be high due to, for instance, accidents, while other occupations may be associated with a high level of physical activity unaccompanied by any physical or other type of danger.

In this study, although secondary occupations of World War I pension recipients were coded, it did not seem that a second occupation would yield enough distinctive information to warrant a two stage analysis of the results. Consequently for World War II only the principal lifetime occupation was coded and the analysis is based on these data for the total population of cigarette smokers and non-smokers. For further details on the coding of occupations see "Occupation Coding" in Part 4, "Handling of the Data".

Classification of Occupations

Some 14 occupational groupings with a further 8 particular occupations or sub-groups of occupations were selected for use in this study. The basis of this classification was the "Classification of Occupations, Ninth Census of Canada 1951", compiled by the Dominion Bureau of Statistics. Although these 14 groups of occupations are somewhat broad, it was considered that they were specific enough for an exploratory examination of the effects of occupation and probably the best compromise possible considering the size of the populations available for study.

Cause of Death by Occupation

In this study, it is not possible to explore in detail the associations between occupations and causes of death in relation to smoking because the populations available for study are too small. Because of these limitations of population size, the more modest approach of examining the pattern of causes of death within occupations in relationship to the overall pattern of causes of death for all occupations was undertaken. Table 11.1 contains, therefore, the percentage distributions of deaths by cause of death for 14 principal occupational groupings. This table is based upon persons aged 30-64 who had, at the time of survey, a lifetime history of having smoked cigarettes only, or in combination with cigars and pipes. This particular population was chosen for study because it was considered to be the largest relatively uniform population which could be obtained from this Canadian Study. It would have been preferable, for instance, to have examined the cause of death distributions between occupations using non-smokers, but the numbers of persons involved was too small, also, as may be deduced from Table A 6.1, seventy per cent of the deaths among non-smokers were among persons aged 65 and over at the time of the survey. Even so, it will be noted from Table 11.1 that the numbers of deaths are very small for many causes of death.

From Table 11.1, it can be seen that the distributions of deaths by cause of death do not appear to vary considerably between each occupation and the distribution for all occupations combined considering the very wide age group upon which this table is based and the possibilities of different patterns of smoking habits prevailing between the 14 occupational groups. Tables 11.2 and 11.3, based upon the same deaths divided into deaths of persons aged 30-49 and 50-64 respectively, indicate that the same consistency exists in the distributions of deaths by cause of death within these more limited age groups.

This negative finding from our study provides no conclusive evidence concerning such relationships. The age groupings are very broad and different distributions within age groups of the population could expose them to quite different risk of death patterns.

Death Rates Within Occupations

Table 11.4 contains the expected deaths by occupation of non-smokers and current cigarette smokers of three intensities at the time of survey. These expected deaths were obtained by applying the age-specific death rates of persons of the smoking habit in question to a hypothetical population of 100,000 males aged 30-64 distributed by age as was the male population in Canada in that age group at the time of the 1961 Census. For all occupations combined, the numbers of expected deaths increase with the quantities of cigarettes smoked. These expected deaths are proportionate to the numbers of expected deaths quoted in Table 7.4 for persons aged 30-64. Table 11.4 illustrates that, in general, the numbers of expected deaths of persons within each occupational category tend to increase with increasing amounts of cigarettes smoked. While there are partial reverses to this general trend, the populations and numbers of observed deaths upon which these expected deaths are based are, in many cases, very small. The populations involved are given in Table A 11.1 while the numbers of observed deaths are those quoted in Table 11.5.

Interactions of Cigarette Smoking and Occupations

Having examined evidence which suggests that within the various occupations death rates increase with increasing amounts of cigarettes smoked, it is of some interest to try to discover whether some occupations tend to augment the effects of cigarette smoking, or, alternatively if other occupations tend to suppress these effects. To use statistical terminology, an attempt is made to determine whether interactions exist between cigarette smoking and occupations in order to both increase knowledge of the etiology of smoking and to suggest possible areas in which further research may be useful.

To distinguish any effect(s) due to occupation, the non-smokers were considered as one group, while the current smokers of cigarettes were divided on the basis of intensity of smoking into three groups: less than 10, 10-20 and more than 20 cigarettes per day. The age-specific death rates were derived within each of these four groups using all occupations combined. These overall death rates were then applied to the populations at risk in each occupational classification by age class within the age limits 30-64 years to derive the overall "expected" deaths for each classification. These "expected" deaths may be found listed in Table 11.5 together with the total deaths in the age group 30-64 which were actually observed. Table 11.5 draws ones attention to the fact that, although the observed deaths and "expected" deaths are the summation of those occurring in all age classes from 30-64 years, many of the deaths and "expected" deaths total 5 or less whereas few total more than 50.

Mortality ratios for each pair of observed and expected deaths are to be found in Table 11.6. They were termed "standardized" mortality ratios, as, in most cases, the expected deaths are not based upon the age-specific death rates of non-smokers as is usual throughout the remainder of this study.

One may see that these standardized mortality ratios presented in Table 11.6 are, in general, distributed about unity in a random manner. There are, however, exceptions. Consider for instance the Agricultural Group (Nos. 500-509) and in particular Farmers (No. 500) who in all instances have mortality ratios of less than one. In other words, farmers tend to enjoy lower death rates than the majority of persons in other occupations within each smoking category even though within the occupational group farmers who smoke also tend to be associated with higher death rates than those who do not. Similarly, Office Clerks (No. 115), are seen to have higher than average death rates in all four smoking categories.

There are other occupations with similar high and low death ratios. Ratios for managerial and professional workers are low throughout. Ratios for service occupations and labourers are higher than average for all levels of smoking.

In the group, Taxi, Bus and Truck Drivers (Nos. 213-217 and 247-249), one observes the pattern which may be expected if an inter-relationship did exist between smoking and occupation. The standardized mortality ratio increases from 0.74 for non-smokers through the low and medium intensity cigarette smokers to a high of 1.40 among those who smoke more than 20 cigarettes a day. Before arriving at the conclusion that such an inter-relationship does exist in this occupational grouping however, one should note from Table 11.5 that there were only five deaths among the non-smokers.

In the 24 occupational groups if the rankings of magnitude were arranged on a random basis, one would expect to find one example on a chance basis in which the mortality ratio would increase systematically from non-smokers to smokers of more than 20 cigarettes a day. In fact, a check on the rank order of indices for the 24 occupations reveals that the pattern does not differ significantly from one that could be attributed to chance.

The reverse type of observation may also be made in the case of Farmers (No. 500) to the effect that farming to some extent negates the effect of smoking. While indeed it may be true the same criticisms can be applied as previously except that, while the occupation group "Farmers" has a higher population at risk, as demonstrated in the numbers of "expected" deaths in Table 11.5, the drop in the standardized mortality ratios in Table 11.6 is only from 0.91 among non-smokers to 0.80 in the highest cigarette smoking category.

In view of the well-known and recognized health hazards associated with some particular occupations, it may be a matter of some concern that these effects were not demonstrated by our study population. A brief consideration of the factors involved however may throw some light on this question.

Occupational hazards to health have been demonstrated as applicable to certain occupational groups in certain industrial settings in which exposure factors could be measured. All such conditions and definitions of the working situation are lacking in our present study. Even such groups as miners and painters are not clearly designated as to their occupational setting.

The results of this study with regard to occupation must therefore be seen in proper perspective. One can only say that from this study of major occupations reported by veteran pensioners that there is no clear evidence that any specific occupation per se contributed to the death ratios reported by the study population. It would therefore seem that an unselected group of veteran pensioners provides a poor study group from which to demonstrate health effects directly attributable to particular occupational hazards through excess mortality.

TABLE 11.1

DEATHS AND PERCENTAGE DEATHS BY CAUSE OF DEATH AND BY OCCUPATION OF MALES AGED 30-64 WHO HAVE SMOKED CIGARETTES* DURING A PERIOD OF THEIR LIFETIMES

Cause of Death	I.S.C. Code Number	Deaths and Percentage Deaths by Occupation for Males Aged 30-64 Who Have Smoked Cigarettes* During a Period of Their Lifetimes																									
		Managerial		Professional		Clerical		Transportation and Communication		Commercial and Financial		Service		Agricultural		Fishing, Trapping, Logging		Mining		Manufacturing and Mechanical		Stationary Engineers		Construction		Labourers		Not Stated		Total	
		001-059		060-099		110-119		201-251 261-299		301-349 362-369		402-499		500-509		550-568		601-619		700-889		890-899		910-939		950		960,970			
		Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%
Cancer of Pancreas	157	0	-	2	0.8	5	0.7	3	0.7	1	0.3	6	1.6	5	1.2	2	2.3	1	1.0	6	1.0	1	1.9	4	1.2	1	0.3	0	-	37	0.9
Lung Cancers	162,163	10	6.9	8	3.3	36	5.3	27	6.5	16	5.3	33	8.7	22	5.3	7	8.0	4	4.2	47	7.8	6	11.5	29	8.7	24	7.2	0	-	269	6.5
Genito-Urinary Cancers	170-181	4	2.8	3	1.2	16	2.4	6	1.5	7	2.3	8	2.1	4	1.0	2	2.3	3	3.1	10	1.7	0	-	6	1.8	6	1.8	0	-	75	1.8
All Other Cancers		18	12.5	23	9.3	72	10.6	29	7.0	26	8.6	42	11.1	42	10.1	6	6.8	12	12.5	50	8.3	2	3.8	27	8.1	34	10.2	4	6.2	387	9.3
Vascular Lesions	330-334	9	6.2	17	6.9	37	5.4	27	6.5	23	7.6	23	6.1	32	7.7	10	11.4	5	5.2	38	6.3	4	7.7	18	5.4	21	6.3	7	10.9	271	6.5
Coronary Heart Disease	420.1	52	36.1	101	41.1	260	38.3	170	41.2	117	38.6	135	35.5	151	36.4	20	22.7	36	37.5	232	38.5	18	34.6	118	35.4	115	34.5	19	29.7	1544	37.2
Other Heart and Circulatory Diseases	400-468 Less 420.1	18	12.5	33	13.4	96	14.1	44	10.7	44	14.5	44	11.6	42	10.1	12	13.6	12	12.5	74	12.3	9	17.3	38	11.4	38	11.4	5	7.8	509	12.3
Pneumonia and Influenza	480-493	5	3.5	4	1.6	10	1.5	9	2.2	9	3.0	9	2.4	16	3.9	3	3.4	0	-	21	3.5	1	1.9	7	2.1	16	4.8	1	1.6	111	2.7
Bronchitis	500-502	0	-	3	1.2	2	0.3	5	1.2	3	1.0	6	1.6	6	1.4	1	1.1	2	2.1	13	2.2	1	1.9	8	2.4	5	1.5	0	-	55	1.3
Emphysema	527.1	2	1.4	1	0.4	3	0.4	5	1.2	2	0.7	3	0.8	3	0.7	1	1.1	0	-	9	1.5	3	5.8	2	0.6	7	2.1	1	1.6	42	1.0
Accidents-Poisonings Violence	800-999	11	7.6	11	4.5	40	5.9	36	8.7	21	6.9	20	5.3	38	9.2	15	17.0	11	11.5	33	5.5	2	3.8	32	9.6	23	6.9	6	9.4	299	7.2
Residual		15	10.4	40	16.3	102	15.0	52	12.6	34	11.2	51	13.4	54	13.0	9	10.2	10	10.4	69	11.5	5	9.6	44	13.2	43	12.9	21	32.8	549	13.2
Total		144	100.0	246	100.0	679	100.0	413	100.0	303	100.0	380	100.0	415	100.0	88	100.0	96	100.0	602	100.0	52	100.0	333	100.0	333	100.0	64	100.0	4148	100.0

* Alone or in combination with cigars and/or pipe.

TABLE 11.2

DEATHS AND PERCENTAGE DEATHS BY CAUSE OF DEATH AND BY OCCUPATION OF MALES AGED 30-49 WHO HAVE SMOKED CIGARETTES* DURING A PERIOD OF THEIR LIFETIMES

Cause of Death	I.S.C. Code Number	Deaths and Percentage Deaths by Occupation for Males Aged 30-49 Who Have Smoked Cigarettes* During a Period of Their Lifetimes																									
		Managerial		Professional		Clerical		Transportation and Communication		Commercial and Financial		Service		Agricultural		Fishing, Trapping, Logging		Mining		Manufacturing and Mechanical		Stationary Engineers		Construction		Labourers		Not Stated		Total	
		001-059		060-099		110-119		201-251 261-299		301-349 362-369		402-499		500-509		550-568		601-619		700-889		890-899		910-939		950		960,970			
		Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%
Cancer of Pancreas	157	0	-	1	2.8	0	-	0	-	0	-	1	1.4	3	3.0	0	-	0	-	0	-	0	-	0	-	0	-	0	-	5	0.6
Lung Cancers	162,163	1	4.8	0	-	1	0.7	5	4.6	1	1.5	5	7.1	5	5.0	0	-	0	-	6	4.5	0	-	4	5.6	2	2.7	0	-	30	3.3
Genito-Urinary Cancers	170-181	0	-	0	-	3	2.1	1	0.9	0	-	1	1.4	0	-	0	-	0	-	1	0.7	0	-	1	1.4	1	1.4	0	-	8	0.9
All Other Cancers		4	19.0	1	2.8	18	12.4	4	3.7	6	9.0	4	5.7	9	9.0	2	8.7	3	13.0	9	6.7	0	-	5	7.0	7	9.6	1	3.7	73	8.0
Vascular Lesions	330-334	0	-	2	5.6	9	6.2	4	3.7	6	9.0	2	2.9	4	4.0	2	8.7	0	-	5	3.7	0	-	4	5.6	4	5.5	1	3.7	43	4.7
Coronary Heart Disease	420.1	9	42.9	15	41.7	52	35.9	43	39.4	24	35.8	23	32.9	23	23.0	2	8.7	8	34.8	50	37.3	3	37.5	21	29.6	20	27.4	3	11.1	296	32.6
Other Heart and Circulatory Diseases	400-468 Less 420.1	2	9.5	4	11.1	15	10.3	8	7.3	5	7.5	6	8.6	11	11.0	4	17.4	1	4.3	13	9.7	2	25.0	7	9.9	6	8.2	2	7.4	86	9.5
Pneumonia and Influenza	480-493	0	-	0	-	2	1.4	1	0.9	3	4.5	1	1.4	1	1.0	1	4.3	0	-	5	3.7	0	-	0	-	3	4.1	0	-	17	1.9
Bronchitis	500-502	0	-	0	-	1	0.7	1	0.9	0	-	0	-	1	1.0	0	-	0	-	1	0.7	0	-	0	-	0	-	0	-	4	0.4
Emphysema	527.1	0	-	0	-	0	-	1	0.9	0	-	1	1.4	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	2	0.2
Accidents-Poisonings Violence	800-999	2	9.5	5	13.9	12	8.3	20	18.3	14	20.9	10	14.3	19	19.0	10	43.5	7	30.4	21	15.7	0	-	16	22.5	13	17.8	4	14.8	153	16.9
Residual		3	14.3	8	22.2	32	22.1	21	19.3	8	11.9	16	22.9	24	24.0	2	8.7	4	17.4	23	17.2	3	37.5	13	18.3	17	23.3	16	59.3	190	20.9
Total		21	100.0	36	100.0	145	100.0	109	100.0	67	100.0	70	100.0	100	100.0	23	100.0	23	100.0	134	100.0	8	100.0	71	100.0	73	100.0	27	100.0	907	100.0

* Alone or in combination with cigars and/or pipe.

