Use of the Canadian Mortality Data Base for Epidemiological Follow-up

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Epidemiological follow-up of large cohorts exposed to potentially harmful agents and circumstances, has been facilitated in Canada by the development of a consolidated file of information on all deaths in the country back to 1950. This Mortality Data Base is designed to be conveniently searched by computer, and to yield both dates and underlying causes of deaths among members of a study population. Current and future major uses are described. Most of the studies relate to groups of persons numbering in the tens to hundreds of thousands. The studies are concerned with the long-term consequences of various occupations, medical treatments and diagnostic procedures, and circumstances of other kinds which may contribute to deaths from cancer, cardiovascular disease and other causes. The industrial groups include uranium miners, nickel workers, hard rock miners, and radiation workers, plus some exposed to asbestos, fibreglass, vinyl chloride and formaldehyde vapour. The medical patients include persons exposed repeatedly to fluoroscopic X-rays, and others treated with a potentially carcinogenic drug, isoniazid. Similar follow-up is planned for participants in a large nutritional survey, and is in progress for large numbers of mothers who had their first offspring at various ages, there being special interest, respectively, in cardiovascular disease and breast cancer. Demands for such uses of the Mortality Data Base have increased rapidly since its establishment and show no sign of diminishing.

The design and functions of a "Mortality Data Base", containing information from all Canadian death registrations back to 1950, have already been described.[1] The value of this facility is best judged in terms of its actual, planned, and proposed uses for following "at risk" groups of various sorts to determine their mortality experience over the years. We describe here the number and nature of such studies, the sizes of the groups under investigation, and the use made of various personal identifiers. Until recently, truly large-scale follow-up of this kind has been virtually impossible except under special circumstances. It is hoped that greater familiarity with what has now become feasible will help to clear the way for needed studies of delayed risk that might otherwise be judged impractical. We will emphasize how the Mortality Data Base has facilitated the conduct of occupational mortality studies in Canada.

The special features of the Canadian Mortality Data Base are that (a) it contains, from each death registration, not only ample personal identifying information, but also the coded cause of death, (b) it exists both as machine-readable magnetic tape for computer searching, and as compact microfiche and microfilm listings for manual searching, and (c) it is sequenced and consolidated (over all Canadian provinces and over spans of years) to facilitate such searching.

Nothing comparable to this facility exists in any other major country. The recently established United States National Death Index, for example, goes back only to 1979; it also lacks the coded cause of death, so that manual-clerical checking of the death registrations forms will be required, normally at the various state registry offices.[4] Although most developed countries use data processing for published death records and annual mortality statistics, the idea of manipulating the data into a consolidated form for epidemiological searching on a national scale is new. Without such consolidation it is difficult or impossible to search for possible death registrations pertaining to persons whose dead-or-alive status is unknown, or for whom the year and

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The opinions expressed are those of the authors and do not necessarily reflect those of Statistics Canada

registration area of the death are unknown. Where the numbers in a study population are large, what is difficult for even the individual case, may become impossible for the group as a whole due to the cost and labour involved.

Follow-up using the Canadian Mortality Data Base is carried out at Statistics Canada, a central statistical agency whose mandate is to compile, analyse and publish statistical information.[5] The work is usually done on a cost-recovery, contract basis. Table I indicates the scale and demand for the work.

Nature of the searching process

The searches are mostly carried out with the records of the Mortality Data Base first split by sex code and then arrayed in a sequence based on the surname, i.e. in order of a phonetically coded form of the name, with finer subdivision on the basis of the full alphabetic spelling followed by the first given name and birth year. The purpose of the phonetic coding of the surname (the "New York State Identification and Intelligence System" known as NYSIIS)[6] is to get around the effects of common spelling variations which could otherwise interfere with finding the relevant death records. Where necessary, comparisons can be made with all death records carrying the same surname code. Decisions concerning acceptable matches, and calculations of the probability that the correct death record has been found, are based on the full identifying information common to the record which initiated the search and the death record with which it is being compared. The personal identifiers provided for on the Mortality Data Base magnetic tapes are indicated in Table II, and those available on the records initiating the searches for the various studies are shown in Table III.

