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The Chilliwack Respiratory Survey, 1963:
Part I. Methodology

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ABSTRACT

In order to ascertain the prevalence of chronic respiratory disease in residents of a rural town and to determine the relative importance of tobacco smoking and air pollution, a survey was conducted of 726 persons living at Chilliwack, British Columbia, in May and June, 1963. Over 95% of a random sample of adults was interviewed and performed simple tests of respiratory function. The sample was selected from a commercial census. An analysis of the demographic characteristics of the sample indicated that the group, aged 25 to 74 years, was reasonably representative for detailed study of chronic respiratory disease.

SOMMAIRE

En vue de se renseigner sur la fréquence des maladies respiratoires chroniques chez des habitants d'une agglomération rurale et d'établir l'importance relative de l'usage du tabac et de la pollution de l'air, on a procédé, en mai et juin 1963, à un relevé portant sur les 726 personnes vivant à Chilliwack, en Colombie canadienne. On a interrogé 95% des personnes composant un échantillon d'adultes, pris au hasard, parmi un recensement commercial. L'analyse des caractéristiques démographiques du groupe de personnes âgées de 25 à 74 ans, a permis de montrer qu'il constituait une tranche raisonnablement représentative de la population pour pouvoir étudier en détail les maladies respiratoires chroniques.

THE finding and the analysis of geographic differences in the prevalence of a disease should lead to the development of useful hypotheses about its cause. Much of the evidence incriminating atmospheric pollution in the production of chronic bronchitis or pulmonary emphysema has been derived from observations of a geographic correlation between the prevalence of respiratory disease and levels of atmospheric pollution.

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Geographic comparisons of the prevalence of any disease will be invalid unless the same diagnostic instrument is used in a similar fashion in the areas under study, and unless the disease is classified in a similar way. The importance of careful standardization of these factors has been emphasized by Fletcher and Oldham.¹ The availability of a standard questionnaire of respiratory symptoms, such as that of the Medical Research Council of Great Britain,² and simple tests of pulmonary function³ has made feasible productive international research in the cardiorespiratory field.⁴

During January, February, June and July, 1961, a survey of this type was conducted to assess the prevalence of chronic respiratory disease symptoms and pulmonary physiological abnormalities which existed in residents of the town of Berlin, New Hampshire. This city was the site of a large pulp and paper mill complex which employed about

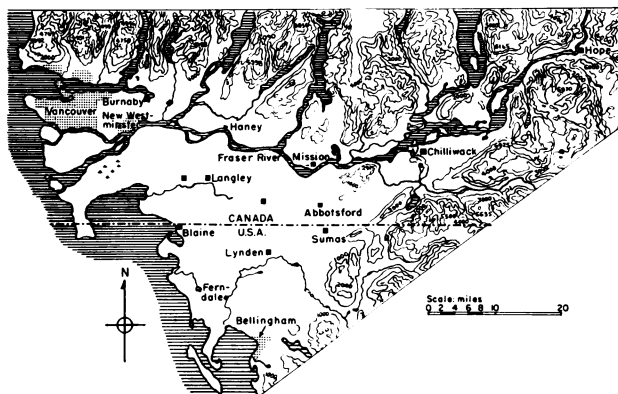


Fig. 1.—Certain features of the topography of the Lower Fraser Valley of British Columbia.

3800 persons. This mill chipped wood, prepared pulp by both sulfite and kraft processes, and manufactured kraft paper products. The air quality of this city has been measured by the U.S. Public Health Service.⁵

Of the residents of Berlin, 1261 persons aged 25 to 74 years co-operated in the survey; this represented 95.7% of the age-stratified probability sample which had been selected from an up-to-date head-tax roll book. The results of this survey⁶⁻⁸ demonstrated that chronic non-specific respiratory disease was strongly influenced by age, sex, and smoking habits, and was apparently little influenced by existing levels of air pollution or estimated occupational exposure to dusts, gases or fumes.

It is possible that the level of air pollution in Berlin was such that the reported prevalence of respiratory disease was greater than would be found in a relatively "clean" area; for that reason it was decided to study another town where there was no air pollution. Techniques and personnel were therefore chosen to be as similar as possible to those used in the Berlin, N.H., study.

