# THE CONTROL OF ACUTE RESPIRATORY ILLNESS BY ULTRA-VIOLET LIGHTS

## STUDY NO. 2

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THE STUDY of acute respiratory illness was conducted in two communities, Pleasantville and Mt. Kisco, in Westchester County, New York. Pleasantville is thirty-one miles (one hour by train) from the central part of New York City, and Mt. Kisco is six miles north of Pleasantville. This investigation was carried on in cooperation with Dr. Mildred W. Wells, of the Westchester County Department of Health, who initiated a study of measles and chicken pox in the two communities.

The objective of the investigation conducted by the Westchester County Department of Health was a study of the channels of flow of measles and chicken pox through a suburban community and investigation of the possibilities of interrupting these channels by ultra-violet irradiation of the atmospheres shared by the children of one community, Pleasantville. The other community, Mt. Kisco, was to serve as a control for comparison with the experimental community.

According to Dr. Wells, the original plan of her study did not include observation of the occurrence of acute respiratory illness such as colds "because of the short incubation period believed to be characteristic of such illnesses, the multiplicity of exposure in and out of the school, and the confusion of the patterns of spread by the inclusion of adults in the population at risk." However, the Milbank Memorial Fund, recognizing the complexity of the problem, felt it was worth while

[1] From the Milbank Memorial Fund. This is the second of a series of papers dealing with a study of the control of acute respiratory illness by ultra-violet lights.

This paper, the second in the series, includes all of the data presented before the Epidemiological Section of The American Public Health Association's Seventy-Eighth Annual Meeting in St. Louis, Missouri, November 2, 1950, and published as Part I in the December, 1950 issue of the *American Journal of Public Health*. The data from this particular paper are included with the permission of the *American Journal of Public Health*.

to study the morbidity from colds and other acute respiratory illnesses in the two communities. The Fund is greatly indebted to Dr. Wells for her ready and continued cooperation in this endeavor.

A description of the type of ultra-violet lights and their installation in Pleasantville, the experimental community, is quoted from a paper published by Wells and Holla (1).

"During the first three months of 1946, ultra-violet lights were placed in all the schools of Pleasantville, in three of the Sunday schools, in the Children's Room of the Library, in the village movie, and in the Department of Health Clinic rooms. During the autumn of 1946, three churches were equipped, the Girl and Boy Scout huts, and the most patronized of the soda fountains. Not until December, 1947, was it possible, however, to irradiate the Catholic Church. Only one group refused cooperation, the Christian Scientists. Although the village movie was one of the first places equipped with lights, the several designs used have not been wholly satisfactory.

"Indirect fixtures containing thirty-watt hot cathode germicidal lamps were mounted seven feet from the floor on the end walls on the basis of two units per typical schoolroom. Expressed in the tentative terminology of the Society of Heating and Ventilating Engineers, the average intensity throughout the irradiated zone of a typical room was 19 milliwatts per sq. ft. (19 microwatts per sq. cm.) or a total lethal irradiation of 61 foot-watts for the irradiated volume of 3,200 cu. ft. Care was at all times taken to see that intensities at the working level were below the maximum specified by the Council of Physical Medicine of the American Medical Association for seven-hour occupancy (2)."

Ultra-violet lights were not placed in the homes. The hours per school day spent by children under the ultra-violet lights varied from three for those in kindergarten to six for older children.

## Data and Method of Study

There are certain strict requirements which must be met if

an experiment such as this is to have validity. The requirements are as follows:

1. The control population must be similar in all essential respects to the experimental population except for the specific factor introduced into the latter.
2. The observation of results must be comparable for the control and experimental populations.
3. Relevant data capable of evaluation and statistical study must be obtained for both populations with equal care and exactness.

The two communities were fairly comparable with respect to size. According to the 1940 Census, there were 4,454 persons living in the incorporated village of Pleasantville and 5,941 in the village of Mt. Kisco. Sixteen per cent of the population of Pleasantville were foreign born compared with 21 per cent in Mt. Kisco. In both communities the foreign born were chiefly Italian. Negroes formed a very small proportion of the population in either place; about 1 per cent in Pleasantville and 3 per cent in Mt. Kisco.

The periodic survey of families for the purpose of collection of illness records was the method employed in this study. All families in which there were one or more children attending grade school or high school in each of the two communities were included in the study. These families were visited every 28 days during the three school years September to June, 1946–1949. On each visit to the family, inquiry was made about acute respiratory illnesses which had occurred among their members during the past four weeks. Visits were not made during the summer months because it was believed that observation during that period would be incomplete since some children go to summer camps and often the entire family is away from the community for part or all of the summer.

Each family visitor was given a list of the common acute respiratory illnesses in the terminology generally used by a family informant. The list is as follows:

1. Cold, head cold, sneezing attack, sinusitis.

2. Sore throat, tonsillitis, septic sore throat, streptococcus sore throat, pharyngitis, quinsy, laryngitis, hoarseness, swollen cervical glands.

3. Bronchitis, chest cold, tracheitis, croup, cough.

4. Grippe, influenza, intestinal influenza or grippe.

5. Pneumonia, pleurisy, and asthma.

6. Earache with a cold or without a cold, otitis media, running ear, and mastoiditis.

Inquiry was made about the presence or absence of each type of illness among members of the family.

7. Inquiry was made concerning certain chronic conditions, as asthma and rheumatic fever.

The sickness record included the nature of the illness as stated by the informant, usually the mother, the date of onset and duration of illness, the onset and duration of disability and the number of days in bed, the amount of medical care and, if hospitalized, the number of days in the hospital.

The sickness record also included (1) the order in which head, throat, or chest was involved in the illness; and (2) data concerning certain symptoms, that is, whether the illness was accompanied by aching in body or head, by cough, by fever, and by upset stomach, nausea, vomiting, or diarrhea.

Acute respiratory illness as reported in this analysis includes head colds or coryza, colds with sore throat, tonsillitis and septic sore throat, colds with chest complications, tracheitis, bronchitis or cough, and influenza. Their distribution in order of frequency was as follows: head colds, 47 per cent; colds with sore throat, 21 per cent; tonsillitis, 5 per cent; colds with chest symptoms, 22 per cent; and influenza or grippe, 5 per cent. Cases of intestinal influenza or intestinal grippe are shown separately.

The method of measurement of results of an experiment such as that conducted in Westchester County is a comparison of events that follow after the introduction of ultra-violet lights in one community with events that occur at the same time in another community where that factor is not present. The events in this instance are attacks of acute respiratory illness,

especially among school-age children. Since illness as it is commonly understood includes a subjective element, it is extremely important that the survey of illness be conducted according to standards which are applied and rigidly adhered to in both communities.

The standards which were set are as follows:

1. Visiting must be done with the same regularity in both communities.
2. The quality of work done by all of the visitors must be as nearly equal as possible.

There were three family visitors and one supervisor in each community. No visitor was to make more than ten visits a day. A careful check of the visiting rate in each community was made day by day and month by month to be sure that the work was not being done in undue haste in one community as compared with the other. A constant check of the quality of the work of the different family visitors was made. Every effort was made to keep the visiting at an equal rate and to maintain an equal quality of work in both communities.

It was thought wise to check the school records of absences for the children in the study families in each community to see if there were any lack of comparability between the two in this respect. Consequently, the data of absences were obtained for the children attending public schools in Pleasantville and in Mt. Kisco. These data were obtained for two three-month periods, October–December, 1945 (the year before the installation of the ultra-violet lights in Pleasantville) and March–May, 1946, the period when the lights were being installed. In neither period was there any significant difference between the two communities in the proportion of children absent because of illness. Also, there were no important differences in the incidence of absenteeism from all causes. In fact, the two communities were strikingly similar in these respects. For example, the proportions with no record of absence because of illness were 15 per cent for Pleasantville compared with 14 per cent for Mt. Kisco in the three-month period October–

December of 1945 and 20 per cent in each community during the period March–May, 1946.

Visiting was started in both communities on February 1, 1946. The mean number of families visited during the three school years of the special study was 530 in Pleasantville and 570 in Mt. Kisco. The families in Pleasantville included some 2,100 persons and those in Mt. Kisco 2,400. In each group of families there were about 900 school-age children and 180 to 200 preschool-age children.

## Characteristics of the Two Communities

In the study of acute respiratory illness, data were obtained from each family which reveal certain social characteristics of the family. The data relevant to this analysis were: a census

Table 1. Loss of families in each year due to moving or refusal to cooperate, Pleasantville and Mt. Kisco, February, 1946–June, 1949.

| Classification | Families Visited | | | |
|---|---|---|---|---|
| | February–June, 1946 | September, 1946–June, 1947 | September, 1947–June, 1948 | September, 1948–June, 1949 |
| | Rate per 100 | | | |
| *Moved* | | | | |
| Pleasantville | — | 5.7 | 6.4 | 5.1 |
| Mt. Kisco | — | 4.7 | 5.3 | 5.8 |
| *Refused to Cooperate* | | | | |
| Pleasantville | 0.6 | 1.7 | 0.8 | 0.6 |
| Mt. Kisco | 1.7 | 0.7 | 0.3 | 0.2 |
| | Number of families | | | |
| *Total* | | | | |
| Pleasantville | 508 | 541 | 533 | 513 |
| Mt. Kisco | 530 | 550 | 584 | 602 |
| *Moved* | | | | |
| Pleasantville | — | 31 | 34 | 26 |
| Mt. Kisco | — | 26 | 31 | 35 |
| *Refused to Cooperate* | | | | |
| Pleasantville | 3 | 9 | 4 | 3 |
| Mt. Kisco | 9 | 4 | 2 | 1 |

of the present household by age and sex of the members, martial status of the head of household, occupation and place of employment of all employed members, and highest education attained for all members.

Before examination of the social characteristics of the two communities, it is of interest to consider the loss of families in each study year due to moving of the family or unwillingness to cooperate. Table 1 shows these data. The moving rates were fairly similar in the two communities year by year. Also, they were approximately the same in Pleasantville compared with Mt. Kisco, from 5 to 6 per cent annually. The rate of refusal to cooperate was low in both communities; less than 1 per cent of the families asked to be omitted from the study. It would certainly seem that both communities were interested in the study.

Table 2 shows that the age distribution of the study population in the two communities was strikingly similar. Selection of families with school-age children would be expected to result in a comparable population unless some particular factor op-

Table 2. Percentage distribution of the population by age, Pleasantville and Mt. Kisco, September, 1947–June, 1948.[1]

| Age Groups | 1947–1948 | | |
|---|---|---|---|
| | Both Communities | Pleasantville | Mt. Kisco |
| Total | 100.0 | 100.0 | 100.0 |
| 0– 4 | 8.6 | 8.3 | 8.8 |
| 5– 9 | 14.3 | 14.6 | 14.1 |
| 10–14 | 12.1 | 12.4 | 11.9 |
| 15–19 | 12.4 | 11.3 | 13.3 |
| 20–24 | 4.7 | 4.6 | 4.8 |
| 25–34 | 10.2 | 9.1 | 11.1 |
| 35–44 | 20.4 | 21.0 | 19.9 |
| 45–54 | 10.6 | 10.8 | 10.4 |
| 55–64 | 3.4 | 4.0 | 2.9 |
| 65+ | 3.3 | 3.9 | 2.8 |
| Total Persons | 4,866 | 2,312 | 2,554 |

[1] Includes families observed 30 weeks or more during September, 1947–June, 1948.

erated in one community and did not affect the other community.