The linkage technique, including the logic and practice of the decision-making procedure and the means by which the degree of assurance of a correct link may be calculated, has been developed over a period of more than two decades to a high degree of sophistication. In practice the computer has been found to be more accurate in linking handicap and death records of children back to the relevant birth registration than clerical staff carrying out the same searches routinely.[7,8] Recently a generalized record linkage system has been developed by Statistics Canada and the Epidemiology Unit of the National Cancer Institute of Canada[9] (NCIC) and is being used to carry out investigations initiated since 1979.

Completed searches

Five major searching operations to obtain Canadian death registration data have been completed.

Infant death-birth linkages, for child-

TABLE II
Personal Identifiers Provided for on the Mortality Data Base Tapes

Identifiers	Number of characters
Relating to the Deceased	
1. Surname (current)	10
2. Given names (first and second)	9 + 7
3. Birth date (year, month, day)	7
4. Birth province or foreign country (coded)	2
5. Sex, marital status, racial origin	4
Relating to the Family	
6. Birth surnames (father, mother, spouse*)	10 + 10 + 10
7. Initials (father, mother, spouse*)	2 + 2 + 2
8. Birth province or foreign country (father, mother)	2 + 2
Relating to the Event	
9. Place of event	10
10. Place of residence (coded)	5
11. Date of death	6

*Items are rarely available

TABLE I
Computer Searches of the "Mortality Data Base"

Study	Number of individuals	Agency
Completed		
1. Infant death-birth linkages (1971 births)	6,000	Statistics Canada
2. Ontario uranium miners	16,000	Ontario Royal Commission
3. Isoniazid and cancer in tuberculosis patients	64,000	National Cancer Institute of Canada
4. Canadian labour force 10% sample	700,000	
5. Fluoroscopy and cancer in tuberculosis patients	100,000	
Current		
6. INCO nickel workers	62,000	McMaster University
7. Falconbridge nickel workers	11,500	
8. Eldorado uranium workers	16,000	Eldorado Nuclear Limited
9. Ontario "nominal rolls" (miners and others)	57,000	Ontario Ministry of Labour and WCB
10. Nutrition Canada survey participants	20,000	Health and Welfare Canada
11. Ontario morticians exposed to formaldehyde	1,500	Chemical Industry Institute of Toxicology
12. CNR railway workers	18,000	National Cancer Institute of Canada
13. Breast cancer and age at first birth	300,000	University of Western Ontario
14. Alberta Cancer Registry death clearance (1953-78)	175,000	Alta Provincial Cancer Hospital Board
15. Ontario Cancer Incidence Reporting System	125,000	Ontario Cancer Treatment and Research Found
16. Newfoundland fluorspar miners	2,000	Atomic Energy Control Board and HWC
Under Negotiation		
17. AECL radiation workers and others	11,000	Atomic Energy of Canada Limited
18. Infant death-birth linkages (annual)	5,000	Health and Welfare Canada (HWC)

