SOME PROBLEMS IN THE COLLECTION AND ANALYSIS OF MORBIDITY DATA OBTAINED FROM SAMPLE SURVEYS

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THIS is a discussion of problems considered in formulating questions to elicit information about ill-health. The biases of different methods are considered and a method of analyzing the data collected in an inquiry utilizing a particular set of questions is described. A comparison is made between the results obtained in this inquiry and those from the Survey of Sickness (1), and the probable effects of the two different methods on the results are discussed.

SCOPE OF THIS SAMPLE SURVEY

This survey was part of a larger research program that was undertaken by the Public Health Department of the London School of Hygiene and Tropical Medicine. The broad aim of the whole project was to study people's use of the different parts of the National Health Service. The study was carried out in a relatively small area so that material could be collected from several sources about the different aspects of the problem. The area chosen was a post-war housing estate just outside London. The estate had a population of about seventeen thousand. As in many other new housing estates, the population was relatively young with a high proportion of children and few elderly people (2).

A family morbidity survey was designed as part of this research project. Its aims were to supplement information obtained from various records, and also to present a picture of the problems of ill-health and the success of the health services in solving these problems, as seen from the viewpoint of the individuals and families concerned. The sample for this study was composed of the families and individuals living in a

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randomly selected three-sixteenths of the dwellings on the estate. We aimed at interviewing, personally, all the adults[2] in this sample of dwellings on two occasions (3), at an interval of four weeks.

In addition, mothers of school and pre-school children were to be interviewed about their children on two other occasions, also at an interval of four weeks.

The morbidity survey was conducted during the period from May, 1954 to February, 1955.

Aims and Difficulties in Formulating the Questions

At the first interview we wanted information about people's health at that point in time. We thought of this as including not only illnesses which were present at the time, but also recurrent conditions to which people believed they were subject. For each of these conditions, we wanted to know such things as when it first started, whether it caused much pain or discomfort, what treatment and advice had been received for it, and whether the individual was satisfied with the treatment received. At the second interview we concentrated on events that had occurred between the two interviews: new illnesses, and incapacities and also the consultations, and any medicines which had been taken during that time. The various consultations and medicines were related to particular illnesses by asking what illnesses they were for, and any condition disclosed at this stage that had not been reported previously was recorded.

At the first interview, however, we were anxious to avoid formulating any criteria of illness based on incapacity, or consultation, or medication in asking about people's health at that time. We wanted to obtain an index of morbidity that did not depend on people's use of the health services or on whether they had spent time in bed or stayed away from work.

It is perhaps worth expanding this point so that we can consider the advantages and disadvantages of the methods we ac-

[2] This we defined simply as people aged 15 or more who had left school.

tually used against those of other possible methods. If, for example, we had asked only about illnesses for which a general practitioner had been consulted, that measure of morbidity would have been open to the objection that some people will consult a doctor about an illness for which other people would not. Whether or not a person consults his doctor about a particular complaint will depend on such things as his estimate of what the doctor can do for his illness, his fear of what he may be told, his dislike of treatment, his need of a certificate, his past experience of general practitioners, his relationship with his present physician, the time he has to wait in the surgery, his estimate of the severity of possible consequences of his illness, his tolerance of pain or discomfort, etc. All these factors mean that the amount of use made of general practitioners may not be directly related to the existence of morbid conditions.

Again, if we had taken as our criteria certain degrees of incapacity, staying in bed or stopping away from work or school or not going out of doors, this would mean in effect very different things for the housewife with young children, the elderly retired man living on his own, the adolescent girl in her first job, and so on.

In addition, if we had taken either of these criteria—consultation with a doctor or a certain degree of incapacity, we would not have been told about a number of conditions in which we were, in fact, interested. We wanted to compare the varicose veins for which people consult the doctor with those they do not, and we wanted to compare the people who acted in these different ways.

Once we rejected these various objective criteria for defining an illness we were confronted with other problems and difficulties. Whether a person reports an illness to an interviewer will be influenced by such things as his impression of the purpose of the inquiry, his relationship with the interviewer, his attitude toward ill-health, his ability to express his opinions, and of course, on the actual questions asked.