The city of Chilliwack, British Columbia, was accordingly surveyed for the prevalence of chronic respiratory disease during May and June, 1963, concurrent with a year-long survey of air quality. The survey was designed to collect data which could answer the following questions:

1. What is the prevalence of chronic respiratory disease in persons aged 25 to 74 years, living in the town of Chilliwack, B.C.? How does this prevalence compare to that observed at Berlin, N.H., when age, sex, and smoking habits have been taken into account?
2. Does the threshold for respiratory disease observed at Berlin⁷ to be at or above 3000 packs of lifetime cigarette smoking exist in the Chilliwack population?
3. What is the relationship between the prevalence of symptoms of peptic ulcer and indigestion, and symptoms of chronic respiratory disease when age, sex, and smoking habits have been taken into account?

4. Is the subject who indicates the presence of symptoms on the standard respiratory questionnaire more likely to report the presence of a non-specific symptom, headache, which is unrelated to respiratory disease?

This paper presents a review of the methodology of the survey and of the response by residents of Chilliwack.

CHILLIWACK CITY

Chilliwack City⁹ is located 65 miles east of Vancouver, B.C. It lies in a wide valley bounded by mountainous terrain to the east, a mountain and the Fraser River to the north, and mountains at the International Boundary to the south. To the west, the valley widens to the sea. The Fraser Valley is flat and fertile and covers 90,000 acres. About 36,000 persons live in the valley—8259 in the city limits of Chilliwack, which is situated to the north of the valley at an altitude of 21 feet above sea level (Fig. 1).

The city of Chilliwack is the major distributory centre for the valley. Most of the valley is used for dairying, and the city processes milk and distributes it to the larger metropolitan complex of Vancouver to the west. Other forms of farming are conducted in the valley, such as the growing of raspberries, strawberries, beans, peas, corn, hops, and filbert nuts. Vegetable and fruit freezing and processing, animal slaughtering and poultry processing are carried on in the city. Because Chilliwack must serve as the business centre for the valley, residents are also engaged in operating various retail outlets and services such as those dealing with automobiles, building supplies, food products, feed and fertilizer.

The level of income is stable at Chilliwack, presumably because of the industrial diversity of the city. In 1959 the average family income was reported to be between \$4000 and \$5000.⁹

Since there is no major industry within the city, there is no source of air pollution apart from automobiles. A newly constructed by-pass of the Trans-Canada Highway now relieves traffic congestion within the city and has probably reduced considerably the pollution with hydrocarbons which may have existed prior to this. A sawmill which burns sawdust waste is situated five miles west of the city; winds carrying the fall ash from this burner are diverted by a small hill and do not pass over the city.

The climate of Chilliwack is western maritime, characteristic of the Pacific Northwest. The average annual temperature (1948-1959) was 50° F. (extremes 0° to +100° F.); the average annual total precipitation (1902-1959) was 61.18 inches. The average annual number of days with precipitation over 0.01 inch (1939-1957) was 163 days; the average annual number of days with 0.1 inch or more of snowfall was 12 days. The average days cloudy and clear (1944-1955) reported at the Ab-

botsford Airport to the west were: 76 clear, 39 partly cloudy, 250 cloudy.⁹

The city has a new hospital with 140 beds. Twenty-five physicians maintain offices in the city. The city is also headquarters for the Upper Fraser Valley Health Unit which serves the entire surrounding valley.

There is no unusual mortality experience in the city.¹⁰

SAMPLE

A household and company census was conducted by B.C. Directories Ltd. for a six-week period beginning February 17, 1963. The purpose of the census was to obtain a complete list of names, occupations and telephone numbers of every person 18 years of age and older residing in the valley for the yearly city and municipality directory. Enumeration was by both household and business address so that individuals working in the city were certain to be identified. In April 1963, B.C. Directories Ltd. kindly made the original census cards available for duplication. Listings for persons living within the city limits of Chilliwack were separated out and each person was placed on a separate McBee "Keysort" card. Duplicates and errors were checked by alphabetic review. The cards were then placed in alphabetical order and were numbered consecutively from 1 to 5108.