DEATHS AND PERCENTAGE DEATHS BY CAUSE OF DEATH AND BY OCCUPATION OF MALES AGED 50-64 WHO HAVE SMOKED CIGARETTES* DURING A PERIOD OF THEIR LIFETIMES

Cause of Death	I.S.C. Code Number	Deaths and Percentage Deaths by Occupation for Males Aged 50-64 Who Have Smoked Cigarettes* During a Period of Their Lifetimes																									
		Managerial		Professional		Clerical		Transportation and Communication		Commercial and Financial		Service		Agricultural		Fishing, Trapping, Logging		Mining		Manufacturing and Mechanical		Stationary Engineers		Construction		Labourers		Not Stated		Total	
		001-059		060-099		110-119		201-251 261-299		301-349 362-369		402-499		500-509		550-568		601-619		700-889		890-899		910-939		950		960,970			
		Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%	Deaths	%
Cancer of Pancreas	157	0	-	1	0.5	5	0.9	3	1.0	1	0.4	5	1.6	2	0.6	2	3.1	1	1.4	6	1.3	1	2.3	4	1.5	1	0.4	0	-	32	1.0
Lung Cancers	162,163	9	7.3	8	3.8	35	6.6	22	7.2	15	6.4	28	9.0	17	5.4	7	10.8	4	5.5	41	8.8	6	13.6	25	9.5	22	8.5	0	-	239	7.4
Genito-Urinary Cancers	170-181	4	3.3	3	1.4	13	2.4	5	1.6	7	3.0	7	2.3	4	1.3	2	3.1	3	4.1	9	1.9	0	-	5	1.9	5	1.9	0	-	67	2.1
All Other Cancers		14	11.4	22	10.5	54	10.1	25	8.2	20	8.5	38	12.3	33	10.5	4	6.2	9	12.3	41	8.8	2	4.5	22	8.4	27	10.4	3	8.1	314	9.7
Vascular Lesions	330-334	9	7.3	15	7.1	28	5.2	23	7.6	17	7.2	21	6.8	28	8.9	8	12.3	5	6.8	33	7.1	4	9.1	14	5.3	17	6.5	6	16.2	228	7.0
Coronary Heart Disease	420.1	43	35.0	86	41.0	208	39.0	127	41.8	93	39.4	112	36.1	128	40.6	18	27.7	28	38.4	182	38.9	15	34.1	97	37.0	95	36.5	16	43.2	1248	38.5
Other Heart and Circulatory Diseases	400-468 Less 420.1	16	13.0	29	13.8	81	15.2	36	11.8	39	16.5	38	12.3	31	9.8	8	12.3	11	15.1	61	13.0	7	15.9	31	11.8	32	12.3	3	8.1	423	13.1
Pneumonia and Influenza	480-493	5	4.1	4	1.9	8	1.5	8	2.6	6	2.5	8	2.6	15	4.8	2	3.1	0	-	16	3.4	1	2.3	7	2.7	13	5.0	1	2.7	94	2.9
Bronchitis	500-502	0	-	3	1.4	1	0.2	4	1.3	3	1.3	6	1.9	5	1.6	1	1.5	2	2.7	12	2.6	1	2.3	8	3.1	5	1.9	0	-	51	1.6
Emphysema	527.1	2	1.6	1	0.5	3	0.6	4	1.3	2	0.8	2	0.6	3	1.0	1	1.5	0	-	9	1.9	3	6.8	2	0.8	7	2.7	1	2.7	40	1.2
Accidents-Poisonings Violence	800-999	9	7.3	6	2.9	28	5.2	16	5.3	7	3.0	10	3.2	19	6.0	5	7.7	4	5.5	12	2.6	2	4.5	16	6.1	10	3.8	2	5.4	146	4.5
Residual		12	9.8	32	15.2	70	13.1	31	10.2	26	11.0	35	11.3	30	9.5	7	10.8	6	8.2	46	9.8	2	4.5	31	11.8	26	10.0	5	13.5	359	11.1
Total		123	100.0	210	100.0	534	100.0	304	100.0	236	100.0	310	100.0	315	100.0	65	100.0	73	100.0	468	100.0	44	100.0	262	100.0	260	100.0	37	100.0	3241	100.0

* Alone or in combination with cigars and/or pipe.

TABLE 11.4

EXPECTED DEATHS OF NON-SMOKERS AND CURRENT CIGARETTE SMOKERS OF THREE INTENSITIES IN ONE YEAR BASED UPON POPULATION OF 100,000 AGED 30-64 DISTRIBUTED BY AGE AS MALES AGED 30-64 IN CANADA AT THE TIME OF THE 1961 CENSUS BY OCCUPATION

Occupation	Code No.	Expected Deaths in Populations of 100,000 Aged 30-64			
		Non-Smokers	Current Cigarette Smokers		
			Less than 10 per day	10-20 per day	More than 20 per day
Managerial	001-059	1197.7	462.8	986.3	989.2
Professional	060-099	596.0	712.7	1176.1	1041.9
Clerical	110-119	859.1	797.0	1095.6	1274.8
Office Clerks	(115)	950.4	759.7	1121.1	1316.9
Transportation and Communication	201-251, 261-299	510.3	1032.5	1235.9	1598.7
Taxi, Bus and Truck Drivers	(213-217), (247-249)	368.7	1186.3	1373.5	1536.8
Commercial and Financial	301-349, 362-369	776.5	976.3	1026.1	1620.4
Salesman	(336)	801.6	957.0	1013.5	1867.6
Service	402-499	712.0	1146.7	1579.5	1382.7
Agricultural	500-509	708.6	813.5	1006.3	850.1
Farmers	(500)	728.1	833.9	999.2	952.7
Fishing Trapping and Logging	550-568	1065.8	513.0	1061.1	811.4
Mining	601-619	513.2	1670.2	1222.3	1296.9
Miners	(607)	578.2	1797.7	1109.9	1282.9
Manufacturing and Mechanical	700-889	765.1	1059.0	1137.9	1185.4
Food Products	(701-709)	2046.9	1408.4	941.5	984.1
Wood Products	(790-799)	718.0	435.1	997.6	492.1
Machinists and Mechanics	(835-841)	601.0	947.8	1001.4	1333.7
Stationary Engineers	890-899	720.4	1636.0	1019.1	1212.8
Construction	910-939	727.6	1061.9	1180.3	1048.9
Carpenters	(915)	878.3	482.6	821.1	993.5
Painters	(927)	1342.9	499.7	578.4	932.8
Labourers	950	105.2	1341.8	1314.0	1254.9
Not Stated or No Occ. of 3 yrs. Duration	960,+970	2087.7	330.0	1546.0	934.0
All Occupations		784.1	996.4	1170.6	1233.4

TABLE 11.5

OBSERVED AND EXPECTED* DEATHS BY OCCUPATION OF MALE NON-SMOKERS AND CURRENT SMOKERS OF CIGARETTES ONLY OF THREE INTENSITIES. AGES 30-64 COMBINED

Occupation	Code Number	Observed and Expected* Deaths by Smoking Category Ages 30-64 Combined							
		Never Smoked		Currently Smoke Cigarettes Only					
				Less than 10 per day		10-20 per day		More than 20 per day	
		Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.
Managerial	001-059	11	8.96	5	10.00	40	45.06	19	23.47
Professional	060-099	14	20.85	12	15.72	66	68.97	37	43.04
Clerical	110-119	43	36.17	29	45.35	224	242.60	111	109.65
Office Clerks	(115)	41	31.80	24	19.09	203	128.54	105	100.38
Transportation and Communication	201-251 261-299	19	17.56	41	37.18	153	148.84	64	48.50
Taxi, Bus, Truck Drivers	(213-217) (247-249)	5	6.79	20	17.63	72	59.02	32	22.93
Commercial and Financial	362-369	10	13.35	29	19.65	81	89.98	56	47.28
Salesmen	(336)	7	9.57	20	13.84	56	63.63	45	32.65
Service	402-499	17	18.85	33	31.98	157	124.93	61	51.18
Agricultural	500-509	43	50.49	55	66.14	141	166.65	38	51.14
Farmers	(500)	42	46.43	50	58.65	127	150.06	34	42.73
Fishing, Trapping and Logging	550-568	8	6.54	11	16.21	30	33.88	7	11.30
Mining	601-619	3	3.34	19	12.59	35	34.04	14	13.40
Miners	(607)	3	3.05	19	11.38	31	33.22	13	12.68
Manufacturing and Mechanical	700-889	27	33.16	63	59.99	235	239.75	68	72.88
Food Products	(701-709)	4	3.23	4	5.36	15	18.86	3	5.29
Wood Products	(790-799)	2	2.05	4	3.71	8	13.23	2	3.51
Machinists, Mechanics	(835-841)	9	12.98	25	23.77	98	125.57	35	33.29
Stationary Engineers	(890-899)	5	3.91	5	3.64	20	22.53	7	7.08
Construction	910-939	15	16.01	34	34.41	130	125.72	40	46.44
Carpenters	(915)	6	5.97	5	11.27	25	21.50	11	13.21
Painters	(927)	4	2.45	5	9.19	15	32.52	9	11.04
Labourers (Non Agricultural Fishing, Logging, Mining)	950	17	16.13	67	48.13	135	121.85	41	39.24
Not Stated or No Occupation of 3 years Duration	960+970	24	11.46	3	4.04	21	14.17	7	5.37
Total		255	256.80	407	405.05	1468	1468.82	570	569.94

* Based upon the age-specific death rates within each of the single smoking categories (Non-Smokers, Less than 10 cigarettes per day, etc.), Males of all occupations combined.

TABLE 11.6

STANDARDIZED* MORTALITY RATIOS BY OCCUPATION OF MALE NON-SMOKERS AND CURRENT SMOKERS OF CIGARETTES ONLY OF THREE INTENSITIES. AGES 30-64 COMBINED.

Occupation	Code No.	Standardized* Mortality Ratios by Smoking Category Ages 30-64 Combined			
		Never Smoked	Currently Smoke Cigarettes Only		
			Less than 10 per day	10-20 per day	More than 20 per day
Managerial	001-059	1.23	0.50	0.89	0.81
Professional	060-099	0.67	0.76	0.96	0.86
Clerical	110-119	1.19	0.64	0.92	1.01
Office Clerks	(115)	1.29	1.26	1.58	1.05
Transportation and Communication	201-251				
	261-299	1.08	1.10	1.03	1.32
Taxi, Bus and Truck Drivers	(213-217)				
	(247-249)	0.74	1.13	1.22	1.40
Commercial and Financial	362-369	0.75	1.48	0.90	1.18
Salesmen	(336)	0.73	1.45	0.88	1.38
Service	402-499	0.90	1.03	1.26	1.19
Agricultural	500-509	0.85	0.83	0.85	0.74
Farmers	(500)	0.90	0.85	0.85	0.80
Fishing, Trapping and Logging	550-568	1.22	0.68	0.89	0.62
Mining	601-619	0.90	1.51	1.03	1.04
Miners	(607)	0.98	1.67	0.93	1.02
Manufacturing and Mechanical	700-889	0.81	1.05	0.98	0.93
Food Products	(701-709)	1.24	0.75	0.80	0.57
Wood Products	(790-799)	0.98	1.08	0.60	0.57
Machinists and Mechanics	(835-841)	0.69	1.05	0.78	1.05
Stationary Engineers	890-899	1.28	1.37	0.89	0.99
Construction	910-939	0.94	0.99	1.03	0.86
Carpenters	(915)	1.00	0.44	1.16	0.83
Painters	(927)	1.63	0.54	0.46	0.82
Labourers (Non Agricultural Fishing, Mining, Logging)	950	1.05	1.39	1.11	1.04
Not Stated or No Occupation of 3 years Duration	960-970	2.09	0.74	1.48	1.30

* Standardized in that the observed deaths are compared to the deaths expected on the basis of the age-specific death rates within each of the single smoking categories, males of all occupations combined.

PART 12 - RESIDENCE

Consideration of the Factors Involved

There are factors which may selectively influence the death rates of urban as compared to rural populations of equivalent ages and smoking habits in this study. For instance, one notes that the population under study is one of veteran disability pensioners or their dependents. The relative proximity of treatment facilities and the relative prevalence of sedentary and nonmanual work in the larger communities are factors which may influence the place of residence of disabled persons. Indeed, many other factors may exist upon which data have not been collected in this study. In particular the data contained in this study are not considered to be sufficiently refined to be able to specifically investigate associations between excess urban mortality and the effects of air pollution.

Study Population

The data collected were tabulated and examined by length of residence in city, suburb, town and rural area respectively by age class within smoking categories. There did not appear to be however any consistent relationship between the magnitude of the death rates and the length of residence in either cities or other areas. This is believed to have been at least partly due to the fact that in many categories the populations and the numbers of deaths involved were small. In view of these results it was decided that it would not be advantageous to consider the data in more than two residence categories. The criterion chosen was whether the pension recipient had been resident for more than or less than five years in a city, a city being generally interpreted as a community of 20,000 persons or more. If further information is required on the definition of a city dweller as used in this study, please refer to "Residence Coding" in Part 4, "Handling of the Data". Although this criterion is arbitrary, it was the one which served best to divide the populations into the most equitable groups for the purpose of comparing death rates. Non-smokers and persons who, at the time of the survey smoked cigarettes only, comprise the populations used for this further study. These populations were subdivided, in addition to the residence criterion, into five year age groups, while the cigarette smokers were further subdivided by smoking intensity. Appendix Table A 12.1 contains the populations at risk and the deaths upon which this analysis into the effects of residence is based.

Urban/Rural Death Rate Comparisons

Table 12.1 lists the deaths of those persons who had resided in a city for five or more years in direct comparison with the deaths which would be expected if the death rates were the same as those persons of equivalent ages and smoking habits who had lived in a city for less than five years. The ratios of these observed deaths to the expected deaths are also given. From this table it may be observed that the ratio is above unity, indicating a higher death rate among those persons who had lived five or more years in a city in 33 of the 44 comparisons, or, 37 of the 48 comparisons totals included. No clear pattern emerges in the distribution of the ratios, for instance, within each age group. The ratios do not all tend to increase in numerical value from the non-smoking category to the greater than 20 cigarettes per day category or vice versa.

In total there were 3658 deaths in the male populations in question who had lived for five or more years in a city whereas 3260.02 deaths were expected, resulting in an overall mortality ratio of 1.12 for all causes of death combined.

It would appear therefore that there is an association between urban residence and mortality rates in excess of those of rural residents independent of smoking habit. These differences between rural and urban death rates are however smaller than the differences between the death rates of cigarette smokers and non-smokers.

Lung Cancer: Urban/Rural Comparison

As Table 12.1 compares the deaths and expected deaths for all causes of death combined for non-smokers and cigarette smokers of three intensities, so Table 12.2 compares the deaths and expected deaths due to lung cancer for the same populations. The actual numbers of deaths involved and the deaths rates by residence are given in detail in Appendix Tables A 12.2 and A 12.3.

From a close examination of Table 12.2 it can be seen that the usefulness of this table is severely limited by the small numbers of observed and expected deaths.

Among the populations considered here, there were a total of 331 deaths from lung cancer. From Table 12.2, it may be deduced that, for persons with a history of having lived 5 or more years in a city, there were some 270 observed deaths from lung cancer compared to 179.48 expected deaths from lung cancer on the basis of the age-specific death rates of persons of equivalent smoking habits but who had not lived in the city for 5 years. This gives an overall mortality ratio for lung cancer for this particular group of persons of 1.50 compared to the overall mortality ratio for all causes of death combined of 1.12 for the same group of persons. Referring again to Table 12.2, it may be seen that in 11 of the 44 comparisons between observed and expected deaths in individual age groups in this table, both the observed and the expected deaths were zero. However, of the 33 comparisons in which either or both of the observed or expected deaths were more than zero, then in 27 comparisons, the numbers of observed deaths were greater than the numbers of expected deaths.

All 7 male non-smokers* who died of lung cancer had lived in the city for more than 5 years. However, among the cigarette smokers, there does not appear to be clear cut evidence that the urban/rural mortality ratios are influenced by either quantities of cigarettes smoked or age.