Our aims in formulating the questions to be asked at the first interview in order to elicit illnesses were, then, first of all to indicate the level of ill-health in which *we* were interested, and, thus, to minimize, we hoped, the effects of people's different ideas and expectations about health and disease on the way in which they reported illnesses here, then to stimulate people to think about their own health in these terms, and finally to overcome some of the difficulties which people experience in expressing their ideas about illness.

In attempting to do this we decided to ask first about chronic illnesses and complaints to which the person had been subject at some time during the preceding twelve months. Secondly, we asked about physical disabilities. (We asked about these specifically because we felt that people with such conditions might not regard them as an illness and would otherwise not have mentioned them.) After that we asked about other illnesses, injuries, or minor complaints which were present at the time. Finally, we read out a list of forty or forty-one conditions and asked if they had any of these at the time or if they were subject to them. We varied the order in which these conditions were presented in four different ways, alphabetically, then top to bottom and ends to middle, so that the first order was 1, 2 . . . 40; the second order was 40, 39 . . . 1; the third was 20, 19 . . . 1, 40, 39 . . . 21; and the fourth order was 21, 22 . . . 40, 1, 2 . . . 20.

The conditions listed were: backache, breathlessness, catarrh, colds, constipation, coughing, depression, diarrhoea, dizziness, eyestrain or other eye trouble, faintness, fever, fits, headaches, indigestion, kidney trouble or trouble passing water, loss of appetite, loss of weight, nerves, night sweats, painful or swollen joints, pains in the chest, palpitations or thumping heart, paralysis or weakness in any limb or other part of the body, piles, rashes or itches, rheumatism, running ears or earache, running sores or ulcers, sleeplessness, stomach pains, swelling of the ankles, swelling or lump in any part of the body, trouble with teeth or gums, undue irritability, undue tiredness, unusual

bleeding from any part of the body, varicose veins, vomiting, weak or painful feet and for women, women's complaints. This list provides a fairly clear indication of the level of ill-health in which we were interested. It is also fairly comprehensive in that most symptoms come under one of the items and there are not very many morbid conditions which are not generally associated with one or more of these items. Such symptoms as headaches, indigestion, or undue tiredness might be regarded by some people as relatively minor, but apart from the fact that we wanted information about such things, there is also the problem that if we had not asked about such things specifically, some people would have reported them and others, who also had them, would not. We would have obtained an index of "willingness to talk about illness" rather than an index of morbidity. However, by asking directly about certain selected diseases and symptoms, we have created other difficulties, principally a bias towards reporting those particular conditions.

It seems relevant here to discuss what other methods we could have used to stimulate people to think about their ill-health.

One of the possibilities was to list, not diseases or symptoms but different parts of the body. This was done to a certain extent on the Survey of Sickness (1). People were asked "Have you anything wrong in the way of colds, catarrh, or nose or throat troubles or anything wrong with your eyes, ears, teeth, headpains, chest, heart, stomach or indigestion, liver, kidneys, bowels or constipation, legs, feet, hands, arms or rheumatism, skin complaints, infectious diseases or anything wrong with your nerves?" Women were also asked whether they had anything wrong in the way of women's complaints. So many actual conditions were introduced that the avoidance of bias by not asking about particular conditions was lost, and this was the main advantage of the method, from our point of view. It seems likely that if a "pure" list of parts of the body were to be tried out, it would be found that people do not think in

those terms. A cold is not something wrong with their nose or throat but a cold.

The way people think about their illnesses was the reason for discarding another suggested solution to this problem—that we should ask only about symptoms not about specific diseases. This had the attraction that symptoms such as pains, lumps, itches, etc., are things that an individual should be able to report reliably, whereas when it comes to reporting say rheumatism the informant is making a diagnosis which may or may not be justified. But here again we found that the neat theoretical solution did not work out in practice. When asked whether they had or were subject to painful or swollen joints, some of the people who said "no" later reported rheumatism, and, when asked how this affected them, said "my knee is swollen" or "my wrist is painful." Now it may be that they did not understand what a joint is, but it may also be that once a complaint has been diagnosed and labelled medically it ceases to be thought of as a symptom. People fail to recognize their rheumatism in a question about swollen and painful joints.