Only persons residing within the city limits of Chilliwack were chosen for the study because certain demographic information was available from the 1961 Canadian Census which could be used to check the validity of the sampling process.

Sample Size and Selection

At Berlin, N.H., it had been found that six weeks was required to interview and test 600 respondents. Because only six weeks could be allotted for the field survey at Chilliwack, a random sample of 600 persons was selected. One-eighth of the cards were therefore chosen by use of tables of random numbers without replacement. During the survey, however, it was the impression that there were many respondents 18 to 24 years and 75 years and older who could not be compared with respondents in the Berlin survey where these persons were excluded.⁶ Therefore, an additional random sample was selected in a similar fashion so that the final sample consisted of *one-seventh* of all persons aged 18 and over registered in the February-March commercial census, a total of 730 persons.

SURVEY TECHNIQUES

Prior to the survey, contact was made with the local medical practitioners, the Union Board of Health, and the Provincial Health Department; enthusiastic support was offered by these groups. Extensive radio, newspaper, and television coverage was then given to the survey to make the public aware of the project. News releases stressed the fact that Chilliwack was a "normal" community which was to be studied to ascertain the prevalence of respiratory symptoms. Mention was made of the study in Berlin, N.H., and the story of the Berlin survey was told to men's organizations, service clubs, women's groups, and the newspapers. Chilliwack was pictured as the "clean rural control"

to Berlin. Every effort was made to play down the now well-established relationship between respiratory disease and smoking, and to concentrate on a presumed relationship with air pollution. Considerable publicity was therefore given to the actual installation of air pollution monitoring devices.

The survey clinic was physically located at the Upper Fraser Valley Health Unit situated behind the Chilliwack General Hospital on the city bus route. A parking lot was adjacent.

Each of the 730 randomly selected persons was asked to participate by an appointment letter and an explanatory note prepared by the city health officer which reiterated the nature and extent of the study.⁸ An arbitrary clinic appointment was given in the initial invitation. If a person failed to keep the appointment, he or she was telephoned by the receptionist and a reappointment was made if possible. Transportation, if necessary, was provided by volunteers of the Registered Nurses Association of Chilliwack. Failure to make or keep a second appointment led to a home visit by one of the physicians and the performance of the full interview and physiological tests if permitted.

A follow-up letter of appreciation was sent to all participants.

Survey Procedure

All respondents were met at the survey centre by a receptionist who took a detailed work history and measured height (standing and sitting) and weight. Height was measured against a wall, using a right angle to ensure precision. Subjects were measured without shoes and values were recorded to the nearest quarter-inch. Subjects were weighed on a balance scale in their street clothing, but without shoes or coats. Weights were recorded to the nearest half-pound. The respondents were then given the Harvard respiratory questionnaire by one of the physicians who also conducted the pulmonary tests.

The Harvard questionnaire[†] is an adaptation of the questionnaire previously given extensive trials by Higgins *et al.*¹¹⁻¹³ and Fletcher *et al.*^{14, 15} and is very similar to that used at Berlin, N.H.⁶ The questionnaire has been precoded to facilitate data processing. In addition to questions concerning respiratory symptoms, the Harvard questionnaire contains questions pertaining to hay fever, peptic ulcer, and indigestion symptoms (modified slightly from Doll and Jones¹⁶), and headache.

Because a number of German-speaking persons live in Chilliwack, it was necessary to translate the Harvard questionnaire into German. This was administered, if necessary, by one of the physicians (D.A.).

In the studies of Fairbairn, Wood and Fletcher,² certain questions in this questionnaire had been noted to be particularly sensitive to observer variation, particularly by the manner in which they were asked. To maintain uniformity and to reduce observer variation, very detailed instructions were prepared for each question, and during the study the physicians interviewed at the start of each day in each other's presence to keep observer variation to a minimum.

At the completion of the questionnaire, the respondent was asked to perform a spirometric test recording

*These are available on request to the authors.