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* See Appendix 8.5 where all the data available on the male non-smokers who died from lung cancer is presented for each individual case.

TABLE 12.1

OBSERVED AND EXPECTED[Δ] DEATHS OF MALES WHO, AT THE TIME OF SURVEY, HAD LIVED FIVE OR MORE YEARS IN A CITY*
FOR LIFETIME NON-SMOKERS AND CURRENT SMOKERS OF CIGARETTES ONLY OF THREE INTENSITIES BY AGE GROUP.

Age Group at Time of Survey		Observed and Expected[Δ] Deaths of Lifetime Non-Smokers and Current Smokers of Cigarettes Only Who Had Resided in a City* For Five or More Years							
		Lifetime Non-Smokers		Currently Smoked Cigarettes Only					
				Less than 10/day		10-20/day		More than 20/day	
		Deaths	Ratio	Deaths	Ratio	Deaths	Ratio	Deaths	Ratio
30-34	Observed	7		2		24		11	
	Expected[Δ]	10.40	0.67	4.38	0.46	28.35	0.85	14.80	0.74
35-39	Observed	9		11		59		24	
	Expected[Δ]	7.82	1.15	7.91	1.39	37.53	1.57	8.49	2.83
40-44	Observed	7		12		66		42	
	Expected[Δ]	19.50	0.36	5.84	2.05	60.88	1.08	36.52	1.15
45-49	Observed	13		17		87		45	
	Expected[Δ]	16.92	0.77	6.89	2.47	42.40	2.05	20.89	2.15
50-54	Observed	14		30		112		48	
	Expected[Δ]	8.68	1.61	20.26	1.48	113.76	0.98	44.76	1.07
55-59	Observed	35		75		322		128	
	Expected[Δ]	37.29	0.94	61.62	1.22	259.55	1.24	153.54	0.83
60-64	Observed	67		135		439		142	
	Expected[Δ]	66.48	1.01	127.31	1.06	383.21	1.15	132.76	1.07
65-69	Observed	103		175		350		89	
	Expected[Δ]	100.69	1.02	183.76	0.95	344.47	1.02	96.00	0.93
70-74	Observed	113		172		217		49	
	Expected[Δ]	98.51	1.15	113.43	1.52	207.77	1.04	41.07	1.19
75-79	Observed	77		83		95		22	
	Expected[Δ]	59.80	1.29	75.08	1.11	87.73	1.08	17.33	1.27
80+	Observed	76		23		22		9	
	Expected[Δ]	59.31	1.28	11.26	2.04	21.11	1.04	4.00	2.25
Total	Observed	522		734		1793		609	
	Expected[Δ]	485.49	1.08	617.61	1.19	1586.76	1.13	570.16	1.07

* Community of 20,000 or more persons.

Δ Based upon the age-specific death rates of males of equivalent smoking habits who had lived for less than five years in a city.

TABLE 12.2

OBSERVED AND EXPECTED[Δ] DEATHS OF MALES WHO, AT THE TIME OF SURVEY, HAD LIVED FIVE OR MORE YEARS IN A CITY*
FOR LIFETIME NON-SMOKERS AND CURRENT CIGARETTE SMOKERS OF THREE INTENSITIES BY AGE GROUP.

Age Group at Time of Survey		Observed and Expected[Δ] Deaths From Lung Cancer with Mortality Ratios							
		Lifetime Non-Smokers		Currently Smoked Cigarettes Only					
				Less than 10/day		10-20/day		More than 20/day	
		Deaths	Ratio	Deaths	Ratio	Deaths	Ratio	Deaths	Ratio
30-34	Observed	1	-	0	-	1	-	0	-
	Expected	0.00		0.00		0.00		0.00	
35-39	Observed	0	-	1	-	3	1.92	1	-
	Expected	0.00		0.00		1.56		0.00	
40-44	Observed	0	-	0	-	3	1.43	0	-
	Expected	0.00		0.00		2.10		0.00	
45-49	Observed	0	-	0	-	6	4.26	5	-
	Expected	0.00		1.15		1.41		0.00	
50-54	Observed	0	-	1	-	12	3.80	1	0.27
	Expected	0.00		0.00		3.16		3.73	
55-59	Observed	0	-	5	2.19	39	1.62	11	1.43
	Expected	0.00		2.28		24.14		7.68	
60-64	Observed	1	-	9	0.90	44	1.31	13	0.59
	Expected	0.00		9.95		33.57		22.13	
65-69	Observed	2	-	11	4.55	40	1.56	7	0.88
	Expected	0.00		2.42		25.62		8.00	
70-74	Observed	2	-	10	1.12	12	1.39	7	-
	Expected	0.00		8.95		8.66		0.00	
75-79	Observed	0	-	5	0.77	5	-	5	1.15
	Expected	0.00		6.53		0.00		4.33	
80+	Observed	1	-	2	-	3	1.42	0	-
	Expected	0.00		0.00		2.11		0.00	
Total	Observed	7	-	44	1.41	169	1.65	50	1.09
	Expected	0.00		31.28		102.33		45.87	

* Community of 20,000 or more persons

Δ Based on the age-specific death rates for lung cancer of males of equivalent smoking habits who had lived for less than five years in a city.

PART 13 - CIGAR SMOKING AND PIPE SMOKING

Selection of Study Populations

In this section information is examined on those persons with a history of having smoked cigars or pipes only as opposed to those persons who currently smoked cigars or a pipe only at the time of the survey. This is necessary because the latter group may contain persons who had previously smoked cigarettes which would in all probability influence the conclusions drawn from these data because, as was observed in Part 6, persons who had stopped smoking cigarettes were found to have a mortality ratio which was essentially second only to persons actively participating in the cigarette smoking habit. Excess deaths of ex-cigarette smokers could then mask any effects which may be attributable to either cigar or pipe smoking. It is recommended therefore that persons interested in the effects of cigar and/or pipe smoking should read this part in conjunction with Part 6 "Overall Effects of Smoking on Mortality". There the overall death rates of both cigar and pipe smokers are examined in relation to non-smokers and persons of other smoking habits and combinations of smoking habits arranged by both smoking history and current smoking habit at the time of survey.

Cigar Smoking

Tables 13.1, 13.2 and 13.3 contain data collected on persons with a history of having smoked cigars only, by age and cause of death and also by cause of death for those persons who had stopped smoking cigars.

While it is considered noteworthy that the overall mortality ratio is greater than unity for both the population as a whole and for those persons who had stopped smoking cigars at the time of survey, the fact that the quantities involved are so small precludes further comments on these tables. Likewise, although mortality ratios generally exceed unity for "Lung Cancer", "Vascular Lesions" and "Other Heart Diseases", because of the small numbers of deaths involved they do not lend themselves to any useful interpretation.

Pipe Smoking

The data collected on persons with a history of having smoked pipes only are given in Tables 13.4, 13.5 and 13.6. One notices immediately that the overall mortality ratios for the three smoking intensities in Tables 13.4 and 13.5 and for those who had stopped smoking pipes in Table 13.6 all approximate unity very closely. From Table 13.4 it is noticed that in the age groups 55-59 and 60-64, the mortality ratios are all above unity. It is also noticed in Table 13.5 that mortality ratios for "Lung Cancer" and "All Other Cancers" are above unity. However, the "Coronary Circulatory" and "Other Heart Disease" do not appear to be associated with higher death rates among pipe smokers than among non-smokers.

TABLE 13.1

OBSERVED AND EXPECTED* DEATHS TOGETHER WITH MORTALITY RATIOS OF MALES HAVING A HISTORY OF HAVING SMOKED CIGARS ONLY BY INTENSITY OF SMOKING AND AGE GROUP.

Age Group at Time of Survey	Observed and Expected* Deaths Together with Mortality Ratios of Males Having a History of Having Smoked Cigars Only, by Intensity of Smoking							
	Less than 3/day		3-10/day		More than 10/day		Overall Δ	
	Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.
30-34	0 0.73	-	0 0.10	-	0 0.05	-	0 0.99	-
35-39	0 0.44	-	0 0.18	-	0 0.03	-	0 0.74	-
40-44	0 0.80	-	0 0.44	-	0 0.03	-	0 1.32	-
45-49	0 0.86	-	1 0.55	1.82	0 0.00	-	1 1.47	0.68
50-54	0 0.76	-	1 0.46	2.17	0 0.00	-	1 1.60	0.62
55-59	8 3.85	2.08	2 1.62	1.23	0 0.34	-	10 6.26	1.61
60-64	15 8.77	1.71	5 2.85	1.75	0 0.55	-	20 12.50	1.60
65-69	13 11.56	1.12	4 4.17	0.96	1 0.19	5.26	20 18.00	1.11
70-74	11 12.59	0.87	2 2.95	0.68	0 0.00	-	13 15.54	0.84
75-79	10 7.31	1.37	2 2.33	0.86	0 0.00	-	12 9.64	1.24
80+	7 8.41	0.83	6 3.74	1.60	0 0.47	-	13 14.01	0.93
Total	64 56.05	1.14	23 19.40	1.19	1 1.59	0.63	90 82.07	1.10
Population at Risk	406		144		17		612	

* Expected Deaths based upon age-specific death rates for non-smokers.

Δ Includes males of unspecified smoking intensities.

TABLE 13.2

OBSERVED AND EXPECTED* DEATHS TOGETHER WITH MORTALITY RATIOS BY CAUSE OF DEATH AND INTENSITY OF SMOKING OF MALES HAVING A HISTORY OF HAVING SMOKED CIGARS ONLY, ALL AGES COMBINED.

Cause of Death	I.S.C. Code Number	Observed and Expected* Deaths Together with Mortality Ratios of Males Having a History of Having Smoked Cigars Only, by Smoking Intensity.							
		Less than 3 per day		3 - 10 per day		More than 10 per day		Overall Δ	
		Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.
Cancer of Pancreas	157	1 0.26	3.85	0 0.09	-	0 0.00	-	1 0.38	2.63
Lung Cancer	162,163	1 0.49	2.04	1 0.14	7.14	0 0.00	-	2 0.68	2.94
Genito-Urinary Cancers	170-181	2 1.78	1.12	1 0.60	1.67	0 0.04	-	3 2.59	1.16
All Other Cancers		3 5.49	0.55	3 1.90	1.58	0 0.14	-	7 8.03	0.87
Vascular Lesions	330-334	10 7.11	1.41	3 2.34	1.28	0 0.14	-	13 10.18	1.28
Coronary Heart Disease	420.1	16 16.39	0.98	6 5.80	1.03	1 0.51	1.96	24 24.22	0.99
Other Heart and Circulatory Diseases	400-468 less 420.1	15 8.89	1.69	2 3.08	0.65	0 0.26	-	17 12.95	1.31
Pneumonia and Influenza	480-493	4 4.06	0.99	0 1.37	-	0 0.09	-	4 5.84	0.68
Bronchitis	500-502	1 0.20	5.00	0 0.06	-	0 0.00	-	1 0.28	3.57
Emphysema	527.1	1 0.21	4.76	0 0.07	-	0 0.00	-	1 0.30	3.33
Accidents, Poisonings, and Violence	800-999	2 2.06	0.97	0 0.68	-	0 0.06	-	2 3.00	0.67
Residual		8 9.11	0.88	7 3.27	2.14	0 0.35	-	15 13.62	1.10
Total		64 56.05	1.14	23 19.40	1.19	1 1.59	0.63	90 82.07	1.10

* Expected Deaths based upon age specific death rates on non-smokers.

Δ Overall includes males of unspecified smoking history.

TABLE 13.3

OBSERVED AND EXPECTED* DEATHS TOGETHER WITH MORTALITY RATIOS BY CAUSE OF DEATH OF MALES WHO STOPPED SMOKING BUT PREVIOUSLY SMOKED CIGARS ONLY. ALL AGES COMBINED.

Cause of Death	I.S.C. Code Number	Observed and Expected* Deaths Together With Mortality Ratios of Males Who Stopped Smoking but Who Previously Smoked Cigars Only		
		Observed Deaths	Expected Deaths	Mortality Ratios
Cancer of Pancreas	157	1	0.09	11.11
Lung Cancer	162,163	0	0.17	-
Genito-Urinary Cancers	170-181	0	0.58	-
All Other Cancers		2	1.77	1.13
Vascular Lesions	330-334	3	2.18	1.38
Coronary Heart Disease	420.1	6	5.41	1.11
Other Heart and Circulatory Diseases	400-468 Less 420.1	3	2.83	1.06
Pneumonia and Influenza	480-493	2	1.23	1.63
Bronchitis	500-502	0	0.05	-
Emphysema	527.1	0	0.07	-
Accidents, Poisonings, Violence	800-999	0	0.64	-
Residual		4	3.11	1.29
Total		21	18.13	1.16

* Based upon age-specific death rates of non-smokers.

TABLE 13.4

OBSERVED AND EXPECTED* DEATHS TOGETHER WITH MORTALITY RATIOS OF MALES HAVING A HISTORY OF HAVING SMOKED PIPE ONLY, BY INTENSITY OF SMOKING AND AGE GROUP.

Age Group at Time of Survey	Observed and Expected* Deaths Together with Mortality Ratios of Males Having a History of Having Smoked Pipe Only, by Intensity of Smoking							
	□ Less than 10/day		□ 10-20/day		□ More than 20/day		Overall ▲	
	Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.
30-34	0 0.54	-	0 0.11	-	0 0.02	-	0 0.75	-
35-39	1 0.52	1.92	0 0.04	-	0 0.03	-	1 0.63	1.59
40-44	0 0.55	-	1 0.30	3.33	0 0.11	-	1 1.02	0.98
45-49	0 0.98	-	2 1.29	1.55	0 0.18	-	2 2.51	0.80
50-54	1 1.07	0.93	0 0.84	-	0 0.31	-	1 2.29	0.44
55-59	7 6.75	1.04	6 3.51	1.71	2 1.11	1.80	15 11.70	1.28
60-64	31 23.79	1.30	18 14.25	1.26	5 4.50	1.11	54 44.08	1.22
65-69	52 56.10	0.93	29 30.70	0.94	5 6.82	0.73	87 96.09	0.91
70-74	78 87.35	0.89	18 28.67	0.63	10 6.43	1.56	109 125.14	0.87
75-79	97 91.08	1.06	33 26.59	1.24	8 10.30	0.78	146 133.30	1.10
80+	107 101.37	1.06	34 34.57	0.98	6 6.07	0.99	154 149.49	1.03
Total	374 370.09	1.01	141 140.84	1.00	36 35.90	1.00	570 566.99	1.00
Population at Risk	1533		647		172		2438	

* Based upon age-specific death rates of non-smokers.

▲ Includes males of unspecified smoking intensity.

□ Pipes full.

TABLE 13.5

OBSERVED AND EXPECTED* DEATHS TOGETHER WITH MORTALITY RATIOS BY CAUSE OF DEATH AND INTENSITY OF SMOKING OF MALES HAVING A HISTORY OF HAVING SMOKED PIPE ONLY; ALL AGES COMBINED.

