Data on Acute Upper Respiratory Diseases

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IN AN unscheduled but propitious development, the U. S. National Health Survey is publishing current statistics which, in a tangential way, contribute notably to the aggregate of information on the influenza epidemic.

The data, the first to come from the new survey program, add several dimensions to the body of knowledge on communicable diseases. They come directly from a source we have not previously been able to tap on a national scale: the people affected by the diseases. They permit an association of incidence and prevalence with age and with two criteria of severity: bed disability and medical attendance. They provide a base for measuring the social and economic cost of the acute upper respiratory infections, including influenza.

The National Health Survey is not set up as an epidemic reporting system. Rather, it is designed to provide a continuing source of fundamental statistical information on the health of the American people in relation to important demographic, medical, social, and economic characteristics. This it will do in a series of reports which will begin to appear later in 1958. These reports will be based on data accumulated over one or more calendar quarters.

One part of the National Health Survey is a continuing household interview survey of a representative sample of the population, and it is this project that has provided current statistics on acute upper respiratory diseases. The household interview phase has been under way nationwide since July 1, 1957.

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Background

Household interviewing is continuous in order to increase accuracy, improve efficiency, and permit accumulation, over various periods of time, of data necessary for study of different health problems. Partly because budgetary considerations do not permit a sample sufficiently large to yield current estimates for items of low incidence or prevalence, it was not contemplated that tabulations by week or month would be made. However, when it appeared that in the fall of 1957 influenza-like diseases would reach a higher than usual level of frequency, the survey staff decided to investigate the possibility that the household interview data would yield useful current information about these diseases. The investigation took the form of a special tabulation of the weekly receipts of household interview schedules which showed acute upper respiratory diseases severe enough to cause 1 or more days of bed disability. (Roughly, the diseases included are International Statistical Classification categories 470–493 and 500 and also a special category for "virus" not otherwise specified.)

The household interviewing is conducted for the Public Health Service by the Bureau of the Census, which designs and selects the sample and processes the data in accordance with specifications established by the Service. The interviewing is done by trained lay interviewers, and the sample interviewed each week is repre-

sentative of the civilian population of the continental United States. The weekly samples consist of approximately 700 households, or 2,200 persons. Since data are collected for the 2 prior weeks, each week's interviewing yields information on about 4,400 person-weeks of health experience.

The questionnaire asks for reports on illnesses of all types in the previous 2 weeks, the character of the illness, whether medical attention was received, whether there was bed disability, and, if so, the number of days of bed disability in the 2-week period. It also seeks information on a number of personal and demographic characteristics.

The data would permit identification of influenza, pneumonia, and other specific diseases as reported by the respondents, but the reliability of such diagnostic information from household reports is questionable. In any event, the interview respondent would not be able to differentiate Asian influenza from other respiratory diseases of similar symptoms and comparable severity. Even for medically attended cases a specific diagnosis is not always made. Accordingly, the special tabulation was applied to the broad group of acute upper respiratory diseases.

In September the National Health Survey began compiling and verifying the weekly data on this group of diseases. The first report appeared on November 2 in the form of a press release. It estimated, for the week ending October 5, the number of new cases involving bed disability (that is, requiring 1 day or more in bed) and the average number of persons in bed each day as a result of these diseases and gave the estimated total number of new cases and of person-days of bed disability from mid-July through October 5. Thereafter a provisional tabulation was issued each week carrying a chart of the new cases and the average number of persons in bed, together with supporting data and technical notes.

Later the cases under consideration were further classified according to whether they had been medically attended, according to age in four age groups, and according to length of time in bed. Calculations were made for various time periods between June 30 and the end of October, and the resulting data are presented in this paper for the first time.