The age of husbands and wives (Table 3) was similar in both communities. The mean age of household heads in Pleasantville was 45 compared with 44 in Mt. Kisco. The corresponding mean ages of the wives were 41 and 40 in the respective communities.

Table 3. Mean age of heads of household and wives in Pleasantville and Mt. Kisco, September, 1947–June, 1948.[1]

| Classification | Mean Age | Standard Deviation |
|---|---|---|
| *Pleasantville* | | |
| Head of Household | 45.1 ± 0.39 | 8.52 |
| Wives | 40.8 ± 0.38 | 7.76 |
| *Mt. Kisco* | | |
| Head of Household | 44.3 ± 0.38 | 8.62 |
| Wives | 39.6 ± 0.34 | 7.35 |

[1] Includes families observed 30 weeks or longer, September, 1947–June, 1948.

The median size of family in Pleasantville and Mt. Kisco is shown in Table 4. The data are arrayed according to the age of the head of the household. In each community the size of the family increases as the age of the head increases. The two communities were strikingly similar with respect to the size of the family.

In 8 per cent of the families in Pleasantville and 9 per cent of those in Mt. Kisco, the head of the household was widowed, divorced, or separated from his or her spouse.

Table 4. Median size of family according to age of head of the household, Pleasantville and Mt. Kisco, 1947–1948.[1]

| Age of Head of Household | First Quartile | Median | Third Quartile | First Quartile | Median | Third Quartile |
|---|---|---|---|---|---|---|
| | Pleasantville | | | Mt. Kisco | | |
| All Ages | 4.15 | 4.88 | 5.80 | 4.15 | 4.87 | 5.98 |
| 25–39 | 4.28 | 4.84 | 5.57 | 4.15 | 4.72 | 5.72 |
| 40–54 | 4.03 | 4.85 | 5.84 | 4.08 | 4.88 | 5.96 |
| 55+ | 4.30 | 5.13 | 6.48 | 4.63 | 5.63 | 6.58 |

[1] Includes families observed thirty weeks or longer, September, 1947–June, 1948.

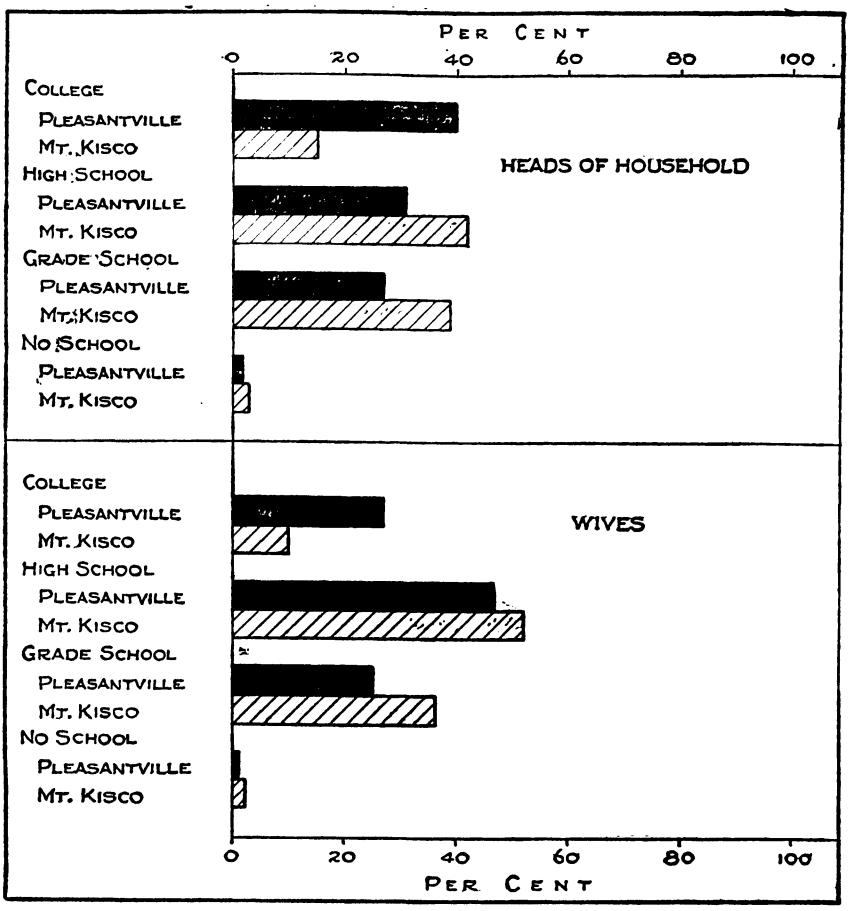


Fig. 1. Distribution of household heads and wives according to highest education attained, Pleasantville and Mt. Kisco.

Figure 1 shows for each community the distribution of the heads of household and the wives according to the educational attainment. The upper section of Figure 1 shows the data for household heads and the lower section shows the data for the wives. There was a definite difference between the two communities with respect to education of the head of the household. For example, 40 per cent of the heads of household in the Pleasantville families had a college education compared with 15 per cent in Mt. Kisco. The same differences were genrally true of the wives in the two communities.

Figure 2 shows the household heads in each community dis-

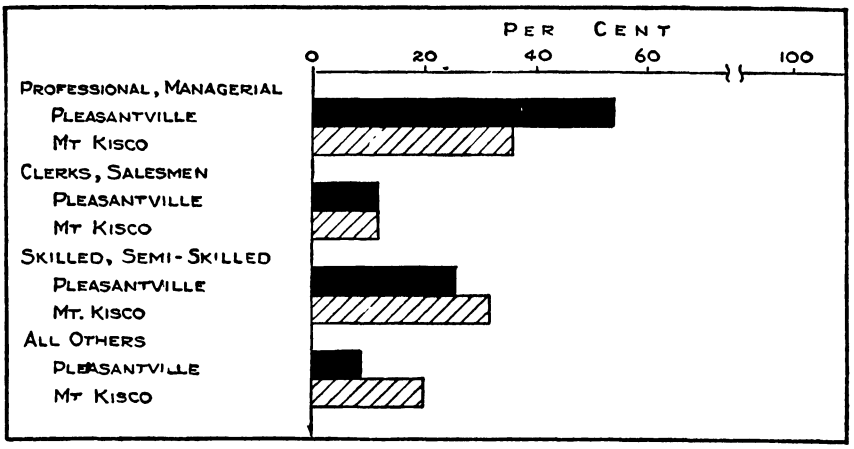


Fig. 2. Distribution of household heads according to occupational class, Pleasantville and Mt. Kisco.

tributed according to occupational class (3).[2] Here again there are marked differences between the two communities. Fifty-four per cent of the household heads in Pleasantville were in the professional or managerial class compared with 36 per cent in Mt. Kisco. Twelve per cent in each community were in the class "clerks and salesmen." The household heads whose occupation was classed as "skilled, semi-skilled, or unskilled (all other)" formed a higher proportion of the total in Mt. Kisco than was true of Pleasantville.

Pleasantville and Mt. Kisco are suburban communities which are not entirely self-maintained, that is, they do not afford employment for their total employed population. Consequently, there is a flow of employed persons out of the community and back into the community each working day. It is possible to classify the families in each community according to whether one or more members worked outside the community.

Table 5 shows the families in Pleasantville and Mt. Kisco classified according to commuter status. It is apparent that the two communities differ markedly with respect to the proportion classed as commuter families. In Pleasantville 76 per cent of

[2] Coding of occupational class was based upon the Alphabetical Index of Occupations and Industries—Sixteenth Census of the United States: 1940. U. S. Department of Commerce, Bureau of the Census.

| Classification of Families | Per Cent of Families | Status of Family | |
|---|---|---|---|
| | | Commuter | Non-Commuter |
| Pleasantville | 100.0 | 75.9 | 24.1 |
| Mt. Kisco | 100.0 | 53.3 | 46.7 |

Table 5. Families classified according to commuter status in Pleasantville and Mt. Kisco.

the families had one or more commuters in them compared with 53 per cent in Mt. Kisco.

To summarize briefly, the two communities were comparable with respect to (1) the loss of families due to moving or refusal to cooperate; (2) age distribution of the family members; (3) age of husbands and wives; and (4) size of family. There were, however, marked differences between the two communities in the educational attainment of husbands and wives, in the occupational class, and in commuter status of the family.

It will be necessary to find out whether differences in occupational class and commuter status of the family do affect the illness rates in the two communities.

## Incidence of Minor Respiratory Illness

The incidence of acute respiratory illness for persons of all ages and for those of school age is shown in Table 6 for Pleasantville and Mt. Kisco in each of the three study years. In each year and in both age groups the incidence of reported illness was somewhat higher in Pleasantville than in Mt. Kisco.

Table 6. Incidence of acute respiratory illness, September–May.

| School Year and Community | All Ages | School-Age Children 5–18 Years |
|---|---|---|
| | Rate Per 1,000 Population | |
| *1946–1947* | | |
| Pleasantville | 1,446 | 2,007 |
| Mt. Kisco | 1,297 | 1,682 |
| *1947–1948* | | |
| Pleasantville | 1,405 | 1,827 |
| Mt. Kisco | 1,298 | 1,671 |
| *1948–1949* | | |
| Pleasantville | 1,449 | 1,972 |
| Mt. Kisco | 1,398 | 1,779 |

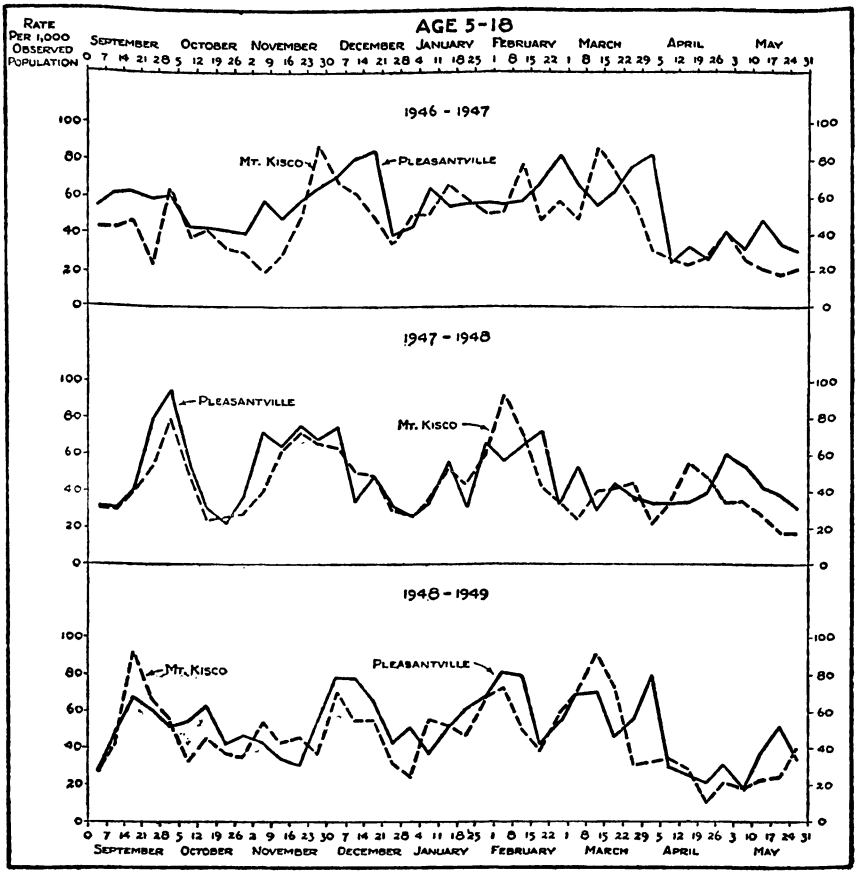


Fig. 3. Weekly incidence of acute resipratory illness among persons aged 5–18 (school ages) in Pleasantville and Mt. Kisco, September to May, 1946–1947, 1947–1948, and 1948–1949. (Pleasantville protected by ultra-violet lights in the schools.)