Cause of Death	I.S.C. Code Number	Observed and Expected* Deaths Together with Mortality ratios of Males Having a History of Having Smoked Pipe Only by Smoking Intensity, All Ages Combined.							
		Less than 10 per Day □		10-20 per day ▫		More than 20 per day ▫		Overall △	
		Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.	Obs. Exp.	M.R.
Cancer of Pancreas	157	4 1.51	2.65	1 0.57	1.75	1 0.14	7.14	6 2.31	2.60
Lung Cancer	162,163	10 2.67	3.75	6 1.08	5.56	1 0.24	4.17	18 4.14	4.35
Genito-Urinary Cancers	170-181	4 11.49	0.35	6 4.60	1.30	0 1.15	-	10 17.84	0.56
All Other Cancers		51 34.33	1.49	15 13.50	1.11	4 3.40	1.18	73 53.08	1.38
Vascular Lesions	300-334	44 50.43	0.87	14 18.50	0.76	5 4.72	1.06	65 76.20	0.85
Coronary Heart Disease	420.1	95 98.95	0.96	43 39.66	1.08	18 10.29	1.17	154 154.22	1.00
Other Heart and Circulatory Diseases	400-468 less 420.1	66 66.13	1.00	23 24.00	0.96	1 6.22	0.16	94 100.04	0.94
Pneumonia and Influenza	480-493	30 34.05	0.88	5 11.85	0.42	4 2.98	1.34	43 50.82	0.85
Bronchitis	500-502	4 1.58	2.53	1 0.56	1.79	0 0.17	-	5 2.37	2.11
Emphysema	527.1	2 1.75	1.14	0 0.61	-	0 0.18	-	2 2.66	0.75
Accidents, Poisonings and Violence	800-999	3 9.93	0.30	2 3.79	0.53	0 1.09	-	5 15.28	0.33
Residual		61 57.27	1.07	25 22.12	1.13	8 5.32	1.50	95 88.03	1.08
Total		374 370.09	1.01	141 140.84	1.00	36 35.90	1.00	570 566.99	1.00
Population at risk		1533		647		172		2438	

* Based upon age-specific death rates of non-smokers.

△ Includes males of unspecified intensity.

▫ Pipes full.

TABLE 13.6

OBSERVED AND EXPECTED* DEATHS TOGETHER WITH MORTALITY RATIOS BY CAUSE OF DEATH OF MALES WHO STOPPED SMOKING BUT PREVIOUSLY SMOKED PIPE ONLY. ALL AGES COMBINED.

Cause of Death	I.S.C. Code Number	Observed and Expected* Deaths Together With Mortality Ratios of Males Who Stopped Smoking but Who Previously Smoked Pipe Only		
		Observed Deaths	Expected Deaths	Mortality Ratios
Cancer of Pancreas	157	0	0.37	-
Lung Cancer	162,163	1	0.67	1.49
Genito-Urinary Cancers	170-181	2	2.73	0.73
All Other Cancers		16	8.17	1.96
Vascular Lesions	330-334	10	11.38	0.88
Coronary Heart Disease	420.1	23	23.76	0.97
Other Heart and Circulatory Diseases	400-468 Less 420.1	14	15.52	0.90
Pneumonia and Influenza	480-493	3	7.95	0.38
Bronchitis	500-502	1	0.33	3.03
Emphysema	527.1	0	0.44	-
Accidents, Poisonings, Violence	800-999	1	2.28	0.44
Residual		14	14.13	0.99
Total		85	87.73	0.97
Population at risk		389		

* Based upon age-specific death rates of non-smokers.

PART 14 - EFFECTS OF CIGARETTE SMOKING - FEMALES

Study Population and Deaths

As shown in Table 14.1, the population of female respondents included in this study consisted of 10,416 non-smokers and 3,810 cigarette smokers making a total of 14,226. Among those respondents, there was a total of 1,794 deaths from all causes during the period July 1, 1956 to June 30, 1962, of which 1,574 were among non-smokers and 220 were among cigarette smokers. The overall mortality ratio of female cigarette smokers is shown to be 1.17 based upon 220 observed deaths and 187.72 deaths expected on the basis of the age-specific death rates of non-smokers.

Current Smoking Habit at Time of Survey

Table 14.2 contains data on non-smokers' and cigarette smokers' deaths from all causes by current smoking habit, intensity of cigarette smoking and by duration of the cigarette smoking habit. Among 609 persons who reported they had stopped smoking there were 45 deaths from all causes where 39 were expected, giving a mortality ratio of 1.15. This mortality ratio is almost as high as that of the current cigarette smokers. Some of these women did mention, however, that they had stopped smoking because of ill health and some even stated that they had stopped smoking on doctor's orders.

Intensity of Cigarette Smoking

The "all ages combined" mortality ratios are above unity for cigarette smoking for all three intensities of smoking. In general, it may be seen from Table 14.2 that, based upon 208 deaths where intensity was specified, and, based on the definition that the mortality ratio of non-smokers is 1.00, the overall mortality ratios increase with increases in the quantities of cigarettes smoked from non-smokers through the cigarette smoking category of less than 10 per day to female cigarette smokers of over 10 cigarettes per day.

Duration of Cigarette Smoking

Based upon 193 deaths where duration of smoking was specified, Table 14.2 does not indicate a general tendency for the death rates of females with a cigarette smoking habit of less than 10 years duration to be greater than those of female non-smokers. Mortality ratios for the individual five-year age groups fluctuate, but, here again, the population at risk and the numbers of deaths in each age group are small, such that any one particular mortality ratio or comparison may not be expected to be indicative or representative of the actual situation. However, among 2838 females who reported a cigarette smoking habit of more than 10 years duration, there were 161 deaths from all causes where 134.7 were expected on the basis of the age-specific death rates of female non-smokers. This represents a mortality ratio of 1.20. Moreover, an examination of the distribution of deaths by age groups shows that, for the combined age groups under 55 years of age, 39 deaths occurred, compared to 18 deaths expected. This is a significant difference and it accounts largely for the overall significant difference.

Causes of Death

Table 14.3 reveals that among the 3,810 female cigarette smokers there were a total of 220 deaths. Of this total, 46 died from coronary heart disease and 48 died from other heart and circulatory diseases. For these diseases the mortality ratios are well above unity being 1.29 and 1.25 respectively.

The group of diseases termed vascular lesions also have an overall mortality ratio of 1.15 based upon 28 observed deaths. The three groups of diseases mentioned above do not however have mortality ratios which are consistently greater than unity over all age groups. In all probability this is principally due to the small population at risk and the small numbers of deaths in individual age groups. In all other causes of death, the numbers of deaths involved are too small to allow useful comments to be made on the resulting mortality ratios.

Conclusion

The data concerning females indicate that, in general, cigarette smokers have a higher death rate from all causes of death combined than non-smokers. The data suggest that the greater the intensity of smoking the higher the mortality ratio, and, the longer the duration of the habit, the higher the mortality ratio. Furthermore, the data suggest an association exists between cigarette smoking and "Coronary Heart Disease" and "Other Heart and Circulatory Diseases". The available data are not sufficient, however, to establish these relationships precisely.

Comparison of Male and Female

In a comparison of the effects of cigarette smoking upon males as compared to females, it is perhaps most useful to first recognize that a basic parallelism exists between the two groups. In both cases, excess mortality is associated with cigarette smokers as compared to non-smokers and that the difference in the mortality rates increases as the quantities of cigarettes smoked increases.

It however recognized that the data do not yield identical results for both males and females. This may be due to one or more of the following:

1. That the amount of data involved, especially in the case of the females, is small and estimates are therefore subject to considerable variation or fluctuation.

2. There are many differences in the male and female populations. For example, in this study the bulk of the male population smoked whereas the bulk of the female population did not smoke. The bulk of the women smokers were in the younger age groups in which there are low mortality rates whereas there were many older male smokers with subsequently high mortality rates. Also the women smokers typically smoked less and had been smoking for a shorter duration than the men. While all the males were disability pensioners the women were drawn from the general community.

3. Differences, principally in the magnitudes of the effects of cigarette smoking between males and females, do exist.

TABLE 14.1

FEMALE POPULATIONS AT RISK, OBSERVED DEATHS, EXPECTED* DEATHS AND DEATH RATES Δ PER 1,000 POPULATION AT RISK BY LIFETIME SMOKING HISTORY AND BY FIVE YEAR AGE GROUPS

Item	Lifetime Smoking History	Age Group of Females at Time of Survey												
		Less Than 30	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+	Total
Population at Risk	Non-Smokers	35	197	412	370	391	567	1,298	1,678	1,897	1,612	1,009	950	10,416
	Cigarette Smokers	48	388	564	537	452	374	451	429	301	182	58	26	3,810
	Total	83	585	976	907	843	941	1,749	2,107	2,198	1,794	1,067	976	14,226
Deaths	Non-Smokers	0	0	3	1	7	16	72	138	228	323	301	485	1,574
	Cigarette Smokers	0	3	4	11	8	22	25	37	38	43	17	12	220
	Total	0	3	7	12	15	38	97	175	266	366	318	497	1,794
Death Rates per 1,000 pop. at risk	Non-Smokers	-	0.0	7.28	2.70	17.90	28.22	55.47	82.24	120.19	200.37	298.32	510.53	
	Cigarette Smokers	-	7.73	7.09	20.48	17.70	58.82	55.43	86.25	126.25	236.26	293.10	461.54	
Observed deaths among Cigarette Smokers		0	3	4	11	8	22	25	37	38	43	17	12	220
Expected deaths among Cigarette Smokers		0.00	0.00	4.11	1.45	8.09	10.55	25.02	35.28	36.18	36.47	17.30	13.27	187.72
Mortality Ratio		-	-	0.97	7.59	0.99	2.09	1.00	1.05	1.05	1.18	0.98	0.90	1.17

* Based on age specific death rates of female non-smokers.

Δ During a six year period.

TABLE 14.2

OBSERVED AND EXPECTED* DEATHS WITH MORTALITY RATIOS FOR FEMALE CIGARETTE SMOKERS HAVING A LIFETIME HISTORY OF HAVING SMOKED CIGARETTES ONLY, BY INTENSITY OF SMOKING, AND BY DURATION OF SMOKING. ALSO FOR FEMALE CIGARETTE SMOKERS WHO HAD STOPPED SMOKING, AND FOR THOSE WHO CURRENTLY SMOKED CIGARETTES AT THE TIME OF SURVEY

Smoking Habit			Age Group of Females at the Time of Survey											Total
			30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+	
Cigarette Smoking by Intensity	Less than 10 per day	Observed Deaths	0	3	4	3	7	16	23	22	28	13	9	128
		Expected* Deaths	0.00	1.65	0.60	3.45	4.99	13.42	22.37	22.24	25.25	13.13	10.72	117.82
		Mortality Ratio	-	1.82	6.67	0.87	1.40	1.19	1.03	0.99	1.11	0.99	0.84	1.09
	10-20 per day	Observed Deaths	2	1	6	3	12	8	12	13	6	3	2	68
		Expected* Deaths	0.00	1.89	0.68	3.69	4.20	9.87	9.46	10.58	6.81	2.68	1.53	51.39
		Mortality Ratio	-	0.53	8.82	0.81	2.86	0.81	1.27	1.23	0.88	1.12	1.31	1.32
	20 per day or more	Observed Deaths	1	0	1	2	1	1	0	2	4	0	0	12
		Expected* Deaths	0.00	0.47	0.12	0.81	1.04	1.33	1.89	1.44	2.00	0.30	0.00	9.40
		Mortality Ratio	-	-	8.33	2.47	0.96	0.75	-	1.39	2.00	-	-	1.28
Cigarette Smoking by Duration	Under 10 years	Observed Deaths	0	2	1	0	4	3	9	5	4	2	2	32
		Expected* Deaths	0.00	0.85	0.28	1.27	1.98	4.60	6.25	6.61	6.41	2.39	3.57	34.21
		Mortality Ratio	-	2.35	3.57	-	2.02	0.65	1.44	0.76	0.62	0.84	0.56	0.94
	10 years & over	Observed Deaths	3	2	9	8	17	20	24	29	28	12	9	161
		Expected* Deaths	0.00	3.08	1.10	6.44	7.82	19.36	25.82	25.96	24.65	12.83	7.66	134.72
		Mortality Ratio	-	0.65	8.18	1.24	2.17	1.03	0.93	1.12	1.14	0.94	1.17	1.20
Stopped Smoking Cigarettes (at Time of Survey)		Observed Deaths	0	0	2	1	6	3	8	8	9	6	2	45
		Expected* Deaths	0.00	0.54	0.21	0.90	1.86	3.11	8.22	7.93	8.62	4.77	3.06	39.22
		Mortality Ratio	-	-	9.52	1.11	3.23	0.96	0.97	1.01	1.04	1.26	0.65	1.15
Currently Smoked Cigarettes (at Time of Survey)		Observed Deaths	3	4	9	7	16	22	28	30	33	11	9	172
		Expected* Deaths	0.00	3.57	1.24	7.14	8.66	21.91	26.97	28.12	27.65	12.53	9.70	147.49
		Mortality Ratio	-	1.12	7.26	0.98	1.85	1.00	1.04	1.07	1.19	0.88	0.93	1.17

* Based on the age specific death rates of female non-smokers.

TABLE 14.3

OBSERVED AND EXPECTED* DEATHS BY CAUSE OF DEATH WITH MORTALITY RATIOS OF FEMALES WITH A LIFETIME HISTORY OF HAVING SMOKED CIGARETTES (ALL INTENSITIES) BY AGE GROUP AT TIME OF SURVEY

Cause of Death	I.S.C. Code Number	Item	Age Group of Females at Time of Survey											
			30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+	Total
Cancer of the Stomach	151	Observed Deaths	0	0	0	0	1	0	0	1	1	2	2	7
		Expected Deaths	0.00	0.00	0.00	1.16	0.66	0.35	0.51	0.16	0.79	0.23	0.16	4.02
Cancer of Pancreas	157	Observed Deaths	0	0	0	0	0	0	1	1	2	0	0	4
		Expected Deaths	0.00	0.00	0.00	0.00	0.00	0.69	0.26	0.16	0.45	0.11	0.03	1.70
Lung Cancer □	162,163	Observed Deaths	0	0	0	1	0	1	0	1	0	0	0	3
		Expected Deaths	0.00	0.00	0.00	0.00	0.00	0.00	0.77	0.48	0.00	0.06	0.03	1.34
Genito-Urinary Cancer	170-181	Observed Deaths	0	2	0	1	2	5	3	2	2	0	0	17
		Expected Deaths	0.00	1.37	0.00	3.47	1.98	5.21	3.58	2.86	2.03	0.69	0.44	21.63
		Mortality Ratio (O/E)		1.46		0.29	1.01	0.96	0.84	0.70	0.99			0.79
All Other Cancers		Observed Deaths	0	0	1	0	2	2	2	2	0	1	0	10
		Expected Deaths	0.00	0.00	0.00	1.16	0.66	2.08	4.09	3.49	2.71	1.03	0.27	15.49
		Mortality Ratio (O/E)					3.03	0.96	0.49	0.57		0.97		0.65
Vascular Lesions	330-334	Observed Deaths	0	0	0	2	1	1	7	5	8	1	3	28
		Expected Deaths	0.00	1.37	0.00	0.00	1.98	1.39	4.60	4.28	5.65	2.87	2.27	24.41
		Mortality Ratio (O/E)					0.51	0.72	1.52	1.17	1.42	0.35	1.32	1.15
Coronary Heart Disease	420.1	Observed Deaths	0	0	2	1	8	9	6	12	6	1	1	46
		Expected Deaths	0.00	0.00	1.45	0.00	1.98	5.21	6.39	7.62	8.02	3.45	1.51	35.63
		Mortality Ratio (O/E)			1.38		4.04	1.73	0.94	1.57	0.75	0.29	0.66	1.29
Other Heart and Circulatory Diseases	400-468 (Excl. 420.1)	Observed Deaths	2	0	2	1	3	1	5	7	15	8	4	48
		Expected Deaths	0.00	0.00	0.00	2.31	0.66	3.13	5.88	8.89	8.69	4.60	4.38	38.54
		Mortality Ratio (O/E)				0.43	4.55	0.32	0.85	0.79	1.73	1.74	0.91	1.25
Pneumonia, Bronchitis and Influenza	480-502	Observed Deaths	0	0	0	0	0	1	1	0	2	0	1	5
		Expected Deaths	0.00	1.37	0.00	0.00	0.00	0.00	1.02	0.64	0.68	0.86	0.63	5.20
Accidents, Poisonings and Violence	800-999	Observed Deaths	1	0	0	1	1	0	2	1	1	1	0	8
		Expected Deaths	0.00	0.00	0.00	0.00	0.00	0.35	0.51	0.48	0.90	0.40	0.44	3.08
Residual		Observed Deaths	0	2	4	1	1	2	5	3	4	3	1	26
		Expected Deaths	0.00	0.00	0.00	0.00	2.64	3.82	4.86	4.13	2.82	1.26	1.18	20.71
Unspecified Causes		Observed Deaths	0	0	2	0	3	3	5	3	2	0	0	18
		Expected Deaths	0.00	0.00	0.00	0.00	0.00	2.78	2.81	3.02	3.73	1.72	1.94	16.00

* Based on the age specific death rates of female non-smokers.