†This questionnaire and detailed instructions for its use are available from the authors.

forced vital capacity (FVC) and forced expiratory volume expelled in one second ($FEV_{1.0}$), after a full inspiration. Five such expirations were made into a Collins 6-litre recording vitalometer, with the respondent standing; the mean of the last three efforts was used to obtain the FVC and $FEV_{1.0}$, which were measured according to the recommendations of Kory *et al.*¹⁷ Volumes were corrected to body temperature, as though they were saturated with water vapour at the atmospheric pressure of the ambient air (BTSP). In addition, five forced expirations were made into the Wright peak-flow meter, and the mean of the last three was reported as the peak expiratory flow rate (PEFR). No nose clip was used.

Each respondent was interviewed and tested by one of the three authors, two of whom (D.A. and B.F.) had previously collaborated in the Berlin, N.H., survey of 1961. For administrative reasons, home visits were conducted by two physicians (D.A. and T.D.) only.

Work Load and Cost

The survey was started on May 14, 1963, and concluded on June 27, 1963; it involved 32 working days by the survey team which consisted of the two senior investigators, the research fellow, and the receptionist. The clinic was open from 9 a.m. to 9 p.m. each day, including some Saturdays. A total of 726 persons was examined, including volunteers as well as members of the sample. It is estimated that each respondent required 15 to 20 minutes for the total interview. On the average, 23 persons were examined each working day; the maximum number seen on one day was 57 persons. This work load was possible because at least two physicians were available at all times, one to man the clinic and one to make house calls.

The cost of the survey in the field, including travel and living costs for all personnel, supplies, and salary of the research fellow and receptionist, was \$3364. The actual cost per subject was therefore \$4.63. Expenses for data processing and salaries for the senior investigators have not been included.

Measurements were made of the spiograms by one research assistant during July and August of 1963. The data were then transcribed to IBM cards for data processing and analysis.

RESPONSE RATE

The random sample which was selected contained 730 persons; 10 persons were removed from the sample as indicated in Table I because they had either died or moved before February 17, 1963, the date of the start of the census conducted by B.C. Directories Ltd. The reason for this error lies in the actual method used for the household census: the household respondent was shown the previous year's card by the enumerator and was asked if there were any errors or changes. While the enumerator made every effort to list new residents, she probably did not exert the same effort to identify and remove persons who had died or moved in the interim. Errors caused by moving were likely to be picked up only if there was a new respondent at the address in question. The known enumeration error was therefore 1.4%.

An additional nine persons were considered to be non-residents even though they were correctly listed by the enumerator. These persons were permanently employed outside Chilliwack; in general they worked in lumber camps or in the metropolitan complex of Vancouver and returned "home" only rarely or at weekends. It is most likely that these persons would be listed as residents of Chilliwack in the *de jure* type of quinquennial census conducted in Canada.*

Of the corrected sample of 711 persons, 95.2% were interviewed (Table I). Only 0.84% refused to co-operate. The remainder of the survey failures were largely because of movement or death of sample members between the start of the commercial census and the start of the respiratory survey. Seven persons could not be located; they likely were transients who had been registered by the enumerator.

The response rate of 95.2% was similar to that found at Berlin, N.H.,⁶ and in many British surveys.¹¹⁻¹⁵

TABLE I.—TOTAL SAMPLE, CHILLIWACK, B.C. RESPIRATORY SURVEY, 1963

1. Sample originally drawn.....	730
2. Removed from sample:	
(a) Census error—deceased or moved before census date*... 10	
(b) Permanently employed outside Chilliwack area..... 9	
	19
3. Sample, corrected.....	711
4. Respondents.....	677
Percentage of sample.....	95.2%
5. Survey failures.....	34
Died since census date*..... 6	
Moved since census date*..... 13	
Too ill to interview..... 2	
Unable to locate..... 7	
Refused..... 6	
Percentage of sample refused	0.84%

*February 17, 1963. This was the first day of the census and the closing date of the sample.

Representativeness of the Sample

The age and sex distribution of the 677 respondents at the time of interview is recorded in Table II. Females outnumbered males, and the modal age group was 45 to 54 years for females and 35 to 44 years for males.