TABLE III
Identifiers Available for Linkage With the Death Records

Linkage study	*Personal identifying information used in the linkages* Sur-name(s)	Given name(s)	Birth date	Birth prov/ entry	Resi-dence prov	Mother's maid. name	Parent initials	Parent birth place	Spouse's given names	Soc. Ins. No.	See Foot-notes
1. Infant death — birth (1971)	(two)	•	•	•	-	•	•	•	-	-	a
2. Isoniazid and cancer	•	•	(yr)	(entry)	•	-	-	-	-	-	b
3. Canadian labour force	•	•	•	-	•	•	-	-	-	•	c
4. Fluoroscopy study	•	•	•	•	-	•	•	•	(•)	-	-
5. INCO nickel workers	•	•	•	-	-	-	-	-	-	(•)	d
6. Falconbridge nickel workers	•	•	•	-	-	-	-	-	-	(•)	d
7. Eldorado uranium workers	•	•	•	(•)	-	(•)	(•)	(•)	-	(•)	e
8. Ontario "nominal rolls"	•	•	•	(•)	-	-	-	-	-	(•)	f
9. Nutrition Canada survey	•	•	•	•	(•)	-	-	-	(•)	-	g
10. Ontario morticians	•	•	•	(•)	•	-	-	-	-	-	h
11. CNR railway workers	•	•	•	-	•	-	-	-	-	-	-
12. Breast cancer study	(two)	(init)	(age)	-	•	-	-	-	(init)	-	i
13. Alberta Cancer Registry	•	•	•	-	•	-	-	-		-	j
14. Ont. Cancer Incidence Reporting System	•	•	•	-	•	-	-	-	-	-	j
15. AECL radiation workers	•	•	•	•	•	(•)	(•)	(•)	(•)	•	k
16. Infant death — birth (annual)	(two)	•	•	•	-	•	•	•	-	-	a
17. Fluorspar miners	•	•	(yr)	-	-	-	-	-	-	-	-

Note. Parentheses indicate these identifiers were frequently absent but were used when available to assist in the computer match or for manual resolution of doubtful cases.

General

The success with which the Mortality Data Base may be searched depends upon the amount of personal identifying information common to the death records and the records that initiate the searches. This is true whether the searching is done manually or by computer. Where some of this information may be incorrectly entered into either sort of record, and especially into those that initiate the searchers, a redundancy of identifiers will serve to increase the assurance of a correct link in spite of the discrepancies created by the incorrect information.

a. The two surnames are the birth surnames of the father and mother of the newborn child, as reported on the child's birth registration and subsequently on its death registration

b. The identifiers called for on the tuberculosis admission forms included residence, date of birth, marital status, sex, country of birth, year of arrival in Canada, citizenship, race, occupation and industry.

c. The identifiers on the Social Insurance Number Index tapes include a second given name if there was one, and an alternative surname (e.g. married as distinct from maiden surname) plus the mother's maiden surname.

d. Full first forenames are present on all 73,000 INCO and Falconbridge records, and the Social Insurance Number is on the latter half of the file.

e. About 80 per cent of the records contain at least one given name plus the full birth date. Just over a quarter of these past workers had Social Insurance Numbers. Parentheses indicate other identifiers that are frequently absent but are used when available.

f. The 57,000 searches will be based on names and birth dates. However, the presence of Social Insurance Numbers for 33,000 of the workers will make it technically feasible to test for the increased accuracy of searching when full identifying information is extracted from the S.I.N. index prior to searching.

g. The personal identifiers recorded during the survey should be ample for accurate searching. Moreover, if manual resolution of doubtful linkages is required, involving comparisons with the microfilm images of death registrations, added precision may be gained through use of particulars on the survey forms to do with city or place of birth, exact address if unchanged at the time of death, and the identifiers for parents, spouses and children when entered together on the list of household members.

h. The linking information from 1928 onward consists of the name in full, date of birth and place of employment. From 1938 onward, place of birth is also available, and from 1958 the father's name.

i. Identifiers available on the birth records, with which to search for records of the subsequent deaths of the mothers, include two surnames (married and maiden), initials, province or country in which the mother was born, age at the time of the birth (versus birth date as given on the death record), and place of birth of the child (versus the place of the mother's death).

j. The degree of success in linking the cancer records to the Mortality Data Base depends heavily on the amounts of personal identifying information provided for on, and actually entered into, the provincial cancer registration forms. Although there has been improvement in recent years, Canadian provinces still vary widely in this respect. The full birth date, for example, which is especially important for searching the Mortality Data Base, is present on less than 70 per cent of the 1975 cancer registrations across Canada, although some provinces report it quite consistently. Thus the success rate is likely to be high for some provinces, low for others, and in general better for recent than for earlier years.

k. The required personal identifying information for most past employees may be obtained from application forms for employment, but in recent years such forms have been changed by law to remove questions pertaining to birth date, birth place, the identities of parents, and even sex, as a precaution against discriminatory hiring practices. Thus special action is required to obtain adequate personal identifiers from current employees after they have been hired. This is viewed as an on-going process to include future employees on a continuing basis.