THE CLASSIFICATION OF SELF-REPORTED ILLNESSES

One of our main interests was in the actions people had taken or not taken about their various complaints, and, to some extent, this would depend on whether they felt the various conditions they had reported were related. What people do about a cough that is associated with bronchitis is likely to be rather different from the action they take about a cough which is not associated with any other symptoms and is attributed to smoking. In addition it might often be unrealistic to ask about the action taken for each component of a composite condition. Therefore, we decided that our unit of illness would be any group of conditions which the informant regarded as being related. So, when the informant reported a second or subsequent condition, the interviewer asked whether it was connected with anything mentioned before, and if the informant thought it was, it was recorded as being part and parcel of that illness.

In addition, for each reported condition the informant was asked first "how does it affect you?", and any symptoms mentioned here were recorded as part of that illness. Then he was asked, "what do you think is the cause?", and occasionally, when the initial response had been to a symptom on the check list, an informant mentioned at this time what might be called a major disease.

Some examples of conditions which informants associated together and which we therefore treated as a single illness were:

(a) Undue tiredness associated with headaches which made the person irritable and was attributed to the journey to work.
(b) Coughing causing breathlessness and attributed to asthma.
(c) Piles associated with constipation and said to be causing stomach ache and attributed to having children.
(d) Weak and painful feet associated with rheumatism which also caused backache and was attributed to living in a damp house.

From this type of information, we coded three things for each illness:

1. *The Main Diagnosis.* This could have been reported initially as a condition or as an associated symptom or as a cause, but each illness could have only one diagnosis, and the selection of the appropriate one was based on a system of priorities which is described below. A modified version of the International Statistical Classification of Diseases and Injuries and Causes of Death was used.

2. *Certain Associated Symptoms or Conditions.* These were the 41 items on our check list, and as many of these as were mentioned were coded here. (We multi-coded 4 columns of a Power-Samas card.)

3. *The Cause,* for which a code was devised from the answers given. It covered 21 different things, including the weather, the war, work, and childbearing, and one code indicated when the reported cause had in fact been coded as the main diagnosis.

METHOD OF SELECTING THE MAIN DIAGNOSIS

Where a single condition was reported, the problem was straightforward. Where two or more conditions were related, and were therefore regarded as a single illness, the system of priorities adopted for selecting the main diagnosis was as follows:

1. If only one condition was classifiable under disease groups 1–15 or 17 in the International Classification the others falling in group 16, symptoms and ill-defined conditions, the defined condition was taken as the main diagnosis.

2. Where two conditions were associated and both fell in groups 1–15 or 17 the criteria as to which should be taken as the main diagnosis were:

a. If one condition was included in our check list and the other was not then the condition not on the check list was taken as the main diagnosis. In this way both conditions were included in the description of the condition, one as the main diagnosis and the other as an associated condition.

b. If one condition, in the general concensus of medical opinion, could be considered as causing the other or as being more severe than the other, then it was taken as the main diagnosis. Examples of this were:

Associated Conditions	*Main Diagnosis*
Bunions and Corns	Bunions
Blood Pressure and Menopause	Menopause
Overweight and Thyroid	Thyroid
Conjuctivitis and Hayfever	Hayfever

c. If neither 1 nor 2 applied then the condition which appears first in the International Classification list was coded as the main diagnosis.

3. Where an illness consisted of two or more conditions all of which fell in the group of "symptoms and ill-defined conditions" we used an order of priority which corresponded in general to the order of the International list.

SOME METHODOLOGICAL IMPLICATIONS OF THE RESULTS

With these questions, and this definition of an illness, an average of 2.9 illnesses per person was reported by adults at the first interview of the survey. Nearly three-quarters of these illnesses were elicited only after the question listing 40 or 41 symptoms or diseases. (Table 1.) Nearly half of the illnesses which were reported at this question were recurrent but not present at the time of interview. They tended to be chronic illnesses, in that 55 per cent first occurred over

Table 1. Certain characteristics of illnesses reported by adults at different questions at the first interview.