□ Appendix 14.1 contains all the data available on the eight female non-smokers who died from lung cancer presented for each individual case.

PART 15 - REFERENCES AND BIBLIOGRAPHIES

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Bibliographies

The above list of references to the literature on Smoking and Health includes only those quoted directly in the text.

Over the last decade in particular the literature available on the subject of smoking in relation to health has increased dramatically. No attempt is made here to produce a bibliography on this literature but the opportunity is taken to point out that one such bibliography is available. Reference to this bibliography, which was prepared for use by the U.S. Surgeon General's Advisory Committee on Smoking and Health is as follows:

> Bocker D., Bibliography on Smoking and Health 1958-1963. U.S. Public Health Service Publication No. 1124.
>
> Bocker D., Bibliography on Smoking and Health, Supplement 1963-64. Supplement 1963-1964 to U.S. Public Health Service Publication No. 1124.

A current bibliography on Smoking and Health is being prepared periodically on a trial basis and distributed to a limited number of people involved in the study of the effects of smoking upon health. This particular bibliography is prepared for the Division of Chronic Diseases, United States Public Health Service, by the Medical Literature Analysis and Retrieval System (MEDLARS) of the Bibliographic Services Division, National Library of Medicine, Bethesda, Maryland.

The Medical Literature Analysis and Retrieval System (MEDLARS) makes it possible to institute a periodic computer search of the literature for articles relating to smoking and health. MEDLARS contains entries from about 2500 bio-medical and bio-medically related journals. Articles will ordinarily be included in this list about four to six weeks after the publication date for American journals with longer lag periods for foreign journals.

Dr. Daniel Horn, Chief, Special Projects Section, Cancer Control Program, Division of Chronic Diseases, United States Public Health Service, has kindly consented to the reproduction and distribution of this bibliography in Canada by the Department of National Health and Welfare.

In Canada, requests for single copies of the bibliography should be addressed to: --

> Dr. H.N. Colburn,
> Medical Consultant,
> Planning and Evaluation Unit,
> Department of National Health and Welfare,
> Ottawa 3, Ontario.

APPENDICES

APPENDIX A 4.1

Dear Sir:

The Department of National Health and Welfare is investigating diseases which are important health problems in Canada, and for this purpose we are obtaining information from large numbers of people. This information will be treated as CONFIDENTIAL where the individual is concerned.

Your co-operation in carefully completing this questionnaire and mailing it in the enclosed addressed envelope (STAMP NOT REQUIRED) will be very much appreciated.

---

1. Your age _____ years.

2. What occupation AND type of work have you done MOST of your life? _____
   Examples mechanic – garage
   plumber – self employed
   clerk – office
   farmer – mixed farming

3. For How Many Years?
   For _____ Years

4. What other occupations AND types of work have you done?
   _____
   _____
   _____

5. For _____ Years
   For _____ Years
   For _____ Years

6. List the number of years you have lived in any of the following during your LIFETIME:

   In Cities (over 20,000 population) _____

   In Suburbs of Cities _____

   In Towns (less than 20,000 population)
   or Villages _____

   In the Country _____

7. For _____ Years
   For _____ Years
   For _____ Years
   For _____ Years

---

8. During your LIFETIME have you smoked a total of -

	(Check) NO	YES	
(a) 100 cigarettes	☐	☐	– (If "Yes" Answer "A" on the other side)
(b) 10 cigars	☐	☐	– (If "Yes" Answer "B" on the other side)
(c) 20 pipefuls of tobacco ..	☐	☐	– (If "Yes" Answer "C" on the other side)

If all your answers to these three questions are NO, we require no further information, and your questionnaire may please be mailed in the envelope provided.

However, if any answer was yes, be sure to answer the questions on the other side (where indicated) before mailing, even if you do not smoke at the present time.

(OVER)

A. CIGARETTE SMOKING

If you have smoked more than 100 cigarettes during your LIFETIME, please answer questions (9), (10) and (11).

(9) At the PRESENT TIME, how many cigarettes a day do you smoke on the average? (check one)		(10) During your LIFETIME, how many years did you smoke at any of these rates?
None	☐	
Under 10 cigarettes a day	☐	For _____ _____ Years.
10-20 cigarettes a day	☐	For _____ Years.
Over 20 cigarettes a day	☐	For _____ Years.

(11) Do you inhale? Yes ☐ No ☐

B. CIGAR SMOKING

If you have smoked more than 10 cigars during your LIFETIME, please answer questions (12), (13) and (14).

(12) At the PRESENT TIME, how many cigars a day do you smoke on the average (check one)		(13) During your LIFETIME, how many years did you smoke cigars at any of these rates?
None	☐	
Under 3 cigars a day	☐	For _____ Years.
3 - 10 cigars a day	☐	For _____ Years.
Over 10 cigars a day	☐	For _____ Years.

(14) Do you inhale? Yes ☐ No ☐

C. PIPE SMOKING

If you have smoked more than 20 pipefuls of tobacco during your LIFETIME, please answer questions (15), (16) and (17).

(15) At the PRESENT TIME, how many pipefuls of tobacco a day do you smoke on the average? (check one)		(16) During your LIFETIME, how many years did you smoke a pipe at any of these rates?
None	☐	
Under 10 pipefuls a day	☐	For _____ Years.
10 - 20 pipefuls a day	☐	For _____ Years.
Over 20 pipefuls a day	☐	For _____ Years.

(17) Do you inhale? Yes ☐ No ☐

CONVERSION FACTORS FOR TOBACCO USAGE

1. 1 Package cigarettes = 20 cigarettes

2. 1 cigarette = 1 pipeful

3.

Number of cigarettes or pipefuls	Weight of Tobacco		
	Day	Week	Month
Less than 10	Less than $\frac{3}{4}$ oz.	Less than 5 oz.	Less than $1\frac{1}{4}$ lbs.
10-20	" " $1\frac{1}{4}$ "	" " 10 "	" " $2\frac{1}{2}$ "
20 or more	More than $1\frac{1}{4}$ "	More than 10 "	More than $2\frac{1}{2}$ "

4. a) One ($\frac{1}{4}$ lb.) package of "makings" = 60 cigarettes
   b) $\frac{1}{4}$ lb. of pipe tobacco = 60 pipefuls.

5. Any other irregular entries, code as quantity "unspecified".

TABLE A 5.1

DEATHS BY CAUSE OF DEATH OF MALE RESPONDENTS BY AGE AT TIME OF SURVEY

Cause of Death	I.S.C. Code Number	Deaths of Respondents by Age Group at Time of Survey										
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Cancer of Pancreas	157	0	0	1	5	3	14	19	17	21	3	6
Lung Cancers	162,163	2	7	6	16	20	93	136	128	63	36	17
Genito-Urinary Cancers	170-181	0	2	1	5	6	21	47	66	58	31	14
All Other Cancers		11	20	30	30	28	120	216	217	123	89	52
Vascular Lesions	330-334	7	12	16	18	31	88	132	184	154	84	66
Coronary Heart Disease	420.1	18	68	97	133	157	470	752	638	419	232	121
Other Heart and Circulatory Diseases	400-468 Less 420.1	10	17	22	41	49	137	295	299	294	212	153
Pneumonia and Influenza	480-493	2	3	8	7	9	29	62	75	81	83	61
Bronchitis	500-502	0	1	1	2	4	17	32	48	29	15	5
Emphysema	527.1	1	0	0	1	4	15	22	21	11	7	6
Accidents, Poisonings and Violence	800-999	45	43	47	30	27	56	71	43	36	17	9
Residual		33	51	64	47	63	123	225	197	147	105	123
All Causes		129	224	293	335	401	1183	2009	1933	1436	914	633

TABLE A 5.2

DEATHS BY CAUSE OF DEATH OF MALE NON-RESPONDENTS BY AGE AT TIME OF SURVEY

Cause of Death	I.S.C. Code Number	Deaths of Non-Respondents by Age Group at Time of Survey										
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Cancer of Pancreas	157	1	2	6	2	4	14	15	21	7	9	1
Lung Cancers	162,163	2	1	12	16	38	77	98	65	45	23	1
Genito-Urinary Cancers	170-181	1	-	4	5	7	32	39	35	23	18	7
All Other Cancers		13	27	29	31	41	122	151	128	76	57	19
Vascular Lesions	330-334	3	17	12	25	28	73	132	94	91	49	52
Coronary Heart Disease	420.1	40	78	121	143	178	401	501	329	214	125	63
Other Heart and Circulatory Diseases	400-468 Less 420.1	16	21	33	43	50	158	226	196	164	112	83
Pneumonia and Influenza	480-493	66	5	13	8	18	44	51	53	57	44	29
Bronchitis	500-502	1	0	4	4	4	18	22	24	15	17	3
Emphysema	527.1	0	0	1	3	3	7	15	15	12	3	4
Accidents, Poisonings and Violence	800-999	61	77	52	41	35	52	52	37	2	14	7
Residual		44	55	56	6	63	138	168	130	97	69	56
All Causes		188	283	343	387	469	1136	1470	1127	803	540	325

TABLE A 5.3

DEATHS BY CAUSE OF DEATH OF MALE NON-SURVEYED PENSION RECIPIENTS BY AGE AT TIME OF SURVEY

Cause of Death	I.S.C. Code Number	Deaths of Non-Surveyed Pension Recipients by Age at Time of Survey										
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Cancer of Pancreas	157	1	-	1	2	-	3	8	9	10	3	2
Lung Cancer	162,163	1	1	3	10	10	38	54	48	33	22	5
Genito-Urinary Cancer	170-181	-	1	-	2	2	5	21	20	24	12	12
All Other Cancers		9	14	13	16	17	44	77	62	71	46	21
Vascular Lesions	330-334	-	2	5	10	9	29	73	86	86	58	37
Coronary Heart Disease	420.1	7	23	34	44	61	135	236	228	165	112	55
Other Heart and Circulatory Diseases	400-468 Less 420.1	6	18	9	16	16	49	150	127	126	108	107
Pneumonia and Influenza	480-493	-	1	5	4	4	26	29	42	73	56	65
Bronchitis	500-502	-	-	1	3	-	10	18	26	17	10	11
Emphysema	527.1	-	-	1	-	2	2	6	8	6	7	-
Accidents, Poisonings and Violence	800-999	21	39	27	10	13	20	20	14	16	11	10
Residual		21	22	33	25	21	68	97	97	80	83	50
All Causes		66	121	131	142	155	429	789	767	707	528	375

TABLE A 5.4

PERCENTAGE DISTRIBUTIONS OF DEATHS AMONG MALE RESPONDENTS BY CAUSE OF DEATH WITHIN AGE GROUPS

Cause of Death	I.S.C. Code Number	Age Groups at Time of Survey										
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Cancer of Pancreas	157	0	0	0.3	1.5	0.7	1.2	0.9	0.9	1.5	0.3	0.9
Lung Cancer	162,163	1.6	3.1	2.0	4.8	5.0	7.9	6.8	6.6	4.4	3.9	2.7
Genito-Urinary Cancer	170-181	0	0.9	0.3	1.5	1.5	1.8	2.3	3.4	4.0	3.4	2.2
All Other Cancers		8.5	8.9	10.2	9.0	7.0	10.1	10.8	11.2	8.6	9.7	8.2
Vascular Lesions	330-334	5.4	5.4	5.5	5.4	7.7	7.4	6.6	9.5	10.7	9.2	10.4
Coronary Heart Disease	420.1	14.0	30.4	33.1	39.7	39.2	39.7	37.4	33.0	29.2	25.4	19.1
Other Heart and Circulatory Diseases	400-468 Less 420.1	7.8	7.6	7.5	12.2	12.2	11.6	14.7	15.5	20.5	23.2	24.2
Pneumonia and Influenza	480-493	1.6	1.3	2.7	2.1	2.2	2.5	3.1	3.9	5.6	9.1	9.6
Bronchitis	500-502	0	0.4	0.3	0.6	1.0	1.4	1.6	2.5	2.0	1.6	0.8
Emphysema	527.1	0.8	0	0	0.3	1.0	1.3	1.1	1.1	0.8	0.8	0.9
Accidents, Poisonings and Violence	800-999	34.9	19.2	16.0	9.0	6.7	4.7	3.5	2.2	2.5	1.9	1.4
Residual		25.6	22.8	21.8	14.0	15.7	10.4	11.2	10.2	10.2	11.5	19.4
All Causes		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE A 5.5

PERCENTAGE DISTRIBUTIONS OF DEATHS AMONG MALE NON-RESPONDENTS BY CAUSE OF DEATH WITHIN AGE GROUPS

Cause of Death	I.S.C. Code Number	Age Groups at Time of Survey										
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Cancer of Pancreas	157	0.5	0.7	1.7	0.5	0.9	1.2	1.0	1.9	0.9	1.7	0.3
Lung Cancer	162,163	1.1	0.4	3.5	4.1	8.1	6.8	6.7	5.8	5.6	4.3	0.3
Genito-Urinary Cancer	170-181	0.5	0	1.2	1.3	1.5	2.8	2.7	3.1	2.9	3.3	2.2
All Other Cancers		6.9	9.5	8.5	8.0	8.7	10.7	10.3	11.4	9.5	10.6	5.8
Vascular Lesions	330-334	1.6	6.0	3.5	6.5	6.0	6.4	9.0	8.3	11.3	9.1	16.0
Coronary Heart Disease	420.1	21.3	27.6	35.3	37.0	38.0	35.3	34.1	29.2	26.7	23.1	19.4
Other Heart and Circulatory Diseases	400-468 Less 420.1	8.5	7.4	9.6	11.1	10.7	13.9	15.4	17.4	20.4	20.7	25.5
Pneumonia and Influenza	480-493	3.2	1.8	3.8	2.1	3.8	3.9	3.5	4.7	7.1	8.1	8.9
Bronchitis	500-502	0.5	0	1.2	1.0	0.9	1.6	1.5	2.1	1.9	3.1	0.9
Emphysema	527.1	0	0	0.3	0.8	0.6	0.6	1.0	1.3	1.5	0.6	1.2
Accidents, Poisonings and Violence	800-999	32.4	27.2	15.2	10.6	7.5	4.5	3.5	3.3	0.2	2.6	2.2
Residual		23.4	19.4	16.3	17.1	13.4	12.1	11.4	11.5	12.1	12.8	17.2
All Causes		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE A 5.6

PERCENTAGE DISTRIBUTIONS OF DEATHS AMONG NON-SURVEYED PENSION RECIPIENTS (MALES) WITHIN AGE GROUPS

Cause of Death	I.S.C. Code Number	Age Groups at Time of Survey										
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Cancer of Pancreas	157	1.5	0	0.8	1.4	0	0.7	1.0	1.2	1.4	0.6	0.5
Lung Cancer	162,163	1.5	0.8	7.6	7.0	6.5	8.9	6.8	6.3	4.7	4.2	1.3
Genito-Urinary Cancer	170-181	0	0.8	0	1.4	1.3	1.2	2.7	2.6	3.4	2.3	3.2
All Other Cancers		13.6	11.6	9.9	11.3	11.0	10.3	9.7	8.1	10.0	8.7	5.6
Vascular Lesions	330-334	0	1.7	3.8	7.0	5.8	6.8	9.3	11.2	12.2	11.0	9.9
Coronary Heart Disease	420.1	10.6	19.0	26.0	31.0	39.4	31.5	29.9	29.7	23.3	21.2	14.7
Other Heart and Circulatory Diseases	400-468 Less 420.1	9.1	14.9	6.9	11.3	10.3	11.4	19.0	16.6	17.8	20.5	28.6
Pneumonia and Influenza	480-493	0	0.8	3.8	2.8	2.6	6.1	3.7	5.5	10.3	10.6	17.3
Bronchitis	500-502	0	0	0.8	2.1	0	2.3	2.3	3.4	2.4	1.9	2.9
Emphysema	527.1	0	0	0.8	0	1.3	0.5	0.8	1.0	0.8	1.3	-
Accidents, Poisonings and Violence	800-999	31.8	32.2	20.6	7.0	8.4	4.7	2.5	1.8	2.3	2.1	2.7
Residual		31.8	18.2	25.2	17.6	13.5	15.9	12.3	12.6	11.3	15.7	13.3
All Causes		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE A 5.7

DEATHS* FROM SELECTED CAUSES OF MALES IN CANADA AGED 35-79 BY FIVE YEAR AGE GROUPS IN 1959

Cause of Death	I.C.S. Code Number	Male Deaths in Canada in 1959 by Age Group									
		35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Total
All Causes		1331	1927	2886	3984	5401	6704	8538	10724	10595	52,090
Lung Cancer	162,163	18	39	119	211	280	370	377	350	201	1,965
Total Neoplasms Less Lung Cancer	140-239 Less 162,163	134	248	363	520	814	1099	1351	1625	1505	7,659
Vascular Lesions	330-334	33	84	127	225	354	530	838	1302	1575	5,068
Coronary Heart Disease△	420.1	249	529	976	1387	1886	2208	2682	2982	2507	15,406
Other Heart and Circulatory Diseases	400-468 Less 420.1	98	172	318	465	699	1036	1482	2266	2522	9,058
Pneumonia and Influenza	480-493	31	47	57	88	122	153	241	400	499	1,638
Bronchitis	500-502	3	9	13	24	49	77	82	94	97	448
Accidents	800-999	486	480	463	432	421	345	306	287	273	3,493

* Source: "Vital Statistics" 1959. Dominion Bureau of Statistics Catalogue No. 84-202.