ren born in 1971," were carried out before the Mortality Data Base had been assembled in its present form. In this early study, infant death registrations for 1971 and 1972 were linked to births in 1971. For 96% of the infant deaths, a matching Canadian birth registration was found by computer linkage. Infants who die very shortly after birth commonly lack specific forenames on their birth and or death record, and these account for part of the records which failed to match. The major objective of this investigation was to explore the technical feasibility of carrying out this type of linkage by computer on a national scale. The study conducted in 1975 was successful, and it was then decided to initiate a plan to develop the historical Mortality Data Base file in order to enhance the usefulness of the existing data sources. From the linked death-birth "linkage" file (in conjunction with the stillbirth file for the same year), perinatal and post-perinatal mortality statistics have been extracted, broken down by maternal age, parity,

gestation and birth weight. Such data are unobtainable from the individual files prior to linkage and may be used to derive indicators of inadequate obstetric and pediatric care. The linked files are also useful for monitoring the impact of the maternal (or paternal) environment or occupation on reproductive outcomes, such as fetal and infant deaths, and the births of children with congenital malformations or deviant birth weights.

Isoniazid and cancer in tuberculosis patients has been studied by the Epidemiology Unit of NCIC using records from the Canadian National Tuberculosis Register of admissions to treatment institutions over the years 1952-60. These records have been linked to death registrations in the Canadian Mortality Data Base in the years 1952-73 and to the National Cancer Incidence records for 1969-73. Isoniazid is known to cause lung tumors, leukemias, and lymphomas in mice. In man there were some indications that it might cause bladder and lung cancer[10], although most studies in the past have yielded negative results. There was thus a need to follow a larger treated population, over a longer period, together with a comparable untreated control group. A total of 108,456 records from the Tuberculosis Register yielded personal identifying information and histories of drug treatment (or its absence) for 64,037 individuals of whom 41,226 received isoniazid and 22,811 did not. A search of the Mortality Data Base yielded 12,398 matching death registrations. This is the most advanced of the investigations using that facility, in that the results have been analysed and published.[11] The data are interpreted as constituting a large body of negative evidence with respect to the carcinogenicity of isoniazid in man.

A Canadian labor force 10 per cent sample provided the base for the large study in which the mortality experience of various occupational groups is compared. Unemployment insurance "Book Renewal Cards" for the years 1965-69 and for 1971 were used. These contain coded information on occupation, industry and province of work, together with the individual's surname and Social Insurance (S.I.) Number. Such cards were filled out each year by contributors to unemployment insurance whose S.I. Numbers ended in digit 4; from 1971 onward when white-collar workers joined the scheme, the sample size was reduced to 5 per cent (those with S.I. Numbers in which the digit 4 was preceded by an odd number). Because most death registrations lack the S.I. Numbers, an intermediate step was necessary prior to searching the Mortality Data Base. This consisted of extracting, by computer, from the central index of S.I. Numbers, personal identifiers of the kinds contained in the death records (see Tables II and III). Full details of the procedures to be used in such an investigation had already been published[12] and the actual study was subsequently organized by the National Cancer Institute of Canada in collaboration with Statistics Canada.[13-15] A total of some 3,000,000 Unemployment Insurance records, on magnetic tape, were merged to provide work information for about 700,000 persons. A search of the Mortality Data Base found 30,000 deaths among study group members to the end of 1973, and with subsequent searches this number will, of course, grow. Results from the preliminary analysis indicate elevated risks of cancer and other fatalities in a surprisingly wide range of occupations. The implications of these findings are still unclear.