The estimated population of Chilliwack City derived from the 1961 Canadian Census¹⁹ is given in Table III. The estimated sample size based upon this population base and the number of respondents by age and sex is given in Table IV. On the basis of a sampling ratio of one-in-seven, the sample of respondents was deficient by 71 males (18.6% of estimate) and 57 females (13.5% of estimate). It

*Canadian Census data are presented on a *de jure* basis—the population of each area being defined as the persons who usually reside in the area regardless of where they are at the date of the census. The population according to location at the time of census is a *de facto* count.¹⁸

TABLE II.—AGE AND SEX DISTRIBUTION OF RESPONDENTS, CHILLIWACK, B.C. RESPIRATORY SURVEY, 1963

Age (years)	Male (No.)	Female (No.)	Total (No.)
18 - 24.....	23	25	48
25 - 34.....	51	48	99
35 - 44.....	61	65	126
45 - 54.....	59	82	141
55 - 64.....	41	57	98
65 - 74.....	34	60	94
75+.....	42	29	71
Total.....	311	366	677

will be observed that less than half of persons aged 18 to 24 were represented in the sample; this is presumably because of their under-enumeration by the commercial census.

When persons 25 to 74 years of age were considered, the sample of respondents was deficient by 46 males (15.7% of estimate) and 22 females (6.6% of estimate).

This deficiency is considered to be acceptable, since Table I demonstrates that 43 persons were not interviewed either because they were permanently employed outside the Chilliwack area or because they were "survey failures". Further, no reasonable population estimates are available for 1963.

Unfortunately, birthplace and marital status could not be used in addition to age and sex for the purposes of validating the sampling process, because detailed cross-tabulations of these variables by age and sex were not available from census data.

TABLE III.—ESTIMATED* POPULATION OF CHILLIWACK, 1961

Age (years)	Male (No.)	Female (No.)	Total (No.)
18 - 24.....	369	380	749
25 - 34.....	442	462	904
35 - 44.....	474	566	1040
45 - 54.....	439	506	945
55 - 64.....	342	416	758
65 - 74.....	352	387	739
75+.....	254	243	497
Total.....	2672	2960	5632

Source: Dominion Bureau of Statistics.¹⁹

*Numbers in the age groups 18-24, 65-74 and 75+ estimated by applying the proportion of persons by single year of life obtained for the entire province of British Columbia.

It is therefore concluded that the sample of persons 25 to 74 years of age is reasonably representative of the population of this age living in Chilliwack in 1963. What biases may exist are likely to be in the direction of under-representing transient and seasonal workers and persons employed outside the city limits. Because the method of enumeration permitted cross-checking of names by residence and place of employment, unemployed women might also be under-represented.

Errors have likely also been introduced into this comparative analysis by the government census process. It is suggested from Table IV that women 45 to 54 years of age may give an age in the range

TABLE IV.—ESTIMATED* AND INTERVIEWED SAMPLE, CHILLIWACK, B.C. RESPIRATORY SURVEY, 1963

Age (years)	Male			Female		
	Estimate (No.)	Interviewed (No.)	Difference	Estimate (No.)	Interviewed (No.)	Difference
18 - 24.....	53	21	-30	55	25	-30
25 - 34.....	63	51	-12	66	48	-18
35 - 44.....	68	61	-7	81	65	-16
45 - 54.....	63	59	-4	72	82	+10
55 - 64.....	49	41	-8	59	57	-2
65 - 74.....	49	34	-15	56	60	+4
75+.....	37	42	+5	34	29	-5
Total.....	382	311	-71	423	366	-57

*Derived from Table III at the sampling ratio of 1:7.

of 35 to 44 years to the census enumerator, but will give their true age in a medical setting.

Further analyses of this survey will be confined to 558 persons 25 to 74 years of age at the time of the survey.

Site of Interview

Of those interviewed, 20.3% of the males and 19.6% of the females had to be interviewed at home; this is slightly better than the experience at Berlin, N.H. (24%).⁷ Older persons were naturally less likely to come to the clinic; about 40% of persons 75 years and older were seen at home.