	Q1. Chronic Illnesses and Recurrent Complaints	Q2. Physical Disabilities	Q3. Other Illnesses Injuries Minor Complaints Present at Time	Q4. Check List of 40 or 41 Items	Reported Later at Interview or Not Known When Reported	All Illnesses
	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Nature						
Continuous	48	87	61	36	35	41
Recurrent, Present	16	3	32	14	14	14
Recurrent, Not Present	34	5	5	48	39	42
Don't Know. No Answer	2	5	2	2	12	3
When First Had It						
All Life	4	12	2	5	9	5
20 Years Ago or More	16	30	8	15	9	15
10 Years Less Than 20 Years	20	26	5	17	9	18
5 Years Less Than 10 Years	17	15	7	18	9	17
1 Year Less Than 5 Years	27	8	11	29	25	27
6 Months Less Than 1 Year	6	1	2	7	10	7
1 Month Less Than 6 Months	7	—	7	5	9	5
Less Than 1 Month	2	1	56	3	4	4
Don't Know. No Answer	1	7	2	1	16	2
Pain or Discomfort						
A Lot	51	20	34	25	22	30
A Little	34	24	53	46	38	43
None	12	42	11	27	23	24
Don't Know. No Answer	3	14	2	2	17	3
General Practitioner Consulted						
Yes	83	51	36	46	48	53
No	15	29	62	52	35	44
Don't Know. No Answer	2	20	2	2	17	3
Number of Illnesses (100 Per Cent)	858	137	130	3,102	102	4,329

five years before the interview, and only 15 per cent in the previous year and 3 per cent in the previous month. It should be remembered however that all these had been present at some time during the previous year. A quarter of them were said to cause a lot of pain or discomfort and a general practitioner had been consulted about nearly half of the conditions reported at this stage of the interview.

Each illness was associated with an average of 1.6 conditions on the check list and adults reported an average of 4.7 of these check list conditions per person. Examples of the effect of associating conditions together in this way are given in Table 2 which shows the proportion of various conditions on the check list which were (a) reported and (b) classified as the main diagnosis.

Two-thirds or more of the reported cases of breathlessness, cough, sleeplessness, and backache were associated with other more serious conditions, in that the other condition became the

Table 2. Proportion of various conditions on the check list which were coded as the main diagnosis and the most frequent diagnoses in other cases.

	Per Cent of Adults Reporting This Condition	Per Cent of Reports of This Condition Coded as Main Diagnosis	Most Frequent Diagnoses in Other Cases
Nerves	22	67	Mental, Psychoneurotic & Personality Disorders, Menopause, Skin Conditions
Varicose Veins	14	92	Obesity
Piles	7	95	Complications of Pregnancy, Puerperium
Colds	22	72	Bronchitis, Sore Throat, Tonsilitis, Hay Fever
Catarrh	26	53	Colds, Bronchitis, Deafness, Sinus
Cough	20	33	Colds, Bronchitis, Catarrh, Tuberculosis, Asthma
Diseases of Teeth	12	93	——
Constipation	13	69	Piles, Ulcer of Stomach or Duodenum
Rheumatism	24	80	Arthritis, Neuritis, Heart Trouble
Headaches	31	47	Nerves, Menstruation, Menopause, Colds, Catarrh
Sleeplessness	12	31	Nerves, Menopause
Breathlessness	19	27	Heart Trouble, Tuberculosis, Bronchitis, Asthma, Obesity, Menopause
Backache	23	32	Rheumatism, Menstruation, Kidney Trouble
Indigestion	17	65	Ulcer of Stomach or Duodenum, Nerves, Constipation

main diagnosis under our system. The most frequent diagnoses when the condition on the check list was not taken as the main diagnosis is shown in the final column of the table. This illustrates our system of priorities. If a cold was associated with bronchitis, tonsilitis or hay fever, one in the latter group became the main diagnosis but if it was related to catarrh or cough then the main diagnosis was a cold. Similarly piles were subordinated to complications of pregnancy or the puerperium but became the main diagnosis when only associated with constipation.

In 5 per cent of the illnesses, the main diagnosis as coded had been reported initially as the cause of associated conditions. In this group the most frequent diagnoses were the menopause, disorders of menstruation, obesity or overweight, complications of pregnancy and blood pressure.

COMPARISON WITH THE SURVEY OF SICKNESS

The illness rates obtained on our inquiry appear relatively high and it therefore seemed worth while to make a comparison with another somewhat similar survey in an attempt to see how far this higher rate can be explained by the different methods used.

The Survey of Sickness was carried out from 1943–1952 and during this period monthly samples of adults in England and Wales were questioned about their health in recent months.[3] We can thus compare the number of illnesses reported as being present during a particular month in this Survey with the number of illnesses present during the four weekly periods in our Family Health Survey. Our figures are based on information supplied by adults who were interviewed twice and include all illnesses reported at the second interview as well as those illnesses which were reported at the first interview and said to have been present at any time between the first and second interviews.

[3] Up to 1951 the sample was drawn from the National Register and included adults aged 16 years and over. The size of the monthly sample varied from 2,500 to 4,000. A multi-stage sample was used, the details of which are given in Reference 1.

The main differences in the methods of the two inquiries are set out in Table 3, and the illness rates for different age and sex groups in each survey in Table 4.

The illness rates on the present inquiry were greater than those on the Survey of Sickness for all age and sex groups, even though on the latter inquiry all conditions and symptoms are said to have been treated as separate illnesses. How far this happened in practice may perhaps be questioned. Interviewers are more likely to do the practical and apparently reasonable thing than to obey instructions from Headquarters implicitly especially if they regard these as being rather theoretical and divorced from reality, and especially also if they

Table 3. Summary of main differences in method between Survey of Sickness and this inquiry.

	Survey of Sickness	Present Inquiry
Period Studied	People Were Interviewed during the First Fortnight of a Month, and Questioned about their Sickness during the Previous Two Calendar Months.	People Interviewed and Asked about Illnesses Present at Time and Conditions to which They Were Subject. People Re-interviewed 4 Weeks Later and Asked about Illnesses Reported at First Interview and Other Illnesses Occurring during Four Weeks.
Questions Asked	Check Questions Asked about Colds, Catarrh, Nose or Throat Trouble, Eyes, Ears, Teeth, Head, Pains, Chest, Heart, Stomach or Indigestion, Liver, Kidneys, Bowels or Constipation, Legs, Feet, Hands, Arms, or Rheumatism, Skin Complaints, Infectious Diseases, Nerves, Women's Complaints.	40 or 41 Specific Diseases or Symptoms Listed at First Interview. At Second Interview People Were Asked about Illnesses, Consultations, Incapacity and Medicines Taken since Previous Interview, and about the Illness to which Any Incapacity, Consultation, Medicine Was Related.
Unit Coded and Analysed	All Conditions and Symptoms Mentioned Were Treated as Separate Illnesses.*	People Asked if Conditions They Reported Were Related, and Connected Conditions Were Treated as a Single Illness.
Person Interviewed	Proxies Allowed after Three Calls. No Figures Available of Numbers Involved.	Proxies Only Accepted if Otherwise No Information Would Have Been Obtained for that Individual. 93 per cent of Adults Interviewed Personally.
Type of Sample	Individuals Aged 16 and Over on The National Register.	All Adults (People Who Had Left School) in a Sample of Dwellings.

* Registrar General's Statistical Review of England and Wales for 1950–51.

	1950 Survey of Sickness Monthly Prevalence Rates (Spells) per Individual Interviewed	Present Inquiry Average Number of Illness Present During Four Weeks Period	Ratio Present Inquiry Rate Survey of Sickness Rate
Males			
16–44	1.00	2.22	2.2
45–64	1.32	2.63	2.0
65 and Over	1.79	3.47	1.9
Females			
16–44	1.38	2.88	2.1
45–64	1.82	3.39	1.9
65 and Over	2.30	3.83	1.7
Males 16 and Over	1.20	2.35	2.0
Females 16 and Over	1.66	3.01	1.8

Table 4. Comparison of illness rates on Survey of Sickness and on present nquiry.

involve extra work. The temptation to regard running noses, catarrh, and coughs as all part of a cold and not to record them as separate conditions must be very great and in many ways eminently reasonable.

The difference in rates was greater for males than for females, and for the youngest age group, 16–44 than for the other age groups. These differences in the *ratios* for the age and sex groups may be due to a greater number of "proxy" interviews on the Survey of Sickness, but the substantial difference between the rates in the two inquiries remains to be explained.