New Cases and Days in Bed

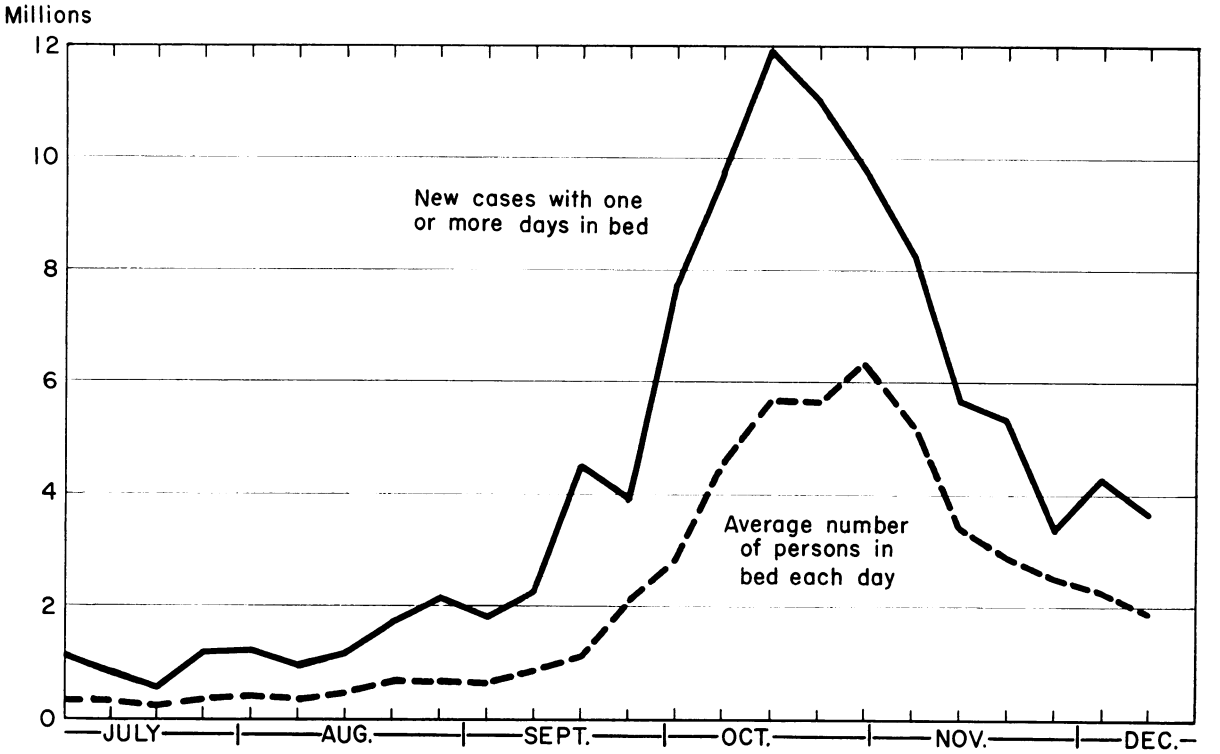
The two series of statistics that were obtained on a week-to-week schedule to trace the course of the epidemic were intended to show the incidence and the prevalence of cases of respiratory disease requiring 1 day or more in bed. Incidence is defined as the number of new cases starting in a specified interval of time, and prevalence, as the number of cases existing at any one time or the average number existing during some period. The incidence series is of greater interest from the epidemiological standpoint, while the prevalence data tend to reflect the social and economic impact of the epidemic by showing the average number of persons incapacitated during the week. A description of the manner of calculating these statistics will facilitate interpretation of the results.

New cases: Information collected in each household interview covers the previous 2 weeks but permits determination of the calendar week in which each case began. Therefore, from successive weekly samples two independent estimates are obtained for each calendar week. The figures presented are averages of the two estimates.

Average number of persons in bed: The prevalence series gives the average daily number of persons confined to bed during each week, and by multiplying each weekly entry by 7, the aggregate total number of days of bed disability can be computed. For this series it is possible to determine from the available data only the 2-week calendar period in which the bed-days occurred. However, a separate estimate is made each week so that estimates are available for successive 2-week periods, each overlapping 1 week with the previous period. By averaging the estimates for 2 successive 2-week periods, an estimate is obtained that relates to the overlapped calendar week. This figure is also the average daily number of bed-days of disability.