A comparison of the two communities with respect to the seasonal incidence of acute respiratory illness is of interest. Figure 3 shows the illness rate for school-age children in each week of each of the three school years, including the months September to May. The heavy line indicates the rates for Pleasantville and the broken line those for Mt. Kisco. Considering the fact that two different communities are being compared, there was a surprising degree of uniformity in the seasonal incidence among school children, especially during the second and third years of the study, 1947–1948 and 1948–1949.

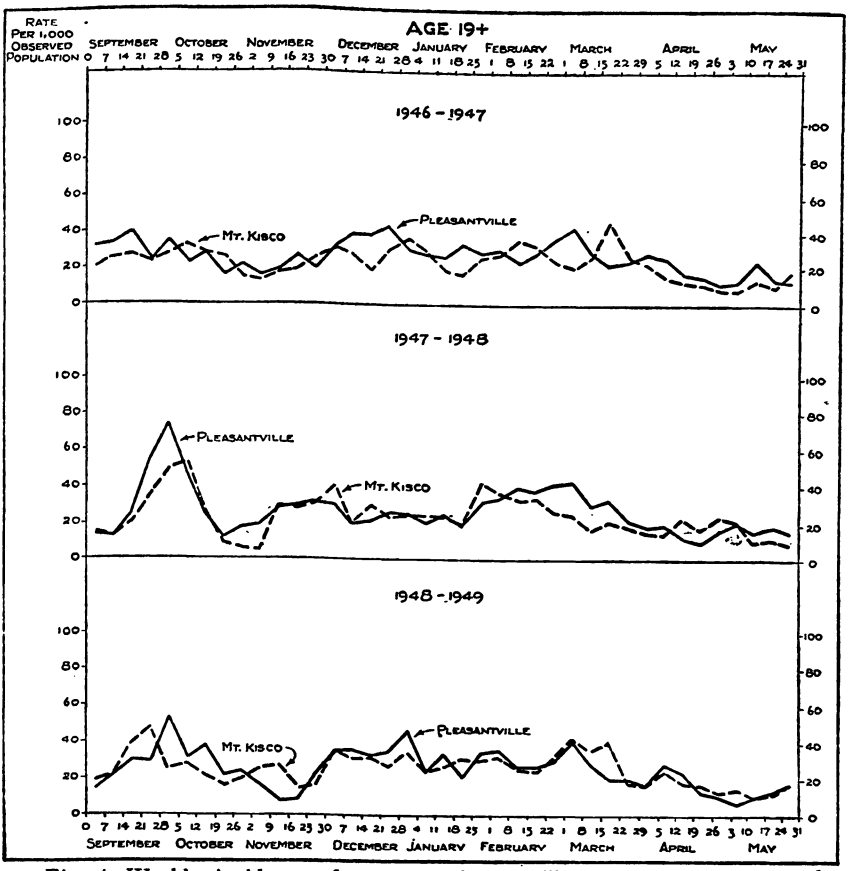


Fig. 4. Weekly incidence of acute respiratory illness among persons aged 19 and over in Pleasantville and Mt. Kisco, September–May, 1946–1947, 1947–1948, and 1948–1949. (Pleasantville protected by ultra-violet lights in the schools.)

From these data there appear to have been what may be termed as four epidemic periods, that is, periods of relatively high incidence of acute respiratory illness. One period in September, the second in November, the third in the latter part of January and February, and the fourth in April or May. These rates are based upon observation of about 900 children observed in each week in each community. Consequently, the fluctuations in the weekly rates cannot be attributed to the influence of small numbers.

Figure 4 shows the same type of data for persons aged 19 and over in the two communities. The weekly incidence in each

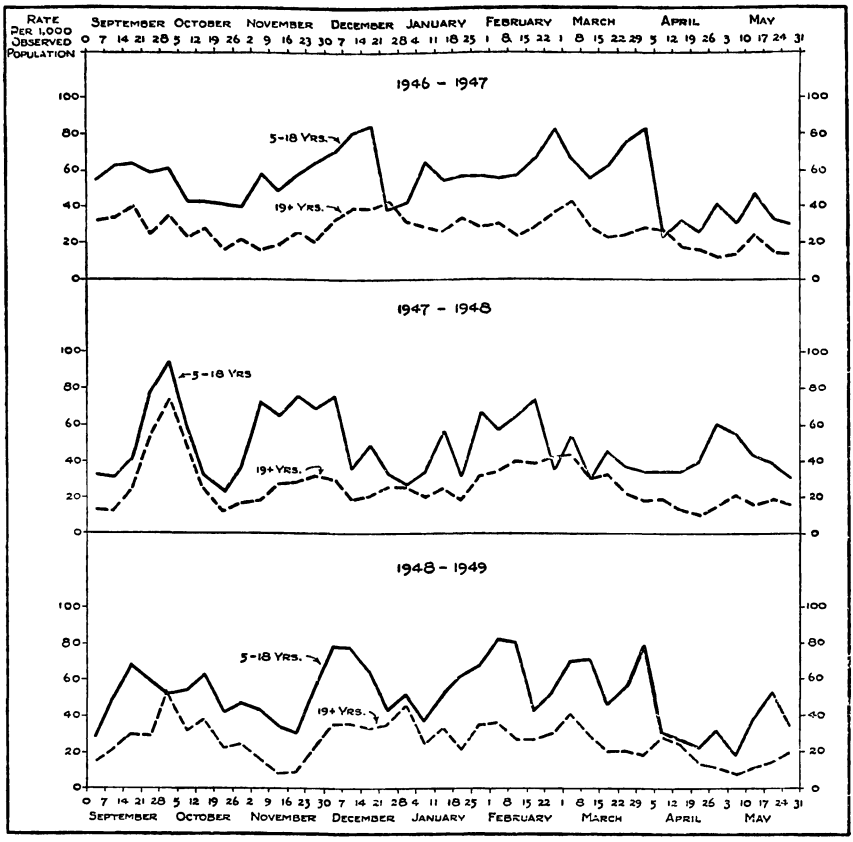


Fig. 5. Comparison of the weekly incidence of acute respiratory illness among children aged 5–18 and adults 19 years and older in each school year in Pleasantville.

year was fairly similar in both communities. In the second year, during the last week of September and the first week of October, the incidence of acute respiratory illness was relatively high among adults, just as it was among school-age children. However, with that exception, there were no particularly marked variations in the level of the rates week by week as was true of the school-age children.

There were about 180 to 200 preschool-aged children in the families in each community. Because of the small numbers, the illness experience of these children during the three school years —9, 1946 to 5, 1948—has been combined. Figure 5 presents a

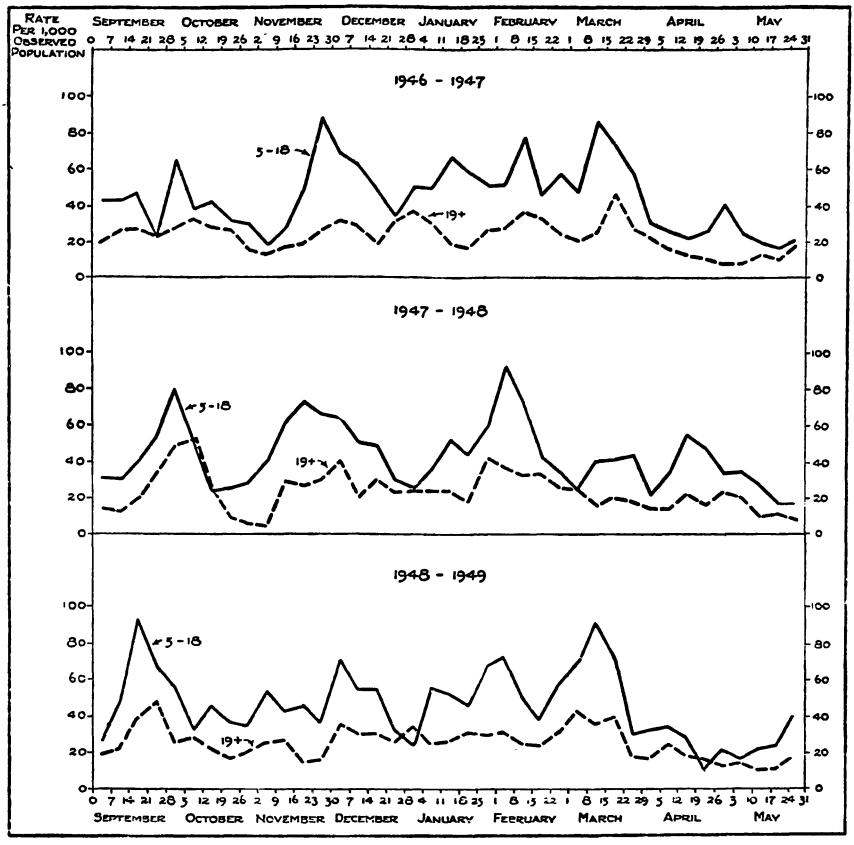


Fig. 6. Comparison of the weekly incidence of acute respiratory illness among children aged 5–18 and adults 19 years and older in each school year in Mt. Kisco.

comparison of the weekly incidence of acute respiratory illness in the two communities. In both communities the incidence was highest in September, November, and early December. The rates of illness were also relatively high during the last week of January and during February and March. Considering the small numbers of children aged 0–4, the weekly incidence in the two communities showed considerable similarity.

Figures 6 and 7 show a comparison of the weekly incidence of acute respiratory illness among school-age children and adults in Pleasantville and Mt. Kisco, respectively, in each school year. In both communities school-age children had an incidence of illness considerably higher than that of persons

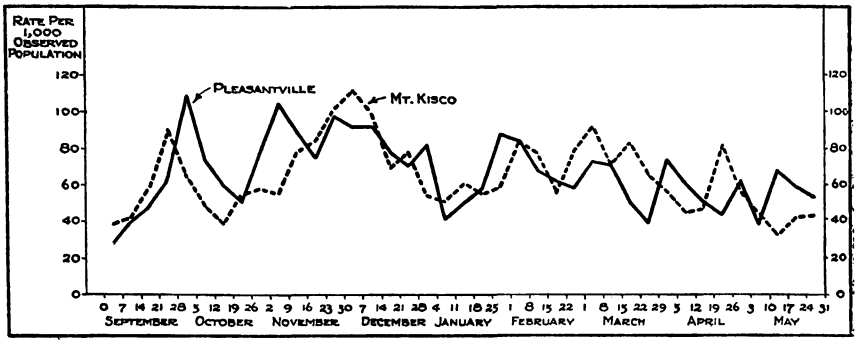


Fig. 7. Weekly incidence of acute respiratory illness among children aged 0–4 years in Pleasantville and Mt. Kisco, September–May. Data for three school years are combined, 1946–1947, 1947–1948, and 1948–1949.

aged 19 or older. This fact corresponds with data from other studies of morbidity. Aside from differences in the level of weekly incidence, the most interesting point brought out by these charts is the suggestion that in each school year the peak of incidence of illness among adults is about one week later than the peak of incidence among school-age children. This was true of both communities with the exception of the September outbreak of respiratory illness in Pleasantville in the school year 1947–1948. In that instance, at both ages, the incidence was highest during the week September 29 to October 5.

## Incidence of Intestinal Influenza

On each visit to the family, inquiry was made concerning the occurrence of intestinal influenza or grippe among the family members. These illnesses usually have digestive manifestations without respiratory symptoms and were sometimes reported as virus X or virus infection of the intestines. In the two populations studied, such illnesses occurred much less frequently than did minor respiratory illness. For this reason the data of the three school years have been combined. Figure 8 shows the weekly incidence in Pleasantville and Mt. Kisco. The most striking point brought out by Figure 8 is that intestinal influenza or grippe had a seasonal incidence which was generally similar in the two communities and was unlike the seasonal incidence noted for minor respiratory illness. The

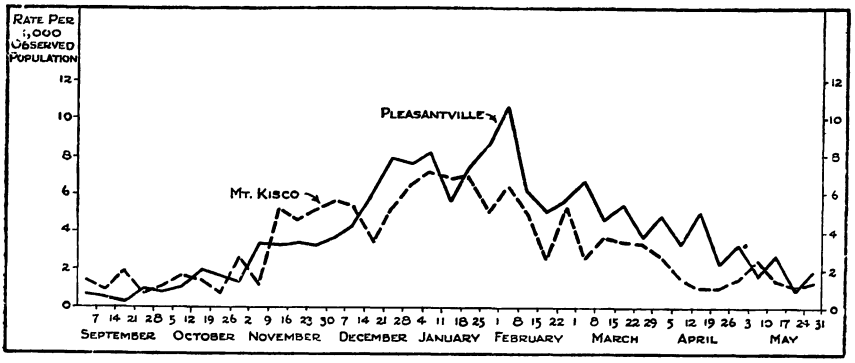


Fig. 8. Weekly incidence of intestinal influenza or grippe in Pleasantville and Mt. Kisco, September–May. Data for three school years are combined, 1946–1947, 1947–1948, and 1948–1949.

incidence rose gradually during the fall, reached its peak during the winter months, and then declined gradually to about the same level as was recorded during the fall months. It seems reasonable to conclude that these data offer an indication that illnesses specified as intestinal influenza or grippe differ epidemiologically from minor respiratory illness.

## Illness by Occupational Class of Family

Illness in each family was coded according to the occupational class of the head of the family. Consequently, it is possible to evaluate the influence of this factor on the incidence of illness. Table 7 shows the rates for persons of all ages in the families in each community classified according to three occupational classes: (1) professional and managerial; (2) clerks,

Table 7. Incidence of illness by occupational class.

| Occupational Class By Year | Pleasantville | Mt. Kisco |
|---|---|---|
| | Rate Per 1,000 | |
| *Professional* | | |
| 1946–1947 | 1,654 | 1,619 |
| 1947–1948 | 1,694 | 1,655 |
| 1948–1949 | 1,735 | 1,640 |
| *Clerks, Skilled* | | |
| 1946–1947 | 1,394 | 1,351 |
| 1947–1948 | 1,200 | 1,251 |
| 1948–1949 | 1,304 | 1,428 |
| *Semiskilled, Other* | | |
| 1946–1947 | 1,086 | 1,034 |
| 1947–1948 | 1,017 | 1,032 |
| 1948–1949 | 942 | 1,157 |

salesmen, and skilled workers; and (3) semi-skilled workers, unskilled, and domestics. The most striking point brought out by the table is that the higher the occupational class, the higher was the incidence of acute respiratory illness. This was true of both communities. Also the rates for the two communities, specific for occupational class of the household head, are much more similar than the total rates were without consideration of this particular classification. The same general pattern was evident when the data were classified according to age. It should be added that the distribution of the population by age is similar in each of the three family groups.

This table shows very definitely the influence of a subjective factor, family attitude toward illness, which may affect reported attacks. There is no good reason to believe that acute respiratory illness is selective of persons in one particular social class compared with another. If that be true, it must be concluded that what is considered as illness in one family is not necessarily considered so in another family.

It will be remembered that the proportion of families where the household head was in the "professional and managerial" occupational class was considerably higher in Pleasantville than in Mt. Kisco, and that the latter community was somewhat weighted with those in the "unskilled labor" class. This may be the reason why rates of illness in Pleasantville were consistently higher than those in Mt. Kisco.

The families in Pleasantville and Mt. Kisco differed also with respect to commuter status of the family. Table 8, which shows the families in the two communities classified according to occupational class and commuter status, indicates quite clearly that commuters were distributed similarly among the occupational classes in Pleasantville and in Mt. Kisco although they formed different proportions in each community. For example, families with one or more commuters formed about 76 per cent in each occupational class in Pleasantville; in Mt. Kisco these families constituted from 49 to 58 per cent of the total in each class.

| Occupational Class | Total | Commuter Status | |
|---|---|---|---|
| | | Commuter | Non-Commuter |
| | | Per Cent | |
| *Pleasantville* | | | |
| Professional and Managerial | 100.0 | 75.6 | 24.4 |
| Clerical and Skilled Workers | 100.0 | 76.9 | 23.1 |
| Semi-Skilled and Unskilled Workers | 100.0 | 75.2 | 24.8 |
| *Mt. Kisco* | | | |
| Professional and Managerial | 100.0 | 49.3 | 50.7 |
| Clerical and Skilled Workers | 100.0 | 58.4 | 41.6 |
| Semi-Skilled and Unskilled Workers | 100.0 | 52.7 | 47.3 |

Table 8. Families classified according to commuter status and occupational class of head of household, Pleasantville and Mt. Kisco.

From the data presented in Tables 7 and 8, it appears that occupational class of the family is an important factor in determining the illness rate of the family and the implications are that commuter status of the family has little or no effect upon the illness rate.

From the data of acute respiratory illness observed in families during three school years in Pleasantville and Mt. Kisco (September, 1946–May, 1949) it is apparent that the introduction of ultra-violet lights in the Pleasantville schools and other places where children congregate did not affect the illness rates. Also, there was no evidence that the seasonal or weekly incidence of such illness among school-age children was affected in any way. In fact, the two communities were strikingly similar in this respect.

## Discussion

Surveys of morbidity have shown that slightly more than 40 per cent of all illness (annually) is due to acute respiratory diseases (4, 5). The "common cold," which is the acute respiratory disease most frequent in occurrence, is considered the most highly infectious of the communicable diseases. Furthermore, these diseases cause a great deal of disability. In a study of illness in the Eastern Health District of Baltimore, 43 per cent of

the respiratory illnesses among males and 38 per cent among females caused interference with usual work or activities (6). In fact, among employed persons, acute respiratory illnesses accounted for 42 per cent of the days lost from work because of illness. Because these diseases are ubiquitous and are costly in terms of personal discomfort and disability, careful research is being done by many investigators to determine their etiology and epidemiology. The ultimate objective of this research is prevention and control of the acute respiratory infections.

In some instances, measures of prevention of a disease have preceded complete knowledge of its etiology. Consequently, careful research is also being done in the form of experiments in the control of respiratory diseases. Knowledge of the etiology of two types of influenza, A and B, has made it possible to produce a vaccine against these types. Studies have been and are being conducted to determine the effectiveness of the vaccine as a prophylactic measure during and before an expected influenza epidemic (7, 8, 9).

In 1934 and in the following years, Wells established the facts (1) that the air of enclosed spaces may become heavily contaminated with a number of pathogenic microorganisms, and (2) that certain specific infections may be transmitted to experimental animals by the aerial route (10, 11). These facts have led to experimentation in the control of airborne infection by means of mechanical ventilation, ultra-violet irradiation, disinfectant vapors, such as triethylene glycol, and dust suppression.

The results of experimentation with ultra-violet irradiation in preventing transfer of infection in strictly controlled environments, such as infant and children's wards in hospitals, have been summarized by the Sub-committee on Air Sanitation of the American Public Health Association as follows: "The sum total of evidence, in infant wards, seems to be that when strict aseptic conditions are maintained, ultra-violet irradiation further reduces the frequency of cross-infection." (12)

Carefully controlled studies, conducted during the period

1943–1947 among recruits at United States Naval Training Centers (Camp Sampson, New York, and Great Lakes), have indicated that ultra-violet irradiation of barracks resulted in a reduction of about 20 per cent in the rate of admissions to sick-bay because of respiratory illness (13, 14). It was pointed out that "the degree to which airborne infection is an important mode of spread of acute respiratory diseases is unknown." However, the results were considered to be sufficiently promising to warrant a continuing program of field research, though not sufficiently promising to warrant more general use of ultra-violet light as a means of control.

Another study of ultra-violet irradiation was conducted in the population of an institution for delinquent boys aged 14–17 in Washington, D. C. This investigation was carried on from July, 1941, to June, 1947. The upper air in two of the four dormitories for white boys was irradiated for 12 hours daily, floor radiation was added in 1944, and the hours were extended to 24. The other two dormitories with no irradiation served as controls. The population of each dormitory varied from 45 to about 70. Hospital admission, based chiefly on the presence of fever, was the criterion of illness. The authors of the report on this study found that the incidence of respiratory illness among the boys in the irradiated dormitories was sometimes higher, sometimes lower, than that of the control dormitories, with no evidence that ultra-violet radiation consistently effected a reduction in disease incidence (15, 16). The small population studied made the general results somewhat indeterminate.

The approach in the study in Westchester County was that of a field investigation in epidemiology. The study embraced the entire school-child population and their families in two different communities. It was confined to the observation of acute respiratory illnesses as they occur in groups of people of various ages under natural conditions.