△ Source: Dominion Bureau of Statistics as a special tabulation.

TABLE A 5.8

DEATHS FROM SELECTED CAUSES OF DEATH AMONG MALES IN CANADA AGED 35-79 EXPECTED ON THE BASIS OF THE AGE-SPECIFIC DEATH RATES OF THE MALE RESPONDENTS

Cause of Death	I.S.C. Code Number	EXPECTED Male Deaths in Canada in 1959 by Age Group									
		35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Total
All Causes		1487	1649	2819	4191	5434	6838	7269	8636	7583	45,606
Lung Cancer	162,163	23	52	58	200	271	514	492	472	333	2,415
Total Neoplasms Less Lung Cancer	140-239 Less 162,163	127	162	308	500	501	857	1020	1340	1067	5,882
Vascular Lesions	330-334	81	88	154	225	420	486	478	822	813	3,567
Coronary Heart Disease	420.1	207	501	933	1664	2128	2598	2721	2850	2213	15,815
Other Heart and Circulatory Diseases	400-468 Less 420.1	115	125	212	513	664	757	1067	1336	1552	6,341
Pneumonia and Influenza	480-493	23	22	77	88	122	160	224	335	428	1,479
Bronchitis	500-502	0	7	10	25	54	94	116	214	153	673
Accidents	800-999	519	316	452	375	356	309	257	192	190	2,966

TABLE A 6.1

DEATHS OF MALES WHO NEVER SMOKED AND MALES OF SEVEN TYPES OF LIFETIME SMOKING HISTORIES BY AGE GROUP

Age Group at Time of Survey	Never Smoked	Deaths by Type of Lifetime Smoking Histories						
		Cigarettes Only	Cigarettes plus Cigars	Cigarettes plus Pipe	Cigarettes plus Cigars plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	12	56	14	4	43	0	0	0
35-39	14	88	22	18	81	0	1	0
40-44	18	124	30	16	103	0	1	1
45-49	22	140	23	27	119	1	2	1
50-54	19	187	30	26	137	1	1	1
55-59	54	515	79	104	393	10	15	13
60-64	117	778	114	230	656	20	54	40
65-69	170	689	99	210	592	20	87	66
70-74	179	432	58	158	397	13	109	90
75-79	120	214	32	89	216	12	146	85
80+	128	63	16	47	126	13	154	86
Total	853	3286	517	929	2863	90	570	383

TABLE A 6.2

MALE POPULATIONS AT RISK: NEVER SMOKED AND MALES OF SEVEN TYPES OF LIFETIME SMOKING HISTORIES BY AGE GROUP

Age Group at Time of Survey	Never Smoked	Population by Type of Lifetime Smoking Histories						
		Cigarettes Only	Cigarettes plus Cigars	Cigarettes plus Pipe	Cigarettes plus Cigars plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	739	3185	900	658	3039	61	46	55
35-39	1113	4639	1299	884	4470	59	50	77
40-44	656	3410	714	640	3179	48	37	60
45-49	359	2239	457	472	2101	24	41	39
50-54	249	1851	382	351	1534	21	30	47
55-59	631	3271	661	744	3275	73	137	162
60-64	1067	3791	705	1165	4181	114	402	330
65-69	897	2421	429	753	2698	95	507	348
70-74	668	1195	201	484	1348	58	467	299
75-79	361	436	84	221	566	29	401	237
80+	274	113	31	85	229	30	320	187
Total	7014	26551	5863	6457	26620	612	2438	1841

TABLE A 6.3

DEATH RATES* PER 1,000 MALES WHO NEVER SMOKED AND OF MALES OF SEVEN TYPES OF LIFETIME SMOKING HISTORIES BY AGE GROUP

Age Group at Time of Survey	Never Smoked	Death Rates* per 1,000 Males at Risk by Lifetime Smoking Histories						
		Cigarettes Only	Cigarettes plus Cigars	Cigarettes plus Pipe	Cigarettes plus Cigars plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	16.2	17.6	15.6	6.1	14.1	0.0	0.0	0.0
35-39	12.6	19.0	16.9	20.4	18.1	0.0	20.0	0.0
40-44	27.4	36.4	42.0	25.0	32.4	0.0	27.0	16.7
45-49	61.3	62.5	50.3	57.2	56.6	41.7	48.8	25.6
50-54	76.3	101.0	78.5	74.1	89.3	47.6	33.3	21.3
55-59	85.6	157.4	119.5	139.8	120.0	137.0	109.5	80.2
60-64	109.6	205.2	161.7	197.4	156.9	175.4	134.3	121.2
65-69	189.5	284.6	230.8	278.9	219.4	210.5	171.6	189.7
70-74	268.0	361.5	288.6	326.4	294.5	224.1	233.4	301.0
75-79	332.4	490.8	381.0	402.7	381.6	413.8	364.1	358.6
80+	467.2	557.5	516.1	552.9	550.2	433.3	481.2	459.9

* Over a six year follow-up period.

TABLE A 6.4

EXPECTED* DEATHS OF MALES OF SEVEN TYPES OF LIFETIME SMOKING HISTORIES BY AGE GROUP

Age Group at Time of Survey	Expected* Deaths by Lifetime Smoking Histories						
	Cigarettes Only	Cigarettes plus Cigars	Cigarettes plus Pipe	Cigarettes plus Cigars plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	51.7	14.6	10.7	49.4	1.0	0.8	0.9
35-39	58.4	16.3	11.1	56.2	0.7	0.6	1.0
40-44	93.6	19.6	17.6	87.2	1.3	1.0	1.6
45-49	137.2	28.0	28.9	128.8	1.5	2.5	2.4
50-54	141.2	29.2	26.8	117.0	1.6	2.3	3.6
55-59	279.9	56.6	63.7	280.3	6.2	11.7	13.9
60-64	415.7	77.3	127.7	458.4	12.5	44.1	36.2
65-69	458.8	81.3	142.7	511.3	18.0	96.1	66.0
70-74	320.2	53.9	129.7	361.2	15.5	125.1	80.1
75-79	144.9	27.9	73.5	188.1	9.6	133.3	78.8
80+	52.8	14.5	39.7	107.0	14.0	149.5	87.4
Total	2154.5	419.1	672.0	2345.0	82.1	567.0	371.7

* Based upon the age-specific death rates of male non-smokers.

TABLE A 6.5

DEATHS OF MALES WHO NEVER SMOKED AND MALES OF SEVEN TYPES OF CURRENT SMOKING HABITS BY AGE GROUP

Age Group at Time of Survey	Never Smoked	Deaths by Current Smoking Habit						
		Cigarettes Only	Cigarettes plus Cigars	Cigarettes plus Pipe	Cigarettes plus Cigars plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	12	66	16	3	16	2	0	3
35-39	14	129	18	14	22	3	1	1
40-44	18	168	33	17	29	1	1	3
45-49	22	196	22	21	33	4	4	3
50-54	19	250	30	29	31	2	3	4
55-59	54	680	73	64	73	23	35	14
60-64	117	960	103	152	151	49	77	53
65-69	170	837	95	133	141	35	118	68
70-74	179	540	63	90	77	24	156	84
75-79	120	252	34	57	43	25	162	67
80+	128	75	19	33	30	28	166	65
Total	853	4153	506	613	646	196	723	365

TABLE A 6.6

MALE POPULATIONS AT RISK: NEVER SMOKED AND MALES OF SEVEN TYPES OF CURRENT SMOKING HABITS BY AGE GROUP

Age Group at Time of Survey	Never Smoked	Population by Current Smoking Habit						
		Cigarettes Only	Cigarettes plus Cigars	Cigarettes plus Pipe	Cigarettes plus Cigars plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	739	4,549	852	409	837	161	72	114
35-39	1,113	6,580	1,195	511	1,214	214	137	138
40-44	656	4,708	763	438	795	134	94	116
45-49	359	3,096	496	343	537	82	76	83
50-54	249	2,430	375	277	401	80	75	85
55-59	631	4,176	625	598	767	208	245	244
60-64	1,067	4,659	698	863	1,002	284	599	448
65-69	897	2,908	412	572	669	199	657	392
70-74	668	1,436	197	331	314	108	592	291
75-79	361	524	85	146	135	68	452	200
80+	274	133	35	63	54	56	320	142
Total	7,014	35,199	5,733	4,551	6,725	1,594	3,319	2,253

TABLE A 6.7

DEATH RATES* PER 1,000 MALES WHO NEVER SMOKED AND MALES OF SEVEN TYPES OF CURRENT SMOKING HABITS BY AGE GROUP

Age Group at Time of Survey	Never Smoked	Death Rates* per 1,000 Males at Risk by Current Smoking Habit						
		Cigarettes Only	Cigarettes plus Cigars	Cigarettes plus Pipe	Cigarettes plus Cigars plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	16.2	14.5	18.8	7.3	19.1	12.4	0.0	26.3
35-39	12.6	19.6	15.1	27.4	18.1	14.0	7.3	7.2
40-44	27.4	35.7	43.2	38.8	36.5	7.5	10.6	25.9
45-49	61.3	63.3	44.4	61.2	61.5	48.8	52.6	36.1
50-54	76.3	102.9	80.0	104.7	77.3	25.0	40.0	47.1
55-59	85.6	162.8	116.8	107.0	95.2	110.6	142.9	57.4
60-64	109.6	206.1	147.6	176.1	150.7	172.5	128.5	118.3
65-69	189.5	287.8	230.6	232.5	210.8	175.9	179.6	173.5
70-74	268.0	376.0	319.8	271.9	245.2	222.2	263.5	288.7
75-79	332.4	480.9	400.0	390.4	318.5	367.6	358.4	335.0
80+	467.2	563.9	542.9	523.8	555.6	500.0	518.8	457.7

* Over a six year follow-up period.

TABLE A 6.8

EXPECTED* DEATHS OF MALES OF SEVEN TYPES OF CURRENT SMOKING HABITS BY AGE GROUP

Age Group at Time of Survey	Expected* Deaths by Current Smoking Habits						
	Cigarettes Only	Cigarettes plus Cigars	Cigarettes plus Pipe	Cigarettes plus Cigars plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	73.9	13.8	6.6	13.6	2.6	1.2	1.9
35-39	82.8	15.0	6.4	15.3	2.7	1.7	1.7
40-44	129.2	20.9	12.0	21.8	3.7	2.6	3.2
45-49	189.7	30.4	21.0	32.9	5.0	4.7	5.1
50-54	185.4	28.6	21.1	30.6	6.1	5.7	6.5
55-59	357.4	53.5	51.2	65.6	17.8	21.0	20.9
60-64	510.9	76.5	94.6	109.9	31.1	65.7	49.1
65-69	551.1	78.1	108.4	126.8	37.7	124.5	74.3
70-74	384.8	52.8	88.7	84.1	28.9	158.6	78.0
75-79	174.2	28.3	48.5	44.9	22.6	150.2	66.5
80+	62.1	16.4	29.4	25.2	26.2	149.5	66.3
Total	2701.5	414.3	487.9	570.7	184.4	685.4	373.5

* Based upon the age-specific death rates of male non-smokers.

TABLE A 6.9

DEATHS OF MALES WHO NEVER SMOKED AND MALES OF SEVEN TYPES OF LIFETIME SMOKING HISTORIES BUT WHO WERE NON-SMOKERS AT THE TIME OF SURVEY BY AGE GROUP

Age Group at Time of Survey	Never Smoked	Deaths: Current Non-Smokers by Lifetime Smoking History				
		Cigarettes Only	Cigarettes[A] plus Cigars plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	12	7	4	0	0	0
35-39	14	12	9	0	1	0
40-44	18	11	12	0	0	0
45-49	22	13	17	0	0	0
50-54	19	19	15	0	0	0
55-59	54	58	100	2	2	4
60-64	117	124	203	4	5	8
65-69	170	102	190	7	19	8
70-74	179	78	116	2	12	11
75-79	120	37	74	4	21	13
80+	128	17	35	2	25	9
Total	853	478	775	21	85	53

[A] Includes Cigarettes plus Cigars, Cigarettes plus Pipe and Cigarettes plus Cigars plus Pipe.

TABLE A 6.10

MALE POPULATIONS AT RISK: NEVER SMOKED AND MALES OF SEVEN TYPES OF LIFETIME SMOKING HISTORIES BUT WHO WERE NON-SMOKERS AT THE TIME OF SURVEY BY AGE GROUP

Age Group at Time of Survey	Never Smoked	Population: Current Non-Smokers by Lifetime Smoking History				
		Cigarettes Only	Cigarettes plus Cigars[A] plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	739	361	540	15	22	11
35-39	1,113	582	861	12	16	13
40-44	656	406	615	7	6	3
45-49	359	241	398	4	9	6
50-54	249	183	297	5	1	3
55-59	631	469	924	19	17	22
60-64	1,067	653	1,336	28	60	38
65-69	897	418	844	22	84	48
70-74	668	237	431	13	56	37
75-79	361	81	184	4	57	29
80+	274	35	62	7	61	22
Total	7,014	3,666	6,492	136	389	232

[A] Includes Cigarettes plus Cigars, Cigarettes plus Pipe and plus Cigarettes plus Cigars plus Pipe.

TABLE A 6.11

DEATH RATES* PER 1,000 MALES WHO NEVER SMOKED AND OF MALES OF SEVEN TYPES OF LIFETIME SMOKING HISTORIES BUT WHO WERE NON-SMOKERS AT THE TIME OF SURVEY BY AGE GROUP

Age Group at Time of Survey	Never Smoked	Death Rates* per 1,000: Current Non-Smokers by Lifetime Smoking History				
		Cigarettes Only	Cigarettes plus Cigars$^{\Delta}$ plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	16.2	19.4	7.4	-	-	-
35-39	12.6	20.6	10.5	-	62.5	-
40-44	27.4	27.1	19.5	-	-	-
45-49	61.3	53.9	42.7	-	-	-
50-54	76.3	103.8	50.5	-	-	-
55-59	85.6	123.7	108.2	105.3	117.6	181.8
60-64	109.6	189.9	151.9	142.9	83.3	210.5
65-69	189.5	244.0	225.1	318.2	226.2	166.7
70-74	268.0	329.1	269.1	153.8	214.3	297.3
75-79	332.4	456.8	402.2	1,000.0	368.4	448.3
80+	467.2	485.7	564.5	285.7	409.8	409.1

$^{\Delta}$ Includes Cigarettes and Cigars, Cigarettes plus Pipe, and Cigarettes plus Cigars plus Pipe.

* Over a six year follow-up period.

TABLE A 6.12

EXPECTED*DEATHS OF MALES OF SEVEN TYPES OF LIFETIME SMOKING HISTORIES BUT WHO WERE NON-SMOKERS AT THE TIME OF THE SURVEY BY AGE GROUPS

Age Group at Time of Survey	Expected*Deaths: Current Non-Smokers by Lifetime Smoking History				
	Cigarettes Only	Cigarettes Cigars$^{\Delta}$ plus Pipe	Cigars Only	Pipe Only	Cigars plus Pipe
30-34	5.9	8.8	0.2	0.4	0.2
35-39	7.3	10.8	0.2	0.2	0.2
40-44	11.1	16.9	0.2	0.2	0.1
45-49	14.8	24.4	0.2	0.6	0.4
50-54	14.0	22.7	0.4	0.1	0.2
55-59	40.1	79.1	1.6	1.5	1.9
60-64	71.6	146.5	3.1	6.6	4.2
65-69	79.2	160.0	4.2	15.9	9.1
70-74	63.5	115.5	3.5	15.0	9.9
75-79	26.9	61.2	1.3	18.9	9.6
80+	16.4	29.0	3.3	28.5	10.3
Total	350.8	674.9	18.2	87.9	46.1

$^{\Delta}$ Includes Cigarettes plus Cigars, Cigarettes plus Pipe, and Cigarettes plus Cigars plus Pipe.

* Based upon the age-specific death rates of male non-smokers.

TABLE A 7.1

DEATHS OF MALES HAVING A LIFETIME HISTORY OF HAVING SMOKED CIGARETTES ONLY
BY INTENSITY OF SMOKING AND AGE GROUP

Age Group at Time of Survey	Deaths of Males Having a Lifetime History of Having Smoked Cigarettes Only by Intensity of Smoking		
	Less than 10 per day	10-20 per day	More than 20 per day
30-34	6	38	11
35-39	18	51	15
40-44	18	74	30
45-49	19	86	34
50-54	35	108	42
55-59	90	290	122
60-64	183	451	131
65-69	234	355	84
70-74	190	189	46
75-79	105	83	21
80+	31	23	5
Total	929	1,748	541

TABLE A 7.2

MALE POPULATIONS AT RISK: MALES HAVING A LIFETIME HISTORY OF HAVING SMOKED CIGARETTES ONLY BY INTENSITY OF SMOKING AND AGE GROUP

Age Group at Time of Survey	Male Populations at Risk: Males Having a Lifetime History of Having Smoked Cigarettes Only by Intensity of Smoking		
	Less than 10 Cigarettes per day	10-20 Cigarettes per day	More than 20 Cigarettes per day
30-34	537	1,923	675
35-39	830	2,803	942
40-44	610	1,993	763
45-49	394	1,310	503
50-54	353	1,088	391
55-59	737	1,842	626
60-64	1,075	2,045	585
65-69	843	1,221	298
70-74	506	539	120
75-79	209	176	41
80+	57	39	8
Total	6,151	14,979	4,952

TABLE A 7.3

EXPECTED* DEATHS OF MALES HAVING A LIFETIME HISTORY OF HAVING SMOKED CIGARETTES ONLY BY INTENSITY OF SMOKING AND AGE GROUP

Age Group at Time of Survey	Expected* Deaths of Males Having a Lifetime History of Having Smoked Cigarettes Only by Intensity of Smoking		
	Less than 10 Cigarettes per day	10-20 Cigarettes per day	More than 20 Cigarettes per day
30-34	8.72	31.23	10.96
35-39	10.44	35.26	11.85
40-44	16.74	54.69	20.94
45-49	24.14	80.28	30.82
50-54	26.93	83.01	29.83
55-59	63.07	157.63	53.57
60-64	117.87	224.23	64.15
65-69	159.77	231.40	56.48
70-74	135.59	144.43	32.16
75-79	69.47	58.50	13.63
80+	26.63	18.22	3.74
Total	659.37	1,118.88	328.13

* Based on age-specific death rates of non-smokers.

TABLE A 7.4

DEATHS* PER 1,000 MALES HAVING A LIFETIME HISTORY OF HAVING SMOKED CIGARETTES ONLY BY INTENSITY OF SMOKING AND AGE GROUP

Age Group at Time of Survey	Deaths* per 1,000 Males Having a Lifetime History of Having Smoked Cigarettes Only by Intensity of Smoking		
	Less than 10 Cigarettes per day	10-20 Cigarettes per day	More than 20 Cigarettes per day
30-34	11.17	19.76	16.30
35-39	21.69	18.19	15.92
40-44	29.51	37.13	39.32
45-49	48.22	65.65	67.59
50-54	99.15	99.26	107.42
55-59	122.12	157.44	194.89
60-64	170.23	220.54	223.93
65-69	277.58	290.75	281.88
70-74	375.49	350.65	383.33
75-79	502.39	471.59	512.20
80+	543.86	589.74	625.00
Overall	151.01	116.70	109.25

* Over a six year follow-up period.

TABLE A 7.5

DEATHS OF MALES WHO CURRENTLY SMOKED CIGARETTES ONLY
BY INTENSITY OF SMOKING AND AGE GROUP

Age Group at Time of Survey	Deaths of Males Who Currently Smoked Cigarettes Only by Intensity of Smoking		
	Less than 10 Cigarettes per day	10-20 Cigarettes per day	More than 20 Cigarettes per day
30-34	6	41	18
35-39	18	83	28
40-44	17	95	56
45-49	23	117	56
50-54	41	149	60
55-59	102	408	168
60-64	199	576	184
65-69	251	471	113
70-74	210	265	64
75-79	106	120	26
80+	30	32	11
Total	1,003	2,357	784

TABLE A 7.6

MALE POPULATIONS AT RISK: MALES WHO CURRENTLY SMOKED CIGARETTES ONLY
BY INTENSITY OF SMOKING AND AGE GROUP

Age Group at Time of Survey	Populations at Risk: Males Who Currently Smoked Cigarettes Only by Intensity of Smoking		
	Less than 10 Cigarettes per day	10-20 Cigarettes per day	More than 20 Cigarettes per day
30-34	599	2,857	1,087
35-39	904	4,077	1,592
40-44	651	2,828	1,227
45-49	434	1,825	834
50-54	402	1,431	596
55-59	781	2,459	929
60-64	1,104	2,702	853
65-69	916	1,608	376
70-74	529	747	159
75-79	220	248	56
80+	60	56	15
Total	6,600	20,838	7,724

TABLE A 7.7

DEATHS PER 1,000 MALES WHO CURRENTLY SMOKED CIGARETTES ONLY
BY INTENSITY OF SMOKING AND AGE GROUP

Age Group at Time of Survey	Deaths per 1,000 Males Who Currently Smoked Cigarettes Only by Intensity of Smoking		
	Less than 10 Cigarettes per day	10-20 Cigarettes per day	More than 20 Cigarettes per day
30-34	10.0	14.4	16.6
35-39	19.9	20.4	17.6
40-44	26.1	33.6	45.6
45-49	53.0	64.1	67.2
50-54	102.0	104.1	100.7
55-59	130.6	165.9	180.8
60-64	180.2	213.2	215.7
65-69	274.0	292.9	300.5
70-74	397.0	354.8	402.5
75-79	481.8	483.9	464.3
80+	500.0	571.4	733.3

N.B. See Table A 6.3 for deaths per 1,000 non-smokers by age group.

TABLE A 7.8

EXPECTED* DEATHS OF MALES WHO CURRENTLY SMOKED CIGARETTES ONLY
BY INTENSITY OF SMOKING AND AGE GROUP

Age Group at Time of Survey	Expected* Deaths of Males Who Currently Smoked Cigarettes Only by Intensity of Smoking		
	Less than 10 Cigarettes per day	10-20 Cigarettes per day	More than 20 Cigarettes per day
30-34	9.73	46.40	17.65
35-39	11.37	51.29	20.03
40-44	17.86	77.60	33.67
45-49	26.60	111.84	51.11
50-54	30.67	109.18	45.48
55-59	66.83	210.44	79.50
60-64	121.05	296.27	93.53
65-69	173.60	304.75	71.26
70-74	141.75	200.17	42.61
75-79	73.13	82.44	18.62
80+	28.03	26.16	7.01
Total	700.62	1,516.54	480.47

* Based upon the age-specific death rates of non-smokers.

TABLE A 8.1

DEATHS BY CAUSE OF DEATH OF MALES WHO NEVER SMOKED BY AGE GROUP AT TIME OF SURVEY

Cause of Death	I.S.C. Code Number	Deaths of Males Who Never Smoked by Age Group at Time of Survey										
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Cancer of Pancreas	157	0	0	1	0	0	0	1	0	1	0	1
Lung Cancer	162,163	1	0	0	0	0	0	1	2	2	0	1
Genito-Urinary Cancers	170-181	0	0	0	0	0	1	4	9	6	3	3
All Other Cancers		1	2	2	3	2	3	13	20	18	10	10
Vascular Lesions	330-334	2	1	2	3	3	3	7	23	34	18	13
Coronary Heart Disease	420.1	1	2	4	10	6	21	43	60	40	33	28
Other Heart and Circulatory Diseases	400-468 Less 420.1	0	0	1	2	1	12	15	21	29	26	26
Pneumonia and Influenza	480-493	0	2	1	0	0	1	4	9	17	13	15
Bronchitis	500-502	0	0	0	0	0	0	0	1	1	1	0
Emphysema	527.1	0	0	0	0	0	0	1	0	0	1	1
Accidents, Poisonings, Violence	800-999	5	3	3	2	1	2	2	6	6	5	0
Residual		2	4	4	2	6	11	26	19	25	10	30
Total		12	14	18	22	19	54	117	170	179	120	128

TABLE A 8.2

DEATHS BY CAUSE OF DEATH OF MALES WHO AT THE TIME OF SURVEY CURRENTLY SMOKED CIGARETTES ONLY, LESS THAN 10 PER DAY, BY AGE GROUP

Cause of Death	I.S.C. Code Number	Deaths of Males Who at the Time of Survey Currently Smoked Cigarettes Only, Less Than 10 per Day, by Age Group										
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Cancer of Pancreas	157	0	0	0	0	0	2	0	1	1	0	1
Lung Cancer	162,163	0	1	0	1	1	6	14	12	13	7	2
Genito-Urinary Cancers	170-181	0	0	0	0	2	3	8	8	3	4	1
All Other Cancers		0	1	2	5	4	10	19	17	9	6	4
Vascular Lesions	330-334	0	0	1	2	1	5	9	15	15	9	3
Coronary Heart Disease	420.1	1	3	6	8	15	40	77	88	64	28	7
Other Heart and Circulatory Diseases	400-468 Less 420.1	0	1	1	1	8	16	34	41	59	26	8
Pneumonia and Influenza	480-493	0	0	0	0	0	5	6	13	14	9	1
Bronchitis	500-502	0	0	0	0	1	1	2	4	4	5	0
Emphysema	527.1	0	0	0	0	0	0	1	4	2	2	0
Accidents, Poisonings, Violence	800-999	3	4	5	1	3	2	9	5	4	0	0
Residual		2	8	2	5	6	12	20	43	22	10	3
Total		6	18	17	23	41	102	199	251	210	106	30

TABLE A 8.3

DEATHS BY CAUSE OF DEATH OF MALES WHO AT THE TIME OF SURVEY CURRENTLY SMOKED CIGARETTES ONLY, 10-20 PER DAY, BY AGE GROUP

Cause of Death	I.S.C. Code Number	Deaths of Males Who at the Time of Survey Currently Smoked Cigarettes Only, 10-20 per Day, by Age Group										
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Cancer of Pancreas	157	0	0	0	2	1	5	1	4	2	1	0
Lung Cancer	162,163	1	4	4	7	13	47	56	49	14	5	4
Genito-Urinary Cancers	170-181	0	1	1	1	4	9	8	12	14	6	1
All Other Cancers		1	4	8	9	3	36	54	36	17	13	2
Vascular Lesions	330-334	3	6	5	4	10	36	35	48	19	7	2
Coronary Heart Disease	420.1	8	30	30	47	58	153	204	142	67	20	7
Other Heart and Circulatory Disease	400-468 Less 420.1	4	7	10	12	23	41	88	90	61	36	6
Pneumonia and Influenza	480-493	2	1	2	3	4	9	27	21	17	6	3
Bronchitis	500-502	0	0	0	0	3	8	12	13	10	2	1
Emphysema	527.1	0	0	0	1	0	4	6	5	3	1	1
Accidents, Poisonings, Violence	800-999	13	12	15	15	8	20	16	9	5	3	0
Residual		9	18	20	16	22	40	69	42	36	20	5
Total		41	83	95	117	149	408	576	471	265	120	32

TABLE A 8.4

DEATHS BY CAUSE OF DEATH OF MALES WHO AT THE TIME OF SURVEY CURRENTLY SMOKED CIGARETTES ONLY, MORE THAN 20 PER DAY, BY AGE GROUP

Cause of Death	I.S.C. Code Number	Deaths of Males Who at the Time of Survey Currently Smoked Cigarettes Only, More Than 20 per Day, by Age Group										
		30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Cancer of Pancreas	157	0	0	0	0	1	2	1	1	2	0	0
Lung Cancer	162,163	0	1	0	5	2	13	20	9	7	6	0
Genito-Urinary Cancers	170-181	0	0	0	0	0	2	6	2	5	0	0
All Other Cancers		1	3	2	1	2	26	19	14	6	2	1
Vascular Lesions	330-334	0	0	0	1	4	11	14	7	6	2	0
Coronary Heart Disease	420.1	3	10	25	27	25	62	65	32	17	5	6
Other Heart and Circulatory Diseases	400-468 Less 420.1	0	1	3	8	6	14	26	17	12	6	4
Pneumonia and Influenza	480-493	0	0	3	1	2	2	5	7	2	1	0
Bronchitis	500-502	0	0	0	0	0	3	3	5	1	0	0
Emphysema	527.1	0	0	0	0	0	3	1	2	1	0	0
Accidents, Poisonings, Violence	800-999	7	10	7	3	7	13	7	2	2	1	0
Residual		7	3	16	10	11	17	17	15	3	3	0
Total		18	28	56	56	60	168	184	113	64	26	11

SUPPLEMENTARY INFORMATION CONCERNING MALE NON-SMOKERS WHO DIED FROM LUNG CANCER

Case No.	Age as of April 1, 1956	Age at Death	Occupation	Residence	Cause of Death	I.S.C. No.
1.	34	38	Office clerk 8 yr. Electrician 2 "	City 17 yr. Town 2 " In the country 15 "	Cancer of the lung	(163)
2.	62	66	Labourer N.K.	City 35 yr. Town 12 " In the country 15 "	Cancer of the lung	(163)
3.	65	68	Carpenter 35 yr. Farming 10 " War Service 3 "	City 42 yr. In the country 20 "	Bronchogenic carcinoma	(162.1)
4.	69	70	Painting N.K. Navy 7 yr. Army 3 "	City 26 yr. Town 36 " In the country rest of life	Bronchogenic carcinoma with Brain metastases	(162.9)
5.	70	75	Clergyman 42 yr. Student 15 " Active Service 9½ "	City 5 yr. Town 50 " In the country 5 "	Carcinoma of the lung	(163)
6.	70	76	Ranching 15 yr. Clay Products 10 " Janitor 12 " War Service 5 "	City 20 yr. In the country 15 "	Bronchogenic carcinoma	(162.1)
7.	80	82	Building construction 59 yr. War Service 3½ "	City Lifetime	Bronchogenic carcinoma	(162.1)

APPENDIX A 8.5 (Continued)

Detailed Clinical Histories of Males with a History of Never Having Smoked Who Died of Lung Cancer

Case No. 1 - Age 34

Bricklayer while in army. (42 mos.)
Sub-acute bronchitis (10% pension in 1956 it was a pre-enlistment condition, aggravated 3/5 while in army joined 1940.)

9/6/55 chest X-ray report shows emphysematous tendencies, but, no definite lesions however was demonstrable. 1958 a chest X-ray showed opacity measuring about 3.5 x 2.5 cms.

A very close inspection of the 1955 film suggests a small soft tissue opacity was present in the same region. The probable diagnosis in this case is a tuberculoma. Bronchoscopic aspirations (pathology reports) Actinomyces bovis granule in sputum.

30.9.58 - Tissue aspiration - left upper lobe. Diagnosis - Negative for malignant tumor cells.

24.4.59 - Aspirated pleural fluid. Diagnosis - Marked pleural exudate showing marked mesothelial proliferation.

5.6.59 - Thoractomy - Condition inoperable Pathological Diagnosis - Actinomycosis of lung pension 100% for that condition.

7.12.59 - Final Diagnosis - Undifferentiated Carcinoma of the lung diagnosed from pleural biopsy which was positive for malignant cells and which was originally thought to be actinomyces, and treated accordingly.

Pathological report - Bronchogenic cancer with multiple metastases. Cancer spread from one lung to the other. (liver etc. miliary.)

No autopsy.

Case No. 2 - Age 62

No pulmonary condition.

Never hospitalized.

Did not die in Canada - given cause of death - cancer unspecified. No Clinical information on file.

Case No. 3 - Age 65

No pension for lung condition at anytime but pensioned for other unrelated causes. Did not receive treatment for his Bronchogenic carcinoma.

Died at home of what death certificate calls Bronchogenic carcinoma.

No autopsy - not pathologically proven on file.

Case No. 4 - Age 69

1945 - pneumonia, chronic cough and mild emphysema.

1947-48 - hemoptysis - pensioned for chronic bronchitis since W.W. 2. Slight loss in weight over period of some years - S.O.B.

Oct. 1954 - Routine chest x-ray - Density in right costophrenic angle - suggestive of Bronchogenic cancer, negative results from Bronchoscopic examination-sputum tests negative.

Feb. 17, 1956 - Wedge resection right upper lobe - specimen proved to be Tuberculoma with some neoplastic tissue.

Bronchogenic Carcinoma with cerebral metastases pathologically confirmed.

No autopsy.

Case No. 5 - Age 70

Pensioned for hypertension in 1946 which was a pre-enlistment condition aggravated during service.

Died suddenly at home, from cancer. Not confirmed on head office files, but stated on Death Certificate as Cancer of lung of one year duration.

No mention at any time of pulmonary pathology.

Case No. 6 - Age 70

No chest condition - no pension.

Hospitalized May 1961 - when he developed a cough and left upper chest pain. An investigation by x-ray showed suggestive left lung lesion. He was then investigated at a Cancer Clinic for evaluation - Patient denies any previous pulmonary pathology except traumatic fracture of ribs during W.W.I.

A left pneumonectomy performed in September 1961. Pathological report shows a squamous cell Bronchogenic cancer was diagnosed. 9 days postoperative the patient died from a pulmonary embolus.

Death Certificate - Massive pulmonary embolus postoperative.

Case No. 7 - Age 80

Pensioned for Bronchitis with cardiac hypertrophy in 1918. This was a pre-enlistment condition with 50% aggravation.

By Aug. 1952 the condition had progressed to a Bronchiectasis. He was treated several times for acute exacerbation of Chronic Bronchitis with emphysema between 1952-57. By July 1957 had had several hemoptysis.

December 28, 1957 was admitted to hospital with complaints of anorexia, weight loss, nausea and vomiting. Chest x-ray at the time showed signs of chronic pulmonary infection, but, a blood picture and sternal marrow suggested myeloma.

TABLE A 11.1

MALE POPULATIONS AT RISK: LIFETIME NON-SMOKERS AND CURRENT SMOKERS OF CIGARETTES ONLY OF THREE INTENSITIES AGES 30 - 64 COMBINED

Occupation	Code No.	Male Populations at Risk by Smoking Category Ages 30 - 64			
		Never Smoked	Currently Smoke Cigarettes Only		
			Less than 10 per day	10-20 per day	More than 20 per day
Managerial	001-059	185	124	583	298
Professional	060-099	427	197	848	484
Clerical	110-119	801	564	3158	1407
Office Clerks	(115)	706	499	2815	1276
Transportation and Communication	201-251 261-299	338	466	1807	664
Taxi, Bus and Truck Drivers	(213-217) (247-249)	160	254	958	371
Commercial and Financial	301-349 362-369	282	230	1128	627
Salesman	(336)	210	166	820	452
Service	402-499	311	355	1349	579
Agricultural	500-509	816	769	1961	600
Farmers	(500)	756	701	1801	523
Fishing, Trapping and Logging	550-568	117	200	459	166
Mining	601-619	54	149	395	148
Miners	(607)	49	140	363	142
Manufacturing and Mechanical	700-889	656	725	2977	935
Food Products	(701-709)	55	60	224	71
Wood Products	(790-799)	37	44	154	45
Machinists and Mechanics	(835-841)	300	304	1429	427
Stationary Engineers	890-899	59	42	224	78
Construction	910-939	297	392	1462	542
Carpenters	(915)	105	137	409	135
Painters	(927)	35	89	308	104
Labourers	950	286	583	1574	504
Not Stated or No Occupation of 3 years Duration	960+970	185	79	254	86
All Occupations		4,814	4,875	18,179	7,118

TABLE A 12.1

MALE POPULATIONS AT RISK AND DEATHS BY THE CRITERION OF HAVING OR NOT HAVING LIVED FIVE YEARS IN A CITY,* OF LIFETIME NON-SMOKERS AND MALES WHO, AT THE TIME OF SURVEY, SMOKED CIGARETTES ONLY BY AGE GROUP

Age Group at Time of Survey	Less than Five Years City* Residence								Five or More Years City* Residence							
	Lifetime Non-Smokers		Current Cigarette Smokers by Intensity						Lifetime Non-Smokers		Current Cigarette Smokers by Intensity					
			Less than 10 per day		10-20 per day		More than 20 per day				Less than 10 per day		10-20 per day		More than 20 per day	
	Pop'n	Deaths	Pop'n	Deaths	Pop'n	Deaths	Pop'n	Deaths	Pop'n	Deaths	Pop'n	Deaths	Pop'n	Deaths	Pop'n	Deaths
30 - 34	240	5	286	4	1072	17	349	7	499	7	313	2	1788	24	738	11
35 - 39	434	5	429	7	1591	24	510	4	679	9	485	11	2488	59	1082	24
40 - 44	233	11	302	5	915	29	340	14	413	7	353	12	1921	66	887	42
45 - 49	125	9	202	6	757	30	287	11	235	13	232	17	1070	87	545	45
50 - 54	91	5	145	11	344	36	126	12	158	14	267	30	1087	112	470	48
55 - 59	213	19	238	27	612	86	192	40	418	35	543	75	1847	322	737	128
60 - 64	458	50	369	64	710	137	205	42	609	67	734	135	1986	439	648	142
65 - 69	358	67	268	76	418	121	75	24	538	103	648	175	1190	350	300	89
70 - 74	268	66	133	38	140	48	42	15	400	113	397	172	606	217	115	49
75 - 79	151	43	53	23	55	25	9	4	210	77	173	83	193	95	39	22
80+	128	52	23	7	18	10	5	2	146	76	37	23	38	22	10	9
Total	2699	332	2448	268	6632	563	2140	175	4305	521	4182	735	14214	1793	5571	609

* Community of 20,000 or more persons.

TABLE A 12.2

MALE DEATHS DUE TO LUNG CANCER (I.S.C. NOS. 162 & 163) AMONG LIFETIME NON-SMOKERS AND MALES WHO, AT THE TIME OF SURVEY, SMOKED CIGARETTES ONLY BY AGE GROUP AND BY THE CRITERION OF HAVING OR NOT HAVING LIVED FIVE YEARS IN A CITY*

Age Group at Time of Survey	Male Deaths Due to Lung Cancer (I.S.C. Nos. 162 & 163)							
	Resided in City* for Less than Five Years				Resided in City* for More than Five Years			
	Lifetime Non-Smokers	Currently Smoked Cigarettes Only			Lifetime Non-Smokers	Currently Smoked Cigarettes Only		
		Less than 10 per day	10-20 per day	More than 20 per day		Less than 10 per day	10-20 per day	More than 20 per day
30-34	0	0	0	0	1	0	1	0
35-39	0	0	1	0	0	1	3	1
40-44	0	0	1	0	0	0	3	0
45-49	0	1	1	0	0	0	6	5
50-54	0	0	1	1	0	1	12	1
55-59	0	1	8	2	0	5	39	11
60-64	0	5	12	7	1	9	44	13
65-69	0	1	9	2	2	11	40	7
70-74	0	3	2	-	2	10	12	7
75-79	0	2	0	1	0	5	5	5
80+	0	0	1	0	1	2	3	0
Total	0	13	36	13	7	44	168	50

* Community of 20,000 or more persons.

TABLE A 12.3

DEATH RATES$^{\Delta}$ PER 1,000 MALES DUE TO LUNG CANCER (I.S.C. NOS. 162 & 163) FOR LIFETIME NON-SMOKERS AND MALES WHO, AT THE TIME OF SURVEY, SMOKED CIGARETTES ONLY BY AGE GROUP AND BY THE CRITERION OF HAVING OR NOT HAVING LIVED FIVE YEARS IN A CITY*

Age Group at Time of Survey	Death Rates$^{\Delta}$ per 1,000 Males Due to Lung Cancer (I.S.C. Nos. 162 & 163)							
	Resided in City* for Less than Five Years				Resided in City* for More than Five Years			
	Lifetime Non-Smokers	Currently Smoked Cigarettes Only			Lifetime Non-Smokers	Currently Smoked Cigarettes Only		
		Less than 10 per day	10-20 per day	More than 20 per day		Less than 10 per day	10-20 per day	More than 20 per day
30-34	0.000	0.000	0.000	0.000	2.004	0.000	0.559	0.000
35-39	0.000	0.000	0.629	0.000	0.000	2.062	1.206	0.924
40-44	0.000	0.000	1.093	0.000	0.000	0.000	1.562	0.000
45-49	0.000	4.950	1.321	0.000	0.000	0.000	5.607	9.174
50-54	0.000	0.000	2.907	7.937	0.000	3.745	11.040	2.128
55-59	0.000	4.202	13.072	10.417	0.000	9.208	21.115	14.925
60-64	0.000	13.550	16.901	34.146	1.642	12.262	22.155	20.062
65-69	0.000	3.731	21.531	26.667	3.717	16.975	33.613	23.333
70-74	0.000	22.556	14.286	0.000	5.000	25.189	19.802	60.870
75-79	0.000	37.736	0.000	111.111	0.000	28.902	25.907	128.205
80+	0.000	0.000	55.556	0.000	6.849	54.054	78.947	0.000

* Community of 20,000 or more persons.

$^{\Delta}$ Based on a six year follow-up period.

TABLE A 13.1

POPULATION AT RISK: MALES HAVING A SMOKING HISTORY OF HAVING SMOKED CIGARS ONLY
BY INTENSITY OF SMOKING AND BY AGE GROUP AT TIME OF SURVEY

Age Group at Time of Survey	Population at Risk: Males Having a Smoking History of Having Smoked Cigars Only by Intensity of Smoking			
	Less than 3 Cigars per day	3 - 10 Cigars per day	More than 10 Cigars per day	Total ▲
30-34	45	6	3	61
35-39	35	14	2	59
40-44	29	16	1	48
45-49	14	9	0	24
50-54	10	6	0	21
55-59	45	19	4	73
60-64	80	26	5	114
65-69	61	22	1	95
70-74	47	11	0	58
75-79	22	7	0	29
80+	18	8	1	30
Total	406	144	17	612

▲ Includes males of unspecified smoking intensities.

TABLE A 13.2

POPULATION AT RISK: MALES HAVING A HISTORY OF HAVING SMOKED CIGARS ONLY BUT WHO HAD STOPPED SMOKING AT THE TIME OF SURVEY BY AGE GROUP

Age Group at Time of Survey	Population at Risk: Males Having a History of Having Smoked Cigars Only but Who Have Currently Stopped Smoking
30-34	15
35-39	12
40-44	7
45-49	4
50-54	5
55-59	19
60-64	28
65-69	22
70-74	13
75-79	4
80+	7
Total	136

TABLE A 13.3

POPULATION AT RISK: MALES HAVING A SMOKING HISTORY OF HAVING SMOKED PIPE ONLY
BY INTENSITY OF SMOKING AND BY AGE GROUP AT TIME OF SURVEY

Age Group at Time of Survey	Population at Risk: Males Having a Smoking History of Having Smoked Pipe Only by Intensity of Smoking			
	Less than 10 Pipefuls per day	10 - 20 Pipefuls per day	More than 20 Pipefuls per day	Total ▲
30-34	33	7	1	46
35-39	41	3	2	50
40-44	20	11	4	37
45-49	16	21	3	41
50-54	14	11	4	30
55-59	79	41	13	137
60-64	217	130	41	402
65-69	296	162	36	507
70-74	326	107	24	467
75-79	274	80	31	401
80+	217	74	13	320
Total	1533	647	172	2438

▲ Includes males of unspecified smoking intensities.

TABLE A 13.4

POPULATION AT RISK: MALES HAVING A HISTORY OF HAVING SMOKED PIPES ONLY BUT WHO HAD STOPPED SMOKING AT THE TIME OF SURVEY BY AGE GROUP

Age Group at Time of Survey	Population at Risk: Males Having a History of Having Smoked Pipes Only but Who Had Stopped Smoking at the Time of Survey
30-34	22
35-39	16
40-44	6
45-49	9
50-54	1
55-59	17
60-64	60
65-69	84
70-74	56
75-79	57
80+	61
Total	389

SUPPLEMENTARY INFORMATION CONCERNING FEMALE NON-SMOKERS WHO DIED FROM LUNG CANCER

Age as of April, 1956	Date of Death	Occupation	Residence	Cause of Death (I.S.C. code only)
64	18.7.61	Housewife	City 29 yr. Suburbs of cities 3 " Towns 23 " In the country 9 "	162.1
64	4.4.62	Housewife 27 yr. Restaurant 12 "	Towns 25 yr. In the country 39 "	162.1
60	3.2.59	Housewife	Not given	162.1
69	12.11.57	Housework 55 yr. Midwife 6 " Waitress in hotel 3 "	Suburbs of cities 37 yr. In the country 32 "	162.
65	13.10.56	Housewife 45 yr.	City 65 yr.	163.
67	8.4.62	Housewife 45 yr. Office work 3 "	City 67 yr.	162.1
76	6.12.59	Housewife	City 46 yr.	162.1
80	16.2.61	Nursing 30 yr. Housewife 50 "	City 40 yr. Towns 40 "	162.1