These two statistical series had quite different characteristics during the height of the recent epidemic, as may be seen in figure 1. The rise in number of new cases started from a low in mid-August and continued to a peak during the week of October 13–19, when about 12 million cases started (table 1). Almost as

Figure 1. Acute upper respiratory diseases [1] involving 1 or more days in bed: number of new cases and average number of persons in bed each day, by week, United States, July 1–December 14, 1957.



[1] Including also influenza, pneumonia, and other similar conditions.

rapidly as it had arisen this epidemic subsided. The statistics showing this drop at a season of the year when respiratory illnesses are usually climbing would have indicated that something out of the ordinary had happened, even if there had not been abundant evidence from other sources that a mild influenza was sweeping the country.

The average daily number of persons in bed started to rise later than the number of new cases, climbed less steeply, did not begin to fall until the new cases were already well past the peak, and then dropped off more slowly. At the highest point, the week of October 27–November 2, there was an average of 6,372,000 persons in bed each day.

It is of some interest that the estimated average number of persons in bed per day should have built up to a peak 2 weeks after the peak of new cases. The method of computing the prevalence index was partly responsible for this lag. As has already been mentioned, the prevalence estimate for each week is based on an average of two estimates each of which relates to a 2-week period, one period overlapping the other by 1 week. Statistically this is equivalent to a 3-week moving average with a weight of 2 given to the center week and a weight of 1 each to the week preceding and the week following this center week.

Apart from this, a lag would be expected in the prevalence figure since in any one week it is affected by a piling up of unrecovered cases that started in previous weeks. Since the usual duration of these cases appears to have been rather short, the lag resulting from this piling up might have been expected to be no more than a week. Evidence which will be presented in the next section, however, suggests that there was a tendency for the dura-

Table 1. Acute upper respiratory diseases [1] involving 1 or more days in bed: number of new cases and average number of persons in bed each day, by week, United States, July 1–December 14, 1957

Week	New cases involving 1 or more days in bed *(thousands)*	Average number of persons in bed each day *(thousands)*
June 30–July 6	1, 105	319
July 7–13	846	311
July 14–20	578	253
July 21–27	1, 203	342
July 28–Aug. 3	1, 264	425
Aug. 4–10	955	339
Aug. 11–17	1, 181	447
Aug. 18–24	1, 758	675
Aug. 25–31	2, 159	654
Sept. 1–7	1, 819	651
Sept. 8–14	2, 279	856
Sept. 15–21	4, 487	1, 152
Sept. 22–28	3, 952	2, 094
Sept. 29–Oct. 5	7, 773	2, 845
Oct. 6–12	9, 712	4, 551
Oct. 13–19	11, 933	5, 699
Oct. 20–26	11, 033	5, 665
Oct. 27–Nov. 2	9, 808	6, 372
Nov. 3–9	8, 297	5, 262
Nov. 10–16	5, 648	3, 389
Nov. 17–23	5, 305	2, 867
Nov. 24–30	3, 339	2, 518
Dec. 1–7	4. 271	2, 276
Dec. 8–14	3, 667	1, 886

[1] Including also influenza, pneumonia, and other similar conditions.

tion of stay in bed to increase slightly as the epidemic progressed.

A rather startling aspect of these national figures on acute upper respiratory disease cases is the size of the numbers. Two things must be borne in mind in this connection. First, the statistics relate to the entire civilian population of the country, approximately 168 million in number; and, second, the estimates relate to some of the commonest ailments that mankind is heir to, as well as Asian influenza. In any winter, colds, sore throats, acute bronchitis, and similar conditions will probably affect a very sizable portion of the population, many of them more than once. Since these data from the National Health Survey are available for the first time this winter, there is no way of measuring the extent to which the number of respiratory cases was higher than usual. Nevertheless, it is an impressive fact that on approximately 104 million occasions between June 30 and December 14 people took to their beds for a day or more because of illnesses of this type.