Fluoroscopy and cancer in tuberculosis patients has been studied, using the Mortality Data Base, to determine the relationship between radiation dose and the magnitude of the subsequent risk of cancer. Of particular interest were cancer of the breast, lung and thyroid, and leukemia. An association between breast cancer and fluoroscopy had already been demonstrated through manual studies of limited size in Nova Scotia and Ontario[16,17] and detailed plans had been proposed for an automated study of a similar nature covering the whole of Canada.[18] The National Cancer Institute of Canada obtained institutional records of patients treated in Canada for tuberculosis during the 1930's to early 1950's when artificial pneumothorax was being practiced and fluoroscopy was used to determine the degree of collapse.[19,20] NCIC has also studied the organ doses that would have been received from the older fluoroscopy machines.[21] Some 137,000 treatment institution records have provided the personal identifying information, and the histories of repeated fluoroscopies, for between 90,000 and 100,000 individual patients. These patient histories have now been linked with the relevant death registrations in the Mortality Data Base, using the identifiers available on the treatment institution records (Table III). In the analysis, information will be sought, not only on the dose-effect relationships, but also the latent periods for cancer induction, and possible changes in sensitivity to the carcinogenic effects of radiation with age. The latter is of special relevance to mammography for which there is believed to be a reduced risk for older women.[22]

Searches in progress

The studies in progress have to do with nickel workers, uranium miners, hardrock miners, an assortment of industrial workers exposed to various hazardous substances, morticians exposed to formaldehyde, railway workers, and participants in a survey of family nutrition in Canada. The effect which the age of a mother at her first birth may have on her subsequent risk of breast cancer is also being investigated. In addition, a number of provinces have expressed a wish to "clear" their cancer register files of records pertaining to deceased registrants, and a pilot study involving the Alberta provincial cancer registry file is being used to test the feasibility of doing this linkage at a national level. The Ontario registry also uses the Mortality Data Base to supplement their incidence data with Ontario cases not previously ascertained from other kinds of records.

Nickel workers in the Sudbury and

Port Colborne area are being followed because of evidence suggesting that the various sulphide forms of nickel are carcinogenic.[23] In Canada the cancer risk from exposures to the atmosphere in sintering plants continued well into the 1950's.[24,25] Since INCO has produced in earlier years up to 75% of the western world's nickel and still accounts for 40%, its potential contribution to the scientific evidence is vast. The initiative for the INCO study came from a joint union-management committee on occupational health set up by INCO Metals Limited and the United Steelworkers of America. In 1976 the Occupational Health Program at McMaster University was commissioned by INCO and the United Steelworkers of America to conduct a mortality study within the company's Ontario operation.[26] Falconbridge Nickel, which likewise operates in the Sudbury area, has initiated a similar study.

The Eldorado uranium workers, who are being followed in a similar fashion, include those employed in mining, milling, the extraction of radium for medical purposes, and the refining of uranium as a nuclear fuel. A nominal roll has been prepared from personnel records, pay records, pension plan forms and medical forms, representing a total of 16,658 employees. The study has been described in some detail by Eldorado Nuclear.[27,28] To ensure that interpretation of the results of the study is conducted independent of the uranium industry, the Epidemiology Unit of NCIC has been asked to do an analysis and to make the findings public.

The Ontario "nominal rolls" of miners and other workers, were developed for a study sponsored jointly by the Ontario Workmen's Compensation Board (WCB) and the Ministry of Labour. Special interest has focused on assessment of the risk of lung cancer in uranium miners. Preliminary investigations had already been carried out using an early version of the Mortality Data Base.[29-31] The present study is more comprehensive and will permit comparisons of uranium miners with other hard-rock miners for whom the radon daughter exposures were much lower, and also with salt miners for whom there was little or no exposure except to diesel fumes.[32,33]

The Nutrition Canada Survey participants comprise some 19,500 Canadians for whom detailed nutritional data were collected in 1970-72, along with information on demographic, social, anthrometric and medical characteristics (e.g. age, sex, income, education, stature, obesity, serum cholesterol, blood pressure). Without knowledge of the subsequent mortality experience of these persons, the implications for health of the various descriptive tabulations that have so far come out of the survey[34,35] would necessarily remain a matter of indirect inference and therefore be less clear.