It is possible to make only rather limited comparisons of the diseases reported on the two studies because of the groups which have been used, but some comparisons of the frequency with which various diagnoses were recorded are given in Table 5. The condition showing the greatest difference, with the excess in our survey was tuberculosis and this probably can be explained in terms of the actual incidence of the disease. The area in which our inquiry was carried out was a post-war housing estate and since people with tuberculosis were given

priority on the housing list, this estate initially contained an unduly high proportion of people with this complaint.

The other conditions with an excess approaching this magnitude were disorders of menstruation and menopausal symptoms. Here part of the explanation for the difference may be that in a third of our cases, these conditions were only mentioned when we asked about the cause of some related symptoms. Another part of the explanation of the different frequency with which disorders of menstruation were reported may be in the age distribution of our adult population which contained a relatively high proportion of adults under 45. Other conditions with a marked excess for the present inquiry were varicose veins and piles each of which was mentioned specifically on this study but not on the Survey of Sickness.

Three conditions, diseases of the teeth, constipation, and

Table 5. Comparison of certain disease rates on Survey of Sickness and present inquiry.

	Rate per 1,000 Individuals				Ratio Present Inquiry Survey of Sickness	
	Survey of Sickness		Present Inquiry*			
	Males	Females	Males	Females	Males	Females
Rheumatism	116	195	110	157	0.9	0.8
Bronchitis	43	38	48	47	1.1	1.2
Arthritis	13	28	15	26	1.2	0.9
Ulcers of Stomach	7	3	} 21	} 8	} 1.2	} 1.6
Ulcers of Duodenum	10	2				
Nerves	54	148	74	139	1.4	0.9
Mental, Psychoneurosis and Personality Disorders	11	16	15	21	1.4	1.3
Asthma	8	9	12	16	1.5	1.8
Colds	126	120	185	185	1.5	1.5
Constipation	26	71	61	125	2.3	1.8
Headaches	65	146	168	232	2.6	1.6
Diseases of Teeth	50	52	110	143	2.2	2.8
Varicose Veins	14	37	82	155	5.9	4.2
Piles	7	7	46	49	6.6	7.0
Menopausal Symptoms		} 27		56		} 6.5
Disorders of Menstruation				120		
Tuberculosis—All Forms	4	3	31	34	7.8	11.3

* These figures are not comparable to those in Table 2 as these are based on illnesses present during a particular four week period while those in Table 2 refer to all illnesses reported at the first interview.

headaches, were recorded as diagnoses about twice as frequently on our study as on the Survey of Sickness although they were mentioned specifically in the questions on both inquiries. Over a third of our cases of constipation were reported because we asked about medicines taken during the period between the two interviews, and a number of people had taken laxatives for constipation but they had not previously reported constipation as an illness. Similarly, 30 per cent of the headaches were reported because of the aspirins which had been taken for them during the period. These factors only account for some of the discrepancy between the rates on the two inquiries. There is other evidence that incidence of these three conditions, diseases of the teeth, constipation, and headaches, is particularly high on the estate where our inquiry was carried out. An analysis of the General Practitioner's records shows that in each case the rates are 2, 3 or 4 times as high as the average rates on other studies of General Practitioner's records.

Finally, the rates on the two inquiries for nerves, colds and rheumatism did not show a very great difference and each was mentioned specifically on both studies. The other conditions showing relatively little difference, bronchitis, asthma, ulcers of the stomach or duodenum, and mental psychoneurosis, and personality disorders are all fairly major complaints.

These comparisons suggest that differences in method make it difficult to reach any definite conclusions about the relative morbidity in the two populations.

Summary

Various objective criteria for defining an illness and the reasons for not using them in this inquiry have been discussed. In the questions finally adopted a list of 40 or 41 separate conditions was included. In the analysis of the results these specified conditions were incorporated into the description of illnesses and the unit of illness was the group of diseases and/or symptoms which informants regarded as being related.

Some comparisons with the Survey of Sickness illustrate the different ways in which the questions asked and the method

of analysis can influence the nature of morbidity data collected on this type of inquiry.

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