One of the well-established facts in this field of epidemiology is that the frequency of acute respiratory illness is highest in children under 5, declines progressively until the young adult

ages when a slight increase occurs, and thereafter declines regularly as age increases. The school class room has been presumed to furnish an environment conducive to the spread of respiratory illness because it brings together in fairly close contact groups with a relatively high susceptibility to such illness. Furthermore, the school offers the closest and most constant community contact which the child 5 to 18 years of age experiences outside of the family unit.

The use of ultra-violet irradiation as a method of air sanitation in the schools of Pleasantville and other places in the community where children congregate was based upon the hypothesis that a substantial proportion of the respiratory infections may be spread by the airborne route and their dissemination can be controlled by this means. However, a comparison of the illness rates of acute respiratory diseases among school-age children in Pleasantville with those in Mt. Kisco, the control community, indicated no effect from ultra-violet irradiation. The weekly incidence of such illness was strikingly similar in the two communities. The periods of high incidence also were similar in the two communities and were not confined to open-window seasons when air sanitation by ultra-violet light is less effective than during cold-weather seasons when open-window ventilation is at a minimum.

It may be concluded that this study has shown that acute respiratory illness in the two communities followed a similar epidemiological pattern regardless of the use of ultra-violet light in one community.

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Acknowledgments are made to Dr. Mildred W. Wells and to the Westchester County Department of Health for generous assistance and cooperation which greatly facilitated the study of acute respiratory illness.

An especial acknowledgment is made to the families in Pleasantville and Mt. Kisco who participated in the study.

Miss Sally Preas, formerly of the Milbank Memorial Fund, assisted

in the organization of the study and in the training of the family visitors.

The members of the field staff in Pleasantville were: Miss Anne Sage Hubbell, supervisor, Misses Katherine Simon, Martha Perkins, and Jane E. Coulter.

In Mt. Kisco: Mrs. Frances Conn, supervisor, Mrs. Marguerite Keller, Misses Virginia Boggs, and Grace Strangio.

Miss Jeanne Clare and Mrs. Arolyn Conwill assisted in both Mt. Kisco and Pleasantville.

## References

1. Wells, Mildred Weeks and Holla, William A.: Ventilation in the Flow of Measles and Chickenpox Through a Community. *Journal of the American Medical Association,* April 29, 1950, 142: No. 17, pp. 1337–1344.

2. Ultra-Violet Lamps for Disinfecting Purposes. Report of Council on Physical Medicine. *Journal of the American Medical Association,* December 22, 1945, 129: pp. 1166–1167.

3. Alphabetical Index of Occupations and Industries. Sixteenth Census of the United States: 1940. U. S. Department of Commerce, Bureau of the Census.

4. Collins, Selwyn D.: Causes of Illness in 9,000 Families, Based on Nation-Wide Periodic Canvasses, 1928–1931. Public Health *Reports,* March 24, 1933, 48: No. 12, pp. 1–26.

5. Downes, Jean: Causes of Illness Among Males and Females. The Milbank Memorial Fund *Quarterly,* October, 1950, 28: No. 4, pp. 407–428.

6. Preas, Sally and Phillips, Ruth: The Severity of Illness Among Males and Females. The Milbank Memorial Fund *Quarterly,* July, 1942, 20: No. 3, pp. 221–244.

7. Francis, Thomas, Jr.: The Development of the 1943 Vaccination Study of the Commission on Influenza. *The American Journal of Hygiene,* July, 1945, 42: No. 1, pp. 1–11.

8. Rickard, E. R.; Thigpen, Minnie; and Crowley, James H.: Vaccination Against Influenza at the University of Minnesota. *The American Journal of Hygiene,* July, 1945, 42: No. 1, pp. 12–20.

9. Hale, William M. and McKee, Albert P.: The Value of Influenza Vaccination When Done at the Beginning of an Epidemic. *The American Journal of Hygiene,* July, 1945, 24: No. 1, pp. 21–27.

10. Wells, W. F.: Airborne Infection II. Droplets and Droplet Nuclei. *American Journal of Hygiene,* November, 1934, 20: pp. 611–618.

11. Wells, W. F. and Brown, H. W.: Recovery of Influenza Virus Suspended in Air and its Destruction by Ultra-Violet Irradiation. *American Journal of Hygiene,* September, 1936, 24: pp. 407–413.

12. Progress in the Control of Airborne Infections. Committee on Research and Standards of the American Public Health Association. *American Journal of Public Health*—Year Book 1949–1950, Part 2. May, 1950, 40: No. 5, pp. 82–88.

13. Willmon, T. L.; Hollaender, Alexander; and Langmuir, Alexander, D.: Studies in the Control of Acute Respiratory Diseases Among Naval Recruits. I. A Review of a Four-Year Experience with Ultra-Violet Irradiation and Dust Suppressive Measures. *American Journal of Hygiene,* September, 1948, 48: No. 2, pp. 227–232.

14. Langmuir, Alexander D.; Jarrett, Lt. E. T. (M.C.) U.S.N.; and Hollaender, Alexander: Studies in the Control of Acute Respiratory Diseases Among Naval Recruits. III. The Epidemiological Pattern and the Effect of Ultra-Violet Irradiation During the Winter of 1946–1947. *The American Journal of Hygiene,* September, 1948, 48: No. 2, pp. 240–252.

15. Schneiter, R.; Hollaender, A.; Caminita, B. H.; Kolb, R. W.; Fraser, H. F.; duBuy, H. C.; Neal, P. A.; and Rosenblum, H. B.: Effectiveness of Ultra-Violet Irradiation of Upper Air for the Control of Bacterial Air Contamination in Sleeping Quarters. Preliminary Report. *American Journal of Hygiene,* September, 1944, 40: No. 2, pp. 136–153.

16. duBuy, H. C.; Dunn, J. E.; Brackett, F. S.; Dressen, W. C.; Neal, P. A.; and Posner, I: An Evaluation of Ultra-Violet Radiation of Sleeping Quarters as Supplement of Accepted Methods of Disease Control. *American Journal of Hygiene,* September, 1948, 48: No. 2, pp. 227–232.

Appendix Table 1. Distribution of household heads and wives according to highest education attained, Pleasantville and Mt. Kisco, 1947–1948.[1]

| Education Completed | Heads of Households | | Wives | |
|---|---|---|---|---|
| | Pleasantville | Mt. Kisco | Pleasantville | Mt. Kisco |
| | Per Cent | | | |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| College | 39.8 | 15.4 | 27.0 | 10.0 |
| High School | 31.1 | 41.9 | 46.9 | 51.5 |
| Grade School | 27.4 | 39.5 | 24.7 | 36.4 |
| No School | 1.7 | 3.2 | 1.4 | 2.1 |
| Number of Heads of the Households[2] | 464 | 494 | 429 | 470 |

[1] Includes families observed 30 weeks or longer, September, 1947–June, 1948.
[2] Excludes unknowns.

Appendix Table 2. Occupations of the heads of households in Pleasantville and Mt. Kisco, 1947–1948.[1]

| Occupational Class | Pleasantville | Mt. Kisco |
|---|---|---|
| | Per Cent | |
| Total | 100.0 | 100.0 |
| Professional, Managerial | 54.0 | 35.8 |
| Clerks, Salesmen | 11.6 | 11.9 |
| Skilled, Semiskilled | 25.7 | 32.4 |
| All Other | 8.7 | 19.9 |
| Number of Heads of the Households[2] | 439 | 469 |

[1] Includes families observed 30 weeks or longer, September, 1947–June, 1948.
[2] Excludes those not employed.

Appendix Table 3. Weekly incidence of acute respiratory illness by age and school year in Pleasantville, September, 1946–May, 1949.

| Week | 1946–1947 | | | 1947–1948 | | | 1948–1949 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Age Group | | | Age Group | | | Age Group | | |
| | 0–4 | 5–18 | 19+ | 0–4 | 5–18 | 19+ | 0–4 | 5–18 | 19+ |
| | Rates Per 1,000 Observed Population | | | | | | | | |
| *September* | | | | | | | | | |
| 1– 7 | 17.5 | 55.4 | 32.3 | 34.0 | 31.7 | 13.4 | 30.8 | 28.3 | 15.2 |
| 8–14 | 72.6 | 61.8 | 33.7 | 25.8 | 30.7 | 12.1 | 27.8 | 51.1 | 22.2 |
| 15–21 | 62.0 | 63.3 | 39.5 | 18.9 | 40.8 | 24.8 | 66.7 | 68.3 | 29.9 |
| 22–28 | 41.1 | 58.8 | 23.7 | 54.2 | 79.5 | 54.2 | 89.8 | 59.6 | 28.7 |
| 29–Oct. 5 | 95.2 | 60.9 | 34.9 | 180.7 | 95.3 | 73.9 | 55.6 | 52.2 | 53.5 |
| *October* | | | | | | | | | |
| 6–12 | 93.3 | 43.4 | 23.4 | 53.3 | 56.7 | 46.8 | 77.8 | 54.6 | 30.8 |
| 13–19 | 72.8 | 43.3 | 27.5 | 70.6 | 30.5 | 23.9 | 38.9 | 63.3 | 37.8 |
| 20–26 | 65.4 | 42.2 | 16.4 | 35.3 | 23.4 | 12.1 | 54.3 | 41.7 | 22.2 |
| 27–Nov. 2 | 45.7 | 39.8 | 22.4 | 88.2 | 38.1 | 17.2 | 97.8 | 46.7 | 24.0 |
| *November* | | | | | | | | | |
| 3– 9 | 83.3 | 57.5 | 16.2 | 126.4 | 71.7 | 19.0 | 102.7 | 43.0 | 16.0 |
| 10–16 | 63.3 | 48.9 | 18.8 | 120.0 | 65.3 | 27.5 | 81.1 | 34.1 | 8.0 |
| 17–23 | 76.4 | 57.9 | 26.7 | 84.7 | 76.2 | 29.0 | 64.5 | 30.4 | 8.9 |
| 24–30 | 70.1 | 65.0 | 19.7 | 108.0 | 68.8 | 32.3 | 112.3 | 54.0 | 21.8 |
| *December* | | | | | | | | | |
| 1– 7 | 69.6 | 70.9 | 33.2 | 79.1 | 75.7 | 29.8 | 122.3 | 79.2 | 35.7 |
| 8–14 | 101.3 | 80.8 | 39.1 | 62.1 | 34.6 | 18.7 | 111.7 | 78.3 | 35.8 |
| 15–21 | 104.3 | 84.7 | 38.8 | 78.7 | 49.3 | 21.2 | 53.2 | 64.0 | 33.3 |
| 22–28 | 73.6 | 39.1 | 42.8 | 55.6 | 33.2 | 26.3 | 79.8 | 43.4 | 35.3 |
| 29–Jan. 4 | 103.0 | 43.8 | 30.5 | 97.8 | 26.6 | 25.3 | 47.6 | 51.7 | 45.9 |
| *January* | | | | | | | | | |
| 5–11 | 41.9 | 65.0 | 28.0 | 32.6 | 34.1 | 20.3 | 47.6 | 36.9 | 24.0 |
| 12–18 | 79.8 | 55.1 | 27.2 | 16.5 | 56.5 | 24.9 | 57.3 | 53.3 | 33.6 |
| 19–25 | 42.9 | 56.6 | 34.2 | 49.7 | 31.1 | 18.2 | 78.5 | 62.4 | 20.5 |
| 26–Feb. 1 | 98.2 | 56.6 | 29.0 | 66.3 | 67.2 | 32.0 | 99.5 | 67.5 | 34.7 |
| *February* | | | | | | | | | |
| 2– 8 | 78.3 | 56.3 | 31.4 | 38.3 | 56.8 | 33.6 | 136.8 | 81.9 | 36.0 |
| 9–15 | 59.5 | 57.6 | 23.7 | 69.5 | 64.9 | 40.2 | 73.7 | 79.6 | 27.1 |
| 16–22 | 46.8 | 67.2 | 28.8 | 85.6 | 72.6 | 38.3 | 51.5 | 41.1 | 27.2 |
| 23–Mar. 1 | 57.8 | 83.4 | 37.2 | 54.1 | 34.4 | 41.7 | 61.9 | 53.6 | 29.9 |
| *March* | | | | | | | | | |
| 2– 8 | 126.4 | 65.5 | 42.7 | 26.9 | 54.0 | 42.7 | 70.0 | 70.1 | 40.7 |
| 9–15 | 34.1 | 54.6 | 29.1 | 64.2 | 30.5 | 29.7 | 111.1 | 71.4 | 28.5 |
| 16–22 | 39.5 | 63.2 | 23.1 | 52.9 | 45.0 | 33.1 | 56.1 | 45.8 | 19.7 |
| 23–29 | 52.0 | 76.7 | 24.9 | 26.6 | 37.4 | 22.1 | 40.6 | 57.1 | 19.7 |
| 30–Apr. 5 | 86.7 | 83.0 | 29.4 | 69.9 | 34.0 | 17.9 | 66.0 | 79.0 | 17.9 |
| *April* | | | | | | | | | |
| 6–12 | 79.5 | 24.3 | 27.3 | 69.5 | 34.0 | 18.7 | 35.4 | 29.5 | 27.7 |
| 13–19 | 28.1 | 32.8 | 18.1 | 48.6 | 34.4 | 13.0 | 71.8 | 26.0 | 24.1 |
| 20–26 | 28.1 | 25.5 | 16.3 | 54.9 | 39.7 | 9.6 | 44.8 | 21.7 | 13.3 |
| 27–May 3 | 33.7 | 41.3 | 12.0 | 104.4 | 60.7 | 15.6 | 49.8 | 31.9 | 10.7 |
| *May* | | | | | | | | | |
| 4–10 | 16.9 | 30.8 | 13.8 | 82.4 | 54.5 | 20.9 | 15.1 | 18.1 | 7.2 |
| 11–17 | 118.0 | 47.7 | 24.8 | 43.5 | 43.1 | 15.7 | 45.9 | 38.4 | 10.8 |
| 18–24 | 67.4 | 34.2 | 14.6 | 60.4 | 39.2 | 19.1 | 50.8 | 53.4 | 14.3 |
| 25–31 | 37.0 | 30.5 | 14.0 | 60.4 | 30.8 | 15.7 | 56.4 | 34.3 | 18.8 |

Appendix Table 4. Number of cases of acute respiratory illness by week of onset in each school year in Pleasantville, September, 1946–May, 1949.

| Weeks | 1946–1947 | | | 1947–1948 | | | 1948–1949 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Age Group | | | Age Group | | | Age Group | | |
| | 0–4 | 5–18 | 19+ | 0–4 | 5–18 | 19+ | 0–4 | 5–18 | 19+ |
| *September* | | | | | | | | | |
| 1– 7 | 2 | 41 | 33 | 5 | 24 | 14 | 4 | 20 | 15 |
| 8–14 | 9 | 47 | 36 | 4 | 24 | 13 | 4 | 38 | 23 |
| 15–21 | 8 | 49 | 43 | 3 | 32 | 27 | 10 | 51 | 31 |
| 22–28 | 6 | 47 | 27 | 9 | 63 | 60 | 15 | 46 | 31 |
| 29–Oct. 5 | 14 | 49 | 40 | 30 | 77 | 85 | 10 | 41 | 59 |
| *October* | | | | | | | | | |
| 6–12 | 14 | 35 | 27 | 9 | 46 | 54 | 14 | 43 | 34 |
| 13–19 | 11 | 35 | 32 | 12 | 25 | 28 | 7 | 50 | 42 |
| 20–26 | 10 | 34 | 19 | 6 | 19 | 14 | 10 | 33 | 25 |
| 27–Nov. 2 | 7 | 32 | 26 | 15 | 31 | 20 | 18 | 37 | 27 |
| *November* | | | | | | | | | |
| 3– 9 | 13 | 47 | 19 | 22 | 58 | 22 | 19 | 34 | 18 |
| 10–16 | 10 | 40 | 22 | 21 | 53 | 32 | 15 | 27 | 9 |
| 17–23 | 12 | 47 | 31 | 15 | 62 | 34 | 12 | 24 | 10 |
| 24–30 | 11 | 53 | 23 | 19 | 56 | 38 | 21 | 43 | 25 |
| *December* | | | | | | | | | |
| 1– 7 | 11 | 58 | 39 | 14 | 61 | 35 | 23 | 62 | 40 |
| 8–14 | 16 | 66 | 46 | 11 | 28 | 22 | 21 | 61 | 40 |
| 15–21 | 17 | 70 | 46 | 14 | 40 | 25 | 10 | 51 | 38 |
| 22–28 | 12 | 32 | 50 | 10 | 27 | 31 | 15 | 35 | 41 |
| 29–Jan. 4 | 17 | 36 | 36 | 18 | 22 | 30 | 9 | 41 | 52 |
| *January* | | | | | | | | | |
| 5–11 | 7 | 53 | 33 | 6 | 28 | 24 | 9 | 29 | 27 |
| 12–18 | 13 | 45 | 32 | 3 | 46 | 29 | 11 | 42 | 38 |
| 19–25 | 7 | 46 | 40 | 9 | 25 | 21 | 15 | 49 | 23 |
| 26–Feb. 1 | 16 | 46 | 34 | 12 | 54 | 37 | 19 | 53 | 39 |
| *February* | | | | | | | | | |
| 2– 8 | 13 | 46 | 37 | 7 | 46 | 39 | 26 | 64 | 40 |
| 9–15 | 10 | 47 | 28 | 13 | 53 | 47 | 14 | 62 | 30 |
| 16–22 | 8 | 55 | 34 | 16 | 59 | 45 | 10 | 32 | 30 |
| 23–Mar. 1 | 10 | 69 | 44 | 10 | 28 | 49 | 12 | 42 | 33 |
| *March* | | | | | | | | | |
| 2– 8 | 22 | 54 | 50 | 5 | 44 | 50 | 14 | 55 | 46 |
| 9–15 | 6 | 45 | 34 | 12 | 25 | 35 | 22 | 56 | 32 |
| 16–22 | 7 | 52 | 27 | 10 | 37 | 39 | 11 | 36 | 22 |
| 23–29 | 9 | 63 | 29 | 5 | 31 | 26 | 8 | 45 | 22 |
| 30–Apr. 5 | 15 | 68 | 34 | 13 | 28 | 21 | 13 | 62 | 20 |
| *April* | | | | | | | | | |
| 6–12 | 14 | 20 | 32 | 13 | 28 | 22 | 7 | 23 | 31 |
| 13–19 | 5 | 27 | 21 | 9 | 28 | 15 | 14 | 20 | 27 |
| 20–26 | 5 | 21 | 19 | 10 | 32 | 11 | 9 | 17 | 15 |
| 27–May 3 | 6 | 34 | 14 | 19 | 49 | 18 | 10 | 25 | 12 |
| *May* | | | | | | | | | |
| 4–10 | 3 | 25 | 16 | 15 | 44 | 24 | 3 | 14 | 8 |
| 11–17 | 21 | 39 | 29 | 8 | 35 | 18 | 9 | 30 | 12 |
| 18–24 | 12 | 28 | 17 | 11 | 32 | 22 | 10 | 42 | 16 |
| 25–31 | 5 | 18 | 12 | 11 | 25 | 18 | 11 | 27 | 21 |

Appendix Table 5. Population by age observed in each week and school year in Pleasantville, September, 1946–May, 1949.

| Weeks | 1946–1947 | | | 1947–1948 | | | 1948–1949 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Age Group | | | Age Group | | | Age Group | | |
| | 0–4 | 5–18 | 19 + | 0–4 | 5–18 | 19 + | 0–4 | 5–18 | 19 + |
| *September* | | | | | | | | | |
| 1– 7 | 114 | 740 | 1,021 | 147 | 757 | 1,045 | 130 | 707 | 987 |
| 8–14 | 124 | 761 | 1,067 | 155 | 782 | 1,074 | 144 | 744 | 1,036 |
| 15–21 | 129 | 774 | 1,089 | 159 | 785 | 1,090 | 150 | 747 | 1,036 |
| 22–28 | 146 | 800 | 1,138 | 166 | 792 | 1,108 | 167 | 772 | 1,081 |
| 29–Oct. 5 | 147 | 805 | 1,145 | 166 | 808 | 1,150 | 180 | 785 | 1,102 |
| *October* | | | | | | | | | |
| 6–12 | 150 | 806 | 1,156 | 169 | 812 | 1,154 | 180 | 788 | 1,105 |
| 13–19 | 151 | 809 | 1,162 | 170 | 819 | 1,171 | 180 | 790 | 1,112 |
| 20–26 | 153 | 805 | 1,159 | 170 | 813 | 1,160 | 184 | 792 | 1,125 |
| 27–Nov. 2 | 153 | 805 | 1,159 | 170 | 813 | 1,160 | 184 | 792 | 1,125 |
| *November* | | | | | | | | | |
| 3– 9 | 156 | 818 | 1,171 | 174 | 809 | 1,159 | 185 | 791 | 1,127 |
| 10–16 | 158 | 818 | 1,170 | 175 | 812 | 1,165 | 185 | 792 | 1,128 |
| 17–23 | 157 | 812 | 1,161 | 177 | 814 | 1,172 | 186 | 790 | 1,127 |
| 24–30 | 157 | 815 | 1,165 | 176 | 814 | 1,175 | 187 | 796 | 1,145 |
| *December* | | | | | | | | | |
| 1– 7 | 158 | 818 | 1,176 | 177 | 806 | 1,176 | 188 | 783 | 1,121 |
| 8–14 | 158 | 817 | 1,176 | 177 | 810 | 1,175 | 188 | 779 | 1,118 |
| 15–21 | 163 | 826 | 1,187 | 178 | 811 | 1,178 | 188 | 797 | 1,140 |
| 22–28 | 163 | 819 | 1,168 | 180 | 814 | 1,180 | 188 | 807 | 1,160 |
| 29–Jan. 4 | 165 | 822 | 1,180 | 184 | 828 | 1,185 | 189 | 793 | 1,132 |
| *January* | | | | | | | | | |
| 5–11 | 167 | 815 | 1,179 | 184 | 820 | 1,181 | 189 | 786 | 1,127 |
| 12–18 | 163 | 817 | 1,178 | 182 | 814 | 1,164 | 192 | 788 | 1,130 |
| 19–25 | 163 | 813 | 1,171 | 181 | 804 | 1,155 | 191 | 785 | 1,124 |
| 26–Feb. 1 | 163 | 813 | 1,171 | 181 | 804 | 1,155 | 191 | 785 | 1,124 |
| *February* | | | | | | | | | |
| 2– 8 | 166 | 817 | 1,180 | 183 | 810 | 1,159 | 190 | 781 | 1,110 |
| 9–15 | 168 | 816 | 1,181 | 187 | 817 | 1,170 | 190 | 779 | 1,107 |
| 16–22 | 171 | 819 | 1,180 | 187 | 813 | 1,176 | 194 | 778 | 1,101 |
| 23–Mar. 1 | 173 | 827 | 1,183 | 185 | 813 | 1,175 | 194 | 783 | 1,104 |
| *March* | | | | | | | | | |
| 2– 8 | 174 | 825 | 1,172 | 186 | 815 | 1,170 | 200 | 785 | 1,130 |
| 9–15 | 176 | 824 | 1,170 | 187 | 819 | 1,177 | 198 | 784 | 1,122 |
| 16–22 | 177 | 823 | 1,167 | 189 | 823 | 1,178 | 196 | 786 | 1,119 |
| 23–29 | 173 | 821 | 1,164 | 188 | 828 | 1,176 | 197 | 788 | 1,117 |
| 30–Apr. 5 | 173 | 819 | 1,156 | 186 | 824 | 1,173 | 197 | 785 | 1,118 |
| *April* | | | | | | | | | |
| 6–12 | 176 | 824 | 1,172 | 187 | 824 | 1,179 | 198 | 780 | 1,118 |
| 13–19 | 178 | 822 | 1,163 | 185 | 814 | 1,157 | 195 | 768 | 1,122 |
| 20–26 | 178 | 824 | 1,168 | 182 | 807 | 1,151 | 201 | 783 | 1,125 |
| 27–May 3 | 178 | 824 | 1,168 | 182 | 807 | 1,151 | 201 | 783 | 1,125 |
| *May* | | | | | | | | | |
| 4–10 | 178 | 813 | 1,160 | 182 | 808 | 1,147 | 199 | 775 | 1,110 |
| 11–17 | 178 | 817 | 1,168 | 184 | 812 | 1,146 | 196 | 782 | 1,113 |
| 18–24 | 178 | 818 | 1,167 | 182 | 817 | 1,151 | 197 | 786 | 1,121 |
| 25–31 | 135 | 591 | 856 | 182 | 812 | 1,143 | 195 | 788 | 1,117 |

Appendix Table 6. Weekly incidence of acute respiratory illness by age and school year in Mt. Kisco, September, 1946–May, 1949.

| Weeks | 1946–1947 | | | 1947–1948 | | | 1948–1949 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Age Group | | | Age Group | | | Age Group | | |
| | 0–4 | 5–18 | 19 + | 0–4 | 5–18 | 19 + | 0–4 | 5–18 | 19 + |
| | Rates Per 1,000 Observed Population | | | | | | | | |
| *September* | | | | | | | | | |
| 1– 7 | 71.4 | 42.6 | 20.4 | 20.1 | 31.0 | 13.9 | 32.1 | 26.9 | 18.6 |
| 8–14 | 70.4 | 43.2 | 26.3 | 17.1 | 30.4 | 11.7 | 43.8 | 48.2 | 21.5 |
| 15–21 | 73.8 | 47.1 | 26.5 | 16.0 | 39.6 | 20.0 | 90.9 | 92.3 | 38.9 |
| 22–28 | 64.1 | 22.8 | 22.7 | 92.8 | 54.3 | 35.2 | 111.7 | 65.7 | 47.8 |
| 29–Oct. 5 | 50.6 | 65.2 | 26.7 | 40.8 | 78.7 | 48.7 | 97.6 | 54.5 | 24.6 |
| *October* | | | | | | | | | |
| 6–12 | 68.8 | 38.0 | 33.3 | 30.5 | 48.6 | 53.4 | 48.8 | 31.9 | 27.5 |
| 13–19 | 37.5 | 42.1 | 27.8 | 20.3 | 23.8 | 26.3 | 58.5 | 45.6 | 21.5 |
| 20–26 | 68.3 | 32.1 | 26.1 | 35.2 | 25.1 | 9.3 | 63.4 | 37.3 | 15.6 |
| 27–Nov. 2 | 43.5 | 29.9 | 15.2 | 45.2 | 28.4 | 6.2 | 82.9 | 35.1 | 20.1 |
| *November* | | | | | | | | | |
| 3– 9 | 18.4 | 18.8 | 12.5 | 35.0 | 41.3 | 5.4 | 103.4 | 53.5 | 26.3 |
| 10–16 | 49.1 | 27.5 | 16.6 | 90.5 | 62.0 | 28.6 | 88.7 | 43.1 | 26.5 |
| 17–23 | 97.6 | 49.9 | 19.3 | 94.5 | 72.5 | 26.9 | 64.0 | 46.3 | 15.2 |
| 24–30 | 61.0 | 88.5 | 26.0 | 156.6 | 65.6 | 30.1 | 80.4 | 36.3 | 16.5 |
| *December* | | | | | | | | | |
| 1– 7 | 108.4 | 68.6 | 31.8 | 90.0 | 63.6 | 40.7 | 136.4 | 71.1 | 36.1 |
| 8–14 | 96.4 | 61.6 | 28.2 | 74.6 | 51.2 | 19.8 | 126.3 | 54.7 | 30.9 |
| 15–21 | 73.2 | 47.8 | 19.0 | 69.7 | 48.7 | 29.6 | 64.4 | 55.0 | 30.5 |
| 22–28 | 97.6 | 33.8 | 30.5 | 65.7 | 29.9 | 23.0 | 73.9 | 31.7 | 25.9 |
| 29–Jan. 4 | 41.7 | 51.1 | 37.1 | 34.5 | 25.5 | 24.3 | 84.2 | 24.4 | 35.3 |
| *January* | | | | | | | | | |
| 5–11 | 41.4 | 50.4 | 29.8 | 50.0 | 36.1 | 24.4 | 59.1 | 55.6 | 24.9 |
| 12–18 | 64.7 | 66.7 | 19.0 | 45.2 | 53.1 | 23.7 | 73.5 | 52.4 | 27.2 |
| 19–25 | 69.0 | 59.1 | 17.4 | 49.5 | 44.4 | 19.1 | 49.3 | 46.0 | 31.8 |
| 26–Feb. 1 | 69.0 | 51.4 | 27.3 | 54.5 | 60.2 | 42.7 | 54.2 | 67.5 | 30.3 |
| *February* | | | | | | | | | |
| 2– 8 | 81.4 | 51.8 | 28.1 | 77.7 | 92.5 | 37.2 | 93.6 | 72.6 | 32.3 |
| 9–15 | 63.6 | 77.9 | 37.2 | 87.4 | 71.9 | 33.4 | 78.8 | 50.3 | 24.9 |
| 16–22 | 44.9 | 46.2 | 32.9 | 62.5 | 43.4 | 33.6 | 55.6 | 37.6 | 23.5 |
| 23–Mar. 1 | 60.8 | 58.4 | 23.9 | 48.3 | 34.9 | 26.0 | 131.3 | 59.0 | 33.4 |
| *March* | | | | | | | | | |
| 2– 8 | 87.0 | 48.1 | 21.4 | 58.0 | 24.5 | 25.2 | 132.7 | 69.6 | 43.3 |
| 9–15 | 85.6 | 87.0 | 26.8 | 38.5 | 41.4 | 16.0 | 90.5 | 91.9 | 36.1 |
| 16–22 | 133.7 | 74.4 | 47.2 | 52.1 | 42.4 | 21.3 | 68.3 | 74.3 | 39.8 |
| 23–29 | 77.3 | 56.5 | 26.6 | 52.1 | 44.5 | 18.2 | 68.0 | 30.7 | 17.9 |
| 30–Apr. 5 | 51.3 | 30.5 | 23.4 | 69.4 | 22.1 | 15.1 | 47.6 | 32.8 | 17.1 |
| *April* | | | | | | | | | |
| 6–12 | 30.8 | 26.2 | 16.1 | 36.2 | 34.6 | 15.1 | 66.7 | 35.1 | 25.4 |
| 13–19 | 30.9 | 23.0 | 13.0 | 36.0 | 55.6 | 23.4 | 72.5 | 28.9 | 18.0 |
| 20–26 | 87.6 | 27.4 | 12.2 | 103.6 | 48.2 | 16.6 | 53.4 | 10.7 | 16.6 |
| 27–May 3 | 72.2 | 41.6 | 8.9 | 58.6 | 33.5 | 24.2 | 38.8 | 22.4 | 12.9 |
| *May* | | | | | | | | | |
| 4–10 | 31.1 | 26.3 | 9.0 | 73.1 | 34.6 | 20.5 | 23.9 | 17.1 | 15.1 |
| 11–17 | 36.6 | 20.6 | 13.8 | 18.1 | 28.2 | 9.8 | 43.3 | 22.5 | 10.7 |
| 18–24 | 31.4 | 18.4 | 11.4 | 36.4 | 17.7 | 12.1 | 57.4 | 24.7 | 12.2 |
| 25–31 | 53.0 | 21.9 | 19.0 | 9.2 | 17.8 | 9.1 | 71.1 | 40.7 | 18.2 |

Appendix Table 7. Number of cases of acute respiratory illness by week of onset in each school year in Mt. Kisco, September, 1946–May, 1949.

| Weeks | 1946–1947 | | | 1947–1948 | | | 1948–1949 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Age Group | | | Age Group | | | Age Group | | |
| | 0–4 | 5–18 | 19+ | 0–4 | 5–18 | 19+ | 0–4 | 5–18 | 19+ |
| *September* | | | | | | | | | |
| 1– 7 | 9 | 36 | 22 | 3 | 27 | 16 | 5 | 23 | 22 |
| 8–14 | 10 | 37 | 29 | 3 | 27 | 14 | 7 | 42 | 26 |
| 15–21 | 11 | 41 | 30 | 3 | 36 | 25 | 16 | 83 | 49 |
| 22–28 | 10 | 20 | 26 | 18 | 50 | 45 | 21 | 60 | 62 |
| 29–Oct. 5 | 8 | 58 | 31 | 8 | 73 | 63 | 20 | 51 | 33 |
| *October* | | | | | | | | | |
| 6–12 | 11 | 34 | 39 | 6 | 45 | 69 | 10 | 30 | 37 |
| 13–19 | 6 | 38 | 33 | 4 | 22 | 34 | 12 | 43 | 29 |
| 20–26 | 11 | 29 | 31 | 7 | 23 | 12 | 13 | 35 | 21 |
| 27–Nov. 2 | 7 | 27 | 18 | 9 | 26 | 8 | 17 | 33 | 27 |
| *November* | | | | | | | | | |
| 3– 9 | 3 | 17 | 15 | 7 | 38 | 7 | 21 | 50 | 35 |
| 10–16 | 8 | 25 | 20 | 18 | 57 | 37 | 18 | 40 | 35 |
| 17–23 | 16 | 45 | 23 | 19 | 67 | 35 | 13 | 43 | 20 |
| 24–30 | 10 | 80 | 31 | 31 | 61 | 39 | 16 | 34 | 22 |
| *December* | | | | | | | | | |
| 1– 7 | 18 | 62 | 38 | 18 | 59 | 53 | 27 | 66 | 48 |
| 8–14 | 16 | 56 | 34 | 15 | 48 | 26 | 25 | 51 | 41 |
| 15–21 | 12 | 44 | 23 | 14 | 46 | 39 | 13 | 52 | 41 |
| 22–28 | 16 | 31 | 37 | 13 | 28 | 30 | 15 | 30 | 35 |
| 29–Jan. 4 | 7 | 47 | 45 | 7 | 24 | 32 | 17 | 23 | 47 |
| *January* | | | | | | | | | |
| 5–11 | 7 | 46 | 36 | 10 | 34 | 32 | 12 | 52 | 33 |
| 12–18 | 11 | 61 | 23 | 9 | 50 | 31 | 15 | 49 | 36 |
| 19–25 | 12 | 54 | 21 | 10 | 42 | 25 | 10 | 43 | 42 |
| 26–Feb. 1 | 12 | 47 | 33 | 11 | 57 | 56 | 11 | 63 | 40 |
| *February* | | | | | | | | | |
| 2– 8 | 14 | 47 | 34 | 16 | 88 | 49 | 19 | 68 | 43 |
| 9–15 | 11 | 71 | 45 | 18 | 68 | 44 | 16 | 47 | 33 |
| 16–22 | 8 | 42 | 40 | 13 | 41 | 44 | 11 | 35 | 31 |
| 23–Mar. 1 | 11 | 53 | 29 | 10 | 33 | 34 | 26 | 55 | 44 |
| *March* | | | | | | | | | |
| 2– 8 | 16 | 44 | 26 | 12 | 23 | 33 | 26 | 65 | 57 |
| 9–15 | 16 | 80 | 33 | 8 | 39 | 21 | 18 | 86 | 48 |
| 16–22 | 25 | 68 | 58 | 11 | 40 | 28 | 14 | 70 | 53 |
| 23–29 | 15 | 52 | 33 | 11 | 42 | 24 | 14 | 29 | 24 |
| 30–Apr. 5 | 10 | 28 | 29 | 15 | 21 | 20 | 10 | 31 | 23 |
| *April* | | | | | | | | | |
| 6–12 | 6 | 24 | 20 | 8 | 33 | 20 | 14 | 33 | 34 |
| 13–19 | 6 | 21 | 16 | 8 | 53 | 31 | 15 | 27 | 24 |
| 20–26 | 17 | 25 | 15 | 23 | 46 | 22 | 11 | 10 | 22 |
| 27–May 3 | 14 | 38 | 11 | 13 | 32 | 32 | 8 | 21 | 17 |
| *May* | | | | | | | | | |
| 4–10 | 6 | 24 | 11 | 16 | 33 | 27 | 5 | 16 | 20 |
| 11–17 | 7 | 19 | 17 | 4 | 27 | 13 | 9 | 21 | 14 |
| 18–24 | 6 | 17 | 14 | 8 | 17 | 16 | 12 | 23 | 16 |
| 25–31 | 8 | 15 | 18 | 2 | 17 | 12 | 15 | 38 | 24 |

Appendix Table 8. Population by age observed in each week, and school year in Mt. Kisco, September, 1946–May, 1949.

| Weeks | 1946–1947 | | | 1947–1948 | | | 1948–1949 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Age Group | | | Age Group | | | Age Group | | |
| | 0–4 | 5–18 | 19 + | 0–4 | 5–18 | 19 + | 0–4 | 5–18 | 19 + |
| *September* | | | | | | | | | |
| 1– 7 | 126 | 846 | 1,077 | 149 | 870 | 1,153 | 156 | 856 | 1,183 |
| 8–14 | 142 | 857 | 1,104 | 175 | 888 | 1,197 | 160 | 872 | 1,211 |
| 15–21 | 149 | 870 | 1,131 | 187 | 910 | 1,249 | 176 | 899 | 1,259 |
| 22–28 | 156 | 877 | 1,146 | 194 | 920 | 1,280 | 188 | 913 | 1,298 |
| 29–Oct. 5 | 158 | 889 | 1,160 | 196 | 927 | 1,294 | 205 | 936 | 1,339 |
| *October* | | | | | | | | | |
| 6–12 | 160 | 894 | 1,170 | 197 | 926 | 1,291 | 205 | 941 | 1,347 |
| 13–19 | 160 | 903 | 1,185 | 197 | 924 | 1,294 | 205 | 942 | 1,349 |
| 20–26 | 161 | 903 | 1,187 | 199 | 916 | 1,294 | 205 | 939 | 1,346 |
| 27–Nov. 2 | 161 | 903 | 1,187 | 199 | 916 | 1,294 | 205 | 939 | 1,346 |
| *November* | | | | | | | | | |
| 3– 9 | 163 | 905 | 1,197 | 200 | 919 | 1,289 | 203 | 934 | 1,332 |
| 10–16 | 163 | 909 | 1,202 | 199 | 920 | 1,294 | 203 | 927 | 1,323 |
| 17–23 | 164 | 902 | 1,192 | 201 | 924 | 1,299 | 203 | 929 | 1,318 |
| 24–30 | 164 | 904 | 1,194 | 198 | 930 | 1,296 | 199 | 937 | 1,337 |
| *December* | | | | | | | | | |
| 1– 7 | 166 | 904 | 1,194 | 200 | 927 | 1,301 | 198 | 928 | 1,328 |
| 8–14 | 166 | 909 | 1,205 | 201 | 938 | 1,311 | 198 | 933 | 1,325 |
| 15–21 | 164 | 920 | 1,213 | 201 | 945 | 1,317 | 202 | 945 | 1,345 |
| 22–28 | 164 | 917 | 1,212 | 198 | 936 | 1,307 | 203 | 947 | 1,351 |
| 29–Jan. 4 | 168 | 919 | 1,213 | 203 | 943 | 1,317 | 202 | 941 | 1,333 |
| *January* | | | | | | | | | |
| 5–11 | 169 | 913 | 1,207 | 200 | 943 | 1,314 | 203 | 935 | 1,324 |
| 12–18 | 170 | 915 | 1,209 | 199 | 941 | 1,307 | 204 | 935 | 1,322 |
| 19–25 | 174 | 914 | 1,208 | 202 | 947 | 1,311 | 203 | 934 | 1,321 |
| 26–Feb. 1 | 174 | 914 | 1,208 | 202 | 947 | 1,311 | 203 | 934 | 1,321 |
| *February* | | | | | | | | | |
| 2– 8 | 172 | 908 | 1,204 | 206 | 951 | 1,318 | 203 | 937 | 1,331 |
| 9–15 | 173 | 911 | 1,210 | 206 | 946 | 1,318 | 203 | 934 | 1,324 |
| 16–22 | 178 | 910 | 1,214 | 208 | 944 | 1,310 | 198 | 930 | 1,318 |
| 23–Mar. 1 | 181 | 908 | 1,211 | 207 | 945 | 1,310 | 198 | 932 | 1,317 |
| *March* | | | | | | | | | |
| 2– 8 | 184 | 915 | 1,215 | 207 | 939 | 1,311 | 196 | 934 | 1,317 |
| 9–15 | 187 | 920 | 1,230 | 208 | 942 | 1,313 | 199 | 936 | 1,329 |
| 16–22 | 187 | 914 | 1,228 | 211 | 943 | 1,314 | 205 | 942 | 1,333 |
| 23–29 | 194 | 920 | 1,239 | 211 | 943 | 1,318 | 206 | 945 | 1,342 |
| 30–Apr. 5 | 195 | 919 | 1,238 | 216 | 951 | 1,324 | 210 | 945 | 1,347 |
| *April* | | | | | | | | | |
| 6–12 | 195 | 916 | 1,239 | 221 | 953 | 1,325 | 210 | 939 | 1,338 |
| 13–19 | 194 | 912 | 1,230 | 222 | 953 | 1,323 | 207 | 935 | 1,332 |
| 20–26 | 194 | 914 | 1,234 | 222 | 954 | 1,325 | 206 | 937 | 1,322 |
| 27–May 3 | 194 | 914 | 1,234 | 222 | 954 | 1,325 | 206 | 937 | 1,322 |
| *May* | | | | | | | | | |
| 4–10 | 193 | 914 | 1,227 | 219 | 955 | 1,317 | 209 | 936 | 1,321 |
| 11–17 | 191 | 921 | 1,230 | 221 | 956 | 1,320 | 208 | 933 | 1,311 |
| 18–24 | 191 | 925 | 1,230 | 220 | 959 | 1,320 | 209 | 933 | 1,316 |
| 25–31 | 151 | 684 | 949 | 218 | 957 | 1,320 | 211 | 934 | 1,316 |

Appendix Table 9. Weekly incidence of acute respiratory illness among children 0–4 years of age, Pleasantville and Mt. Kisco, 1946–1949.

| WEEKS | Rates Per 1,000 Population | |
|---|---|---|
| | Pleasantville | Mt. Kisco |
| *September* | | |
| 1– 7 | 28.1 | 39.4 |
| 8–14 | 40.2 | 41.9 |
| 15–21 | 47.9 | 58.6 |
| 22–28 | 62.6 | 91.1 |
| 29–Oct. 5 | 109.5 | 64.4 |
| *October* | | |
| 6–12 | 74.1 | 48.0 |
| 13–19 | 59.9 | 39.1 |
| 20–26 | 51.3 | 54.9 |
| 27–Nov. 2 | 78.9 | 58.4 |
| *November* | | |
| 3– 9 | 104.9 | 54.8 |
| 10–16 | 88.8 | 77.9 |
| 17–23 | 75.0 | 84.5 |
| 24–30 | 98.1 | 101.6 |
| *December* | | |
| 1– 7 | 91.8 | 111.7 |
| 8–14 | 91.8 | 99.1 |
| 15–21 | 77.5 | 68.8 |
| 22–28 | 69.7 | 77.9 |
| 29–Jan. 4 | 81.8 | 54.1 |
| *January* | | |
| 5–11 | 40.7 | 50.7 |
| 12–18 | 50.3 | 61.1 |
| 19–25 | 57.9 | 55.3 |
| 26–Feb. 1 | 87.9 | 58.7 |
| *February* | | |
| 2– 8 | 85.3 | 84.3 |
| 9–15 | 67.9 | 77.3 |
| 16–22 | 61.6 | 54.8 |
| 23–Mar. 1 | 58.0 | 80.2 |
| *March* | | |
| 2– 8 | 73.2 | 92.0 |
| 9–15 | 71.3 | 70.7 |
| 16–22