The Ontario morticians are of interest as a study group because of their exposures to formaldehyde vapour, in concentrations that are believed to average around 0.3 to 1.2 parts per million. Use is to be made of the records of licences issued to Ontario embalmers and funeral directors. A full description of the study has been prepared by R.J. Levine of the Chemical Industrial Institute of Toxicology.[36]

Railway workers are of interest as a study group because of earlier indications that an excess of bladder cancers may possibly occur among them. The present study cohort consists of all of the male Canadian National Railway pensioners in the period 1965 to 1977.

The breast cancer study will compare the ages of women bearing their first children, as indicated on the British Columbia birth registration tapes, with the causes of their eventual deaths.[37] It has been claimed that the breast cancer risk of women, who bear their first child over the age of 35 is three times the risk for women whose first child is born before age 20, but not all investigations support this conclusion. The present study will be based on more than 848,000 British Columbia birth registrations in the years 1950-73.

The Alberta cancer file death clearance, using the Mortality Data Base, was proposed by the Alberta Provincial Cancer Hospital Board. If considered successful, the procedure would almost certainly become routine for the other provincial cancer registers, and for the centralized National Cancer Incidence Reporting System. Such searches serve also to identify additional cases of cancer not previously ascertained from other sources. Statistics Canada for example, could potentially use the Mortality Data Base as a source of information with which to update the Ontario Cancer Incidence file.

Fluorspar mining in St. Lawrence, Newfoundland, was carried out from 1933 to 1978. Excess mortality from lung cancers among the miners, apparent by the late 1950's, was attributed to accumulation of radon and radon daughters in the fluorspar mines,[38] and this led to a Royal Commission study.[39] The data are currently being updated.

Searches currently being negotiated

Studies involving searches of the Mortality Data Base which are currently being negotiated with Statistics Canada, have to do with (a) a follow-up of employees of Atomic Energy of Canada Limited, including radiation

TABLE IV
Ontario "Nominal Roll" Files, Breakdown

Occupation	Number of individuals
1. Uranium miners	16,843
2. Non-uranium miners	33,437
3. Salt miners	750
4. Asbestos workers	4,188
5. Insulation workers (fibreglass)	778
6. Nickel sinter workers	254
7. Nickel carbonyl workers	100
8. Polyvinyl chloride workers	201
9. Vinyl chloride workers	102
Total	56,653

workers, (b) an annual linkage of infant death records and the appropriate birth records, for reasons given earlier in connection with the similar study of 1971 births and (c) a study of members of the Canadian Diabetic Association to investigate the use of saccharin and the incidence of bladder cancer.

The AECL radiation worker study relates to some 11,000 past and present employees of Atomic Energy of Canada Limited.[40,41] Details of a possible study of all radiation workers in Canada, including those at AECL, have been published earlier.[42]

The infant death-birth linkage to be carried out on an annual basis would serve the purposes outlined above for the comparable study pertaining to 1971 births. This would involve records of some 360,000 live births per year and just over 5,000 deaths in the first year of life.

Possible uses of the Mortality Data Base in the near future

A list of further possible studies is given in Table V, together with the approximate sizes of the population for which searches of the Mortality Data Base might be required. Statistics Canada has been approached regarding some of these, and some have been the subject of public discussion; for yet others the need for mortality data has seemed obvious enough to justify inclusion in the Table. At least one of the studies listed (i.e. that of Ontario Hydro workers, which has been underway for five years) already monitors mortality occurring in both active and pensioned employees. Follow-up studies of many sorts of population sub-groups are becoming increasingly popular, and those who feel the need to know the mortality experience of such groups will undoubtedly turn to the Mortality Data Base when they learn of its existence and potential.

The National Dose Registry for radiation workers deserves special mention in this connection, because it may serve as a model for registries of exposures to other harmful agents with delayed effects, such as asbestos, vinyl chloride, wood dust, benzene, iron oxides, mercury, lead etc. The data pertaining to the radiation exposures come predominantly from (a) the national dosimetry service provided for those exposed occupationally to x-rays from medical, dental and industrial radiography, (b) nuclear power generating stations, and (c) uranium mines. The Registry files go back as far as 1945, and relate to some 250,000 workers. These files are currently being reorganized to provide more ready access to personal dose histories.[43,44] Such centralization into computerized files represents the only practical means by which lifetime dose histories may be assembled for workers who move from one employer to another. The feasibility of linking records of the National Dose Registry with those of the Mortality Data Base is being investigated. Other such records, required in Ontario for industrial exposures to lead, asbestos, silica, mercury, vinyl chloride monomer, isocyanates and noise, could well evolve into similar registries, provided there is sufficient public concern over the possible long-term consequences of chronic exposures.