Demographic Characteristics of the Sample

In Table V are recorded the race, birthplace and mean length of residence in Chilliwack for those interviewed. Virtually the entire sample was Caucasian. Of the males, 64.6% were born in Canada; 66.1% of the females were born in Canada. Excluding the group from the British Isles, the largest of the immigrant groups came from other European countries; one large group consisted of German-speaking Mennonites who immigrated to Canada from Russia near the turn of the century. Indeed, almost 18% of the total population indicated its ethnic background to be German in the 1961 census.¹⁹

TABLE V.—RACE AND BIRTHPLACE OF THE INTERVIEWED SAMPLE AGED 25-74, CHILLIWACK, B.C. RESPIRATORY SURVEY, 1963

	Male			Female		
	Sample No.	%	Mean duration of residence† (years)	Sample No.	%	Mean duration of residence† (years)
Total sample.....	246	100.0	15.2	312	100.0	15.1
Race						
Caucasian.....	243	98.8		309	99.1	
Negro.....	0	0.0		0	0.0	
Oriental.....	1	0.4		1	0.3	
Other (North American Indian)...	2	0.8		2	0.6	
Birthplace						
British Columbia.....	63	25.6	26.1	66	21.2	21.4
Canada.....	96	39.0	11.2	140	44.9	13.0
United Kingdom and Eire.....	18	7.3	14.7	41	13.1	17.0
Other Commonwealth countries (excluding Hong Kong).....	1	0.4	*	2	0.6	*
United States of America.....	11	4.5	13.8	16	5.1	18.6
Other European countries (including Russia and Ukraine)	55	22.4	10.4	44	14.1	9.4
Asiatic countries (and Hong Kong)...	2	0.8	*	1	0.3	*
Africa.....	0	0.0		0	0.0	
Unknown.....	0	0.0		2	0.6	*

*Insufficient numbers.

†Duration of residence in Chilliwack City.

Of the sample, 95.5% of the males and 93.6% of the females had been or were married at the time of the survey (Table VI).

TABLE VI.—MARITAL STATUS OF THE INTERVIEWED SAMPLE AGED 25 - 74, CHILLIWACK, B.C. RESPIRATORY SURVEY, 1963

	Male		Female	
	(No.)	(%)	(No.)	(%)
Sample size.....	246	100.0	312	100.0
Marital status:				
Single.....	10	4.1	20	6.4
Married.....	227	92.3	239	76.6
Widowed.....	4	1.6	40	12.8
Divorced or separated....	4	1.6	13	4.2
Unknown.....	1	0.4	0	0.0

Another important demographic variable was determined, that of social or occupational class. Blishen's²⁰ occupational class scale, developed from statistics collected during the 1951 census, was used to group reported occupation as at the time of interview or at the time of retirement. This qualitative class scale has the advantage of being Canadian, and was developed from income and years of schooling reported in 1951 for particular jobs. The classes range from Class 1 (highest) to Class 7 (lowest); the class divisions were unfortunately chosen by the originator on purely arbitrary grounds, influenced by his awareness of the relative prestige ranking of occupations. The distribution of the sample by occupational class is presented in Table VII.

TABLE VII.—OCCUPATIONAL CLASS* OF THE 246 INTERVIEWED AGED 25 - 74, MALES, CHILLIWACK, B.C. RESPIRATORY SURVEY, 1963

Class	No.	%
Class 1.....	5	2.0
Class 2.....	40	16.3
Class 3.....	8	3.3
Class 4.....	11	4.5
Class 5.....	82	33.3
Class 6.....	67	27.2
Class 7.....	33	13.4
Combinations:		
Upper (1 and 2).....	45	18.3
Middle (3, 4 and 5).....	101	41.1
Lower (6 and 7).....	100	40.6

*Blishen occupational class scale.²⁰

The number of job changes and residence changes (change of town) in the preceding 10 years were ascertained by a review of the detailed occupational and residential history. These were considered to provide a measure, albeit a crude one, of social stability.

These demographic variables will be given careful consideration when the prevalence of chronic non-specific respiratory disease is examined.

DISCUSSION

The Chilliwack respiratory survey was conducted in conjunction with an air pollution survey to de-

termine the prevalence of chronic non-specific respiratory disease in a town situated in a rural area relatively free from air pollution. Every effort was made to use those survey techniques previously used at Berlin, N.H. Two of the three physician participants were involved in both surveys.

At Berlin, N.H., a two-stage age-stratified sample of population was derived from names clustered on the pages of a head-tax roll book. It was not possible to check the representativeness of this sample against the 1960 United States census data because of a large layoff of men by the pulp and paper mill, with subsequent emigration of young people from the city.

At Chilliwack a random sample was chosen of persons enumerated in a commercial census conducted by a directory publisher. Subsequent examination of the representativeness of the sample indicated considerable under-representation of persons 18 to 24 years. It is our judgment, however, that the sample of persons 25 to 74 years was reasonably valid. This sample consisted of 558 persons (246 males and 312 females).

In both surveys, over 95% of the available sample were interviewed and tested physiologically, though over 20% had to be interviewed at home.

It is proposed to use data collected in the survey to answer the four questions which led to its design. These analyses will be published in subsequent issues of this Journal.

SUMMARY

A respiratory disease prevalence survey was conducted at Chilliwack, British Columbia, during May and June, 1963. Details of the design of this survey and of its conduct have been presented in this paper. Comparisons between the methodology of the Chilliwack survey and that of a previous survey at Berlin, New Hampshire, have been made. The response rate of 95.2% and the representativeness of the sample aged 25 to 74 years were judged to be satisfactory.

The authors wish to thank Dr. A. S. Arneil, Director of the Upper Fraser Valley Health Unit, and his staff, for their enthusiastic support which made the survey possible. They are also grateful for the co-operation of the Director and staff of B.C. Directories Ltd., who made their census of Chilliwack available for sampling. The careful work of Mrs. Donna Wiffen, the secretary for the survey, contributed a great deal to the success of the project.

Data processing was conducted by Mrs. R. Zickmantel, of the Division of Epidemiology, on the University of British Columbia IBM 1620 Computer.

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Pulmonary Aspiration of Gastric Acid—Mendelson's Syndrome

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ABSTRACT

Three cases of pulmonary aspiration of gastric acid as a complication of obstetrical anesthesia are described. The clinical picture consists of dyspnea, cyanosis, tachycardia and shock appearing several hours after the aspiration has occurred. On examination, the chest may be quite clear, but the chest radiograph shows a picture indistinguishable from that of pulmonary edema. The most important therapeutic measure is the intravenous administration of corticosteroids in large doses for several days. Bronchoscopy is contraindicated. With routine use of epidural anesthesia, this obstetrical complication can be avoided.

SOMMAIRE

Les auteurs rapportent trois cas d'aspiration pulmonaire d'acide gastrique, survenus comme complication de l'anesthésie obstétricale. Le tableau clinique comprenait de la dyspnée, de la cyanose, de la tachycardie et d'un choc, apparaissant plusieurs heures après l'aspiration accidentelle dans le poumon. L'examen thoracique peut être normal, mais la radiographie pulmonaire donne une image qui ne peut être différenciée de celle de l'œdème pulmonaire. Le traitement le plus important consiste à donner des corticoïdes par voie intraveineuse. La bronchoscopie est contre-indiquée. L'emploi courant d'une anesthésie épidurale permettrait d'éviter cette complication obstétricale.

IN 1946 Mendelson¹ first described the syndrome of chemical pneumonitis due to aspiration of gastric contents. The harmful effects were found to be correlated with the degree of acidity of the aspirated material. The clinical picture that he described consisted of dyspnea, cyanosis, tachycardia and shock. There was a latent period of two to five hours between the time of aspiration and the onset of symptoms. He stressed that on physical examination of the chest there might be very few physical findings, but chest radiographs revealed a picture similar to that of pulmonary edema. Mendelson distinguished this type of aspiration from aspiration of solid material. In the latter situation, death may result from asphyxia due to mechanical obstruction of the tracheobronchial tree, and immediate bronchoscopy is mandatory.

The following cases of aspiration pneumonitis are reported to recall the clinical features, to emphasize the principles of treatment, and to indicate that, in obstetrical practice at least, aspiration may be markedly reduced or prevented by the routine use of epidural anesthesia.

CASE REPORTS

CASE 1

A 25-year-old woman, gravida 1, was delivered of a full-term infant in another hospital at 10 p.m. on March 19, 1956. She received ether anesthesia during the delivery and vomited black fluid material. This was aspirated as well as possible with an electric suction machine. One hour after delivery, the patient was found to be very dyspneic and slightly cyanotic. A diagnosis of aspiration pneumonia was made and she

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