What fraction of these cases were influenza of the Asian strain? The National Health Survey household interviews yield no reliable data on this point. However, they provide the basis for interesting speculation on related matters. For example, if there is evidence from other sources that x percent of the upper respiratory disease cases during this period were Asian influenza, the survey results would suggest that by December 14 approximately $0.62x$ percent of the entire civilian population of the country had acquired some natural immunity to the Asian strain.

During this same 24-week period acute upper respiratory diseases accounted for about 363 million days of illness in bed. This total is equivalent to 994,000 person-years lost from usual activities, such as work, housekeeping, or school, and it does not include days of reduced activity when the person was incapacitated but did not go to bed. Using such data it would be possible on the basis of various plausible assumptions to make estimates of the monetary loss to the economy as a result of the upper respiratory diseases in an epidemic winter.

Length of Stay in Bed

The data on length of stay in bed tallied from the National Health Survey questionnaires provided a measure of the severity of cases of acute upper respiratory diseases. This information has to be treated with caution, however, since the bed stay for some of the cases had not terminated at the beginning of the interviewing week. In order to deal only with cases likely to be complete, analysis of length of stay in bed is restricted to cases that began during the second week before the week of interview. Since these cases began at least 7 days before the end of the 2-week period, cases requiring less than 7 days in bed were complete. The most that can be said about the length of time in bed for the other cases is that it was 7 days or more. Table 2 shows the frequency distribution of length of stay in bed for cases starting during 4 periods cor-

responding roughly to the 4 calendar months of July, August, September, and October.

Although the number of cases in the sample during July and August was quite small and the errors of sampling are therefore relatively high, the frequency distributions in table 2 point to an increase in the length of bed-stays during October as compared with earlier months. For example, the percentages of cases resulting in 3 or more days in bed were about 46 in July, 42 in August, 44 in September, and 56 in October.

For the whole of the 17-week period from June 30 to October 26 only about 1 case in 8 kept the person in bed for a week or more. This seems to confirm evidence from many other sources that the great majority of the cases during this period were mild.

Age Variations

Acute upper respiratory diseases causing 1 or more days of bed disability occurred more frequently among children and adolescents than among adults during the entire 4-month period. As shown in figure 2, the weekly rate of occurrence of new cases per 1,000 population was highest for the age group 5–19 years, somewhat lower for the age group 0–4 years, and lowest for the two age groups over 20 years old.

Although the average rate of occurrence of acute respiratory diseases for the 4-month period varied with age, little difference is found among the rates for the different age groups during July and August. The rates of occurrence for the four age groups are all quite low and similar in size (table 3). Although these rates may appear to vary inversely with age, care should be taken in inferring from these data any differences between the age groups for the July-August period, since these low rates are subject to relatively large sampling errors.

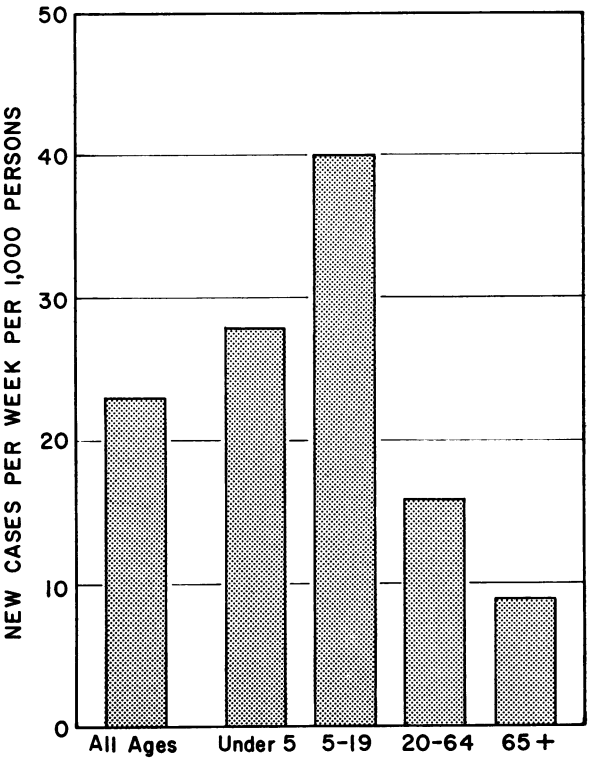
During October the age differences were marked. The average weekly rate of occurrence of new cases was highest for the age group 5–19 years, which had a weekly rate of 111 cases per 1,000 persons. The 0–4 year age group was next, with a weekly rate of 62 cases per 1,000 persons, while the two older age groups had the lowest rates, 41 for the age group 20–64 years and 21 for the age group 65 years and above. It should be noted that the age group

Table 2. Acute upper respiratory diseases [1] involving 1 or more days in bed: percentage distribution of new cases by length of time in bed, United States, June 30–October 26, 1957

Number of days in bed	Period of onset				
	June 30–Oct. 26	June 30–Aug. 3	Aug. 4–Aug. 31	Sept. 1–Sept. 28	Sept. 29–Oct. 26
All cases	100	100	100	100	100
1–2	48	54	59	55	44
3–6	38	36	30	32	42
7 or more	13	10	12	12	14

[1] Including also influenza, pneumonia, and other similar conditions.

Figure 2. Acute upper respiratory diseases [1] involving 1 or more days in bed: average number of new cases per week per 1,000 persons, by age group, United States, June 30–October 26, 1957.



[1] Including also influenza, pneumonia, and other similar conditions.

Table 3. Acute upper respiratory diseases [1] involving 1 or more days in bed: average number of new cases per week and average number of new cases per week per 1,000 persons, by time period and age group, United States, June 30–October 26, 1957

Time period and age group	Average number of new cases per week *(thousands)*	Average number of new cases per week per 1,000 persons in age group
June 30–Oct. 26		
All ages	3, 927	23
0–4	534	28
5–19	1, 797	40
20–64	1, 460	16
65 and over	136	9
June 30–Aug. 31		
All ages	1, 243	7
0–4	279	15
5–19	406	9
20–64	517	6
65 and over	40	3
Sept. 1– 28		
All ages	3, 181	19
0–4	385	20
5–19	1, 490	33
20–64	1, 154	13
65 and over	152	10
Sept. 29–Oct. 26		
All ages	10, 135	60
0–4	1, 198	62
5–19	4, 936	111
20–64	3, 684	41
65 and over	317	21

[1] Including also influenza, pneumonia, and other similar conditions.

5–19 years not only had the highest rate of occurrence but also accounted for a substantial proportion of the total number of cases. Although this age group represents only 25 percent of the total population of the country, it accounted for almost 50 percent of the total new cases that occurred during October.

The relationship between age and days spent in bed due to acute respiratory diseases presents a pattern similar to that shown by the relationship between rate of occurrence and age. During the 4-month period the average number of persons in bed each day per 1,000 population was higher for children and adolescents than for adults (table 4). The age group 5–19 years had the highest rate, 17 persons in bed per day per 1,000 persons. The age group 0–4 years had a rate of 10 per 1,000 persons, while the age groups 20–64 and 65 and above had lower rates of 7 and 5, respectively.

During July and August the average numbers of persons in bed per day per 1,000 persons

Table 4. Acute upper respiratory diseases [1] involving 1 or more days in bed: average number of persons in bed each day and average number of persons in bed each day per 1,000 persons, by time period and age group, United States, June 30–October 26, 1957

Time period and age group	Average number of persons in bed each day *(thousands)*	Average number of persons in bed each day per 1,000 persons in age group
June 30–Oct. 26		
All ages	1, 714	10
0–4	201	10
5–19	778	17
20–64	655	7
65 and over	80	5
June 30–Aug. 31		
All ages	467	3
0–4	93	5
5–19	148	3
20–64	201	2
65 and over	25	2
Sept. 1–28		
All ages	1, 281	8
0–4	145	8
5–19	565	13
20–64	478	5
65 and over	92	6
Sept. 29–Oct. 26		
All ages	4, 681	28
0–4	474	25
5–19	2, 271	51
20–64	1, 756	19
65 and over	181	12

[1] Including also influenza, pneumonia, and other similar conditions.

Table 5. Acute upper respiratory diseases [1] involving 1 or more days in bed: number and percentage of cases which were medically attended among all new cases, by date of occurrence, United States, June 30–October 26, 1957

Time of occurrence	New cases *(thousands)*	Medically attended *(thousands)*	Percent medically attended
June 30–Oct. 26	64, 037	32, 991	52
June 30–July 20	2, 529	1, 629	64
July 21–Aug. 3	2, 467	1, 696	69
Aug. 4–17	2, 136	1, 305	61
Aug. 18–31	3, 917	2, 260	58
Sept. 1–14	4, 098	1, 889	46
Sept. 15–28	8, 439	3, 477	41
Sept. 29–Oct. 12	17, 485	8, 323	48
Oct. 13–26	22, 966	12, 412	54

[1] Including also influenza, pneumonia, and other similar conditions.

were similar and relatively low for each of the age groups. During October, however, substantial differences between the age groups occurred. For the age group 5–19 years, the average number of persons in bed each day was 51 per 1,000 persons, more than twice the figure for any of the other age groups. Almost one-half of the total number of bed-days of disability that occurred during October were experienced by persons in this age group, although, as was mentioned previously, the age group constitutes only one-quarter of the country's population.

Medical Attendance

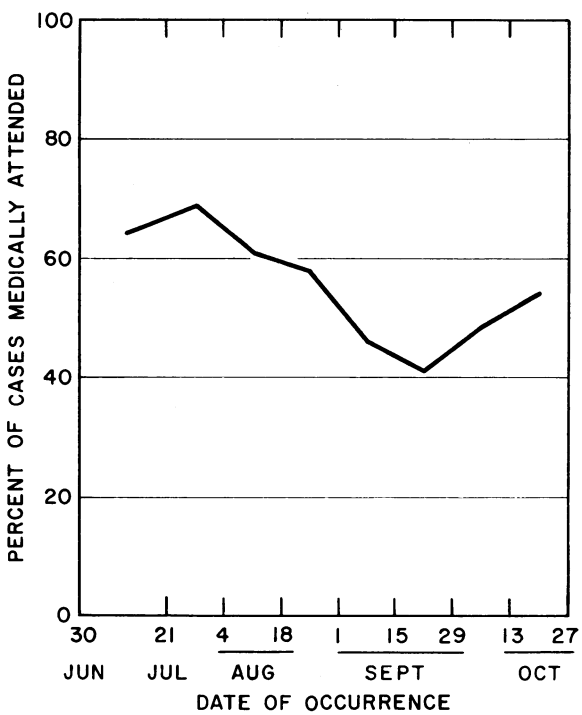
In the household interviewing project of the National Health Survey, medically attended cases are those for which a doctor was consulted at home, at work, at the physician's office, in a clinic, or over the telephone.

Table 5 and figure 3 show, by date of occurrence, the proportion of cases that were medically attended among all new cases of upper respiratory conditions causing bed disability. During early and middle summer, when the frequency of these conditions was low, the proportion medically attended was around 60 to 70 percent. The proportion decreased to about 40 percent in late September and then turned upward to about 50 percent in October, when the reported frequency of bed cases of acute respiratory conditions was at a peak.

For the entire period the proportion of medically attended cases was higher for the very young and for persons over age 65 years than for persons in the school or working ages. The proportion of cases medically attended decreased in September and increased in October within each age group as well as in the total population (table 6).

During the period of this report there were undoubtedly changes in the proportions of the various types of conditions reported under the broad category of acute upper respiratory conditions. This, together with changes in the volume of acute conditions, is probably reflected in the observed pattern of medical attendance. There are no comparable data for previous years, and the reason for the pattern of medical attendance seen here is a matter of conjecture.

Figure 3. Acute upper respiratory diseases [1] involving 1 or more days in bed: percentage of cases which were medically attended among all new cases, by date of occurrence, United States, June 30–October 26, 1957.



[1] Including also influenza, pneumonia, and other similar conditions.

Table 6. Acute upper respiratory diseases [1] involving 1 or more days in bed: percentage of cases which were medically attended among all new cases, by month of occurrence and age, United States, July–October 1957

Month	Age group				
	All ages	0–4	5–19	20–64	65 and over [2]
July–October	52	59	51	48	58
July and August	62	71	69	53	57
September	43	52	43	39	45
October	51	55	51	49	65

[1] Including also influenza, pneumonia, and other similar conditions.

[2] Figures for persons 65 and over are based on small numbers of cases in any given month and should be interpreted with caution.

It is possible that part of the increased volume of new cases in September is due to a normal seasonal increase in minor respiratory conditions for which medical attention is seldom sought. The October increase in the percentage of cases attended by a physician may result from the relatively heavier impact of influenza and an accompanying increase in severity, indicated by the longer stay in bed.

It is noteworthy that the lower proportion of cases which were medically attended in the latter half of the reporting period does not imply a decreased total volume of medical care. In the last 2 weeks of October there were about 12.4 million medically attended cases (table 5). This is greater than the number of medically attended cases during the entire 9 weeks of July and August.

The 12.4 million cases with medical consultation in the last half of October are cases for which the person went to bed. Estimates from other current National Health Survey data on acute respiratory diseases show that there were about half again as many cases with medical consultation but no bed disability. It can therefore be estimated that in this concentrated period of time approximately 18 million cases of acute upper respiratory conditions had medical attention, representing a tremendous volume of consultation and treatment provided by the medical profession.

Reliability of Data

Approximate sampling errors have been calculated for the estimated number of new cases each week. The sampling error varies somewhat from week to week, but 15 percent has been a typical relative error. This means that the estimated number of new cases for 2 weeks out of 3 should be within 15 percent of the figure that would be obtained from a complete enumeration, and it would be expected to be within 30 percent of a complete count in 19 out of 20 weeks.

Relative sampling errors for average number of persons in bed each day for any given week are of the same order of magnitude as for new cases. Estimates in adjacent weeks of average number of persons in bed are not entirely independent of one another, however, whereas each weekly estimate of new cases is independent of estimates for other weeks.

The sampling error for estimated proportion of persons with 3 or more days of bed disability also varies from week to week, but it is near 10 percent.

For monthly estimates, sampling errors are about 50 percent of those for the corresponding weekly figures. For estimates which refer to the entire 4-month period, sampling errors are about 25 percent of those for corresponding weekly data.

In considering reliability of items for which sampling errors have not been presented, two suggestions are offered. First, samples in any given week are quite small; consequently, a figure for any week or for the change from one particular week to another is subject to substantial sampling error and to fairly high risk of error from nonsampling sources. Second, it is desirable to focus attention on the general level or trend indicated by the collective evidence of several adjacent weeks, rather than on the level in any single week or the change from one week to the next. Similarly, samples for some subclasses shown are small, and there is advantage in considering the pattern reflected through several related subclasses.

The estimates of sampling error presented here do not allow for errors of response and nonreporting.