Future potential

For the more distant future, use of the Mortality Data Base will continue to depend on the extent of public demands to know the delayed risks associated with conditions in the workplace and in the environments in which we live. Added to such demands, there may be a continuing interest in the extent to which such killing conditions as cancer and cardiovascular disease can be attributed to yet other circumstances, including diet, food additives, pharmaceuticals, life styles and even the mineral and/or trace element content of drinking water. It has been repeatedly emphasized that the most effective way of investigating such problems is not through observations at a point in time, but rather through individual linear follow-up of people on a substantial scale.[15,23,45,46]

As a result of current experience with searchers of the Mortality Data Base, there should in the future be greater assurance that the approach is feasible, not unduly expensive, and that it need present no threat to personal privacy as carried out under the constraints of present federal and provincial legislation, and within the walls of an agency which already has custody of the records for the production of other sorts of statistics pertaining to the protection of human health.

TABLE V

Studies Which Might Make Use of the Mortality Data Base in the Future

Study	Number of individuals	Agency
1. National Dose Registry of radiation workers	250,000	Health and Welfare Canada
2. Update of the Eldorado Nuclear Study	21,000	Eldorado Nuclear Limited
3. Port Hope cohort study	30,000	Federal-Provincial
4. Ontario Hydro workers	25,000	Ontario Hydro
5. Study of diabetes	12,500	National Cancer Institute of Canada
6. Bendix asbestos study	1,700	Stanford Research Institute
7. Manitoba mining and smelter workers	30,000	Manitoba Cancer Treatment and Research Foundation
8. Icelandic community health study	100,000	
9. St. Regis health study	2,500	Ottawa University
10. Update of the Ontario miner's study	58,000	Workmen's Compensation Board
11. Other provincial cancer registry death clearance (1969 onward)	–	

La poursuite des recherches en épidémiologie sur nombre d'individus exposés aux dangers et aux accidents au Canada a été favorisée par la mise en place d'un système consolidé de fiches de renseignements sur tous les décès survenus au pays depuis 1950. Ces statistiques sur la mortalité sont conçues pour être facilement analysées par ordinateur et pour révéler à la fois les dates et les utilisations fondamentales des décès chez les représentants d'une population étudiée. Les principales utilisations, présentes et à venir, sont ici décrites. La plupart des études portent sur des dizaines et des centaines de milliers d'individus. Elles s'intéressent aux conséquences à long terme des types de travail, traitements médicaux et méthodes de diagnostic, ainsi qu'aux circonstances de type varié qui peuvent entraîner le décès par cancer, maladies cardiovasculaires, et autres causes. Les groupes industriels comprennent les mineurs de l'uranium, les mineurs du nickel, les mineurs de minéraux durs, les travailleurs exposés aux radiations, ainsi que ceux exposés à l'amiante, au fibre de verre, au chlorure de vinyle et aux vapeurs de formaldéhyde. Parmi les patients traités médicalement, on retrouve des gens exposés régulièrement aux rayons-x fluorescopiques, et d'autres traités avec des drogues possiblement cancérigènes et à l'isoniazide. On envisage d'effectuer un suivi semblable chez les participants à de grandes enquêtes sur la nutrition, et on déjà commencé à le faire chez un grand nombre de mères ayant leur premier accouchement à des âges variés, en accordant une attention particulière d'abord aux maladies cardiovasculaires et ensuite au cancer du sein. Les demandes pour utiliser ces statistiques de base sur la mortalité se sont accrues rapidement depuis leur mise en place et ne cessent d'augmenter.

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Received
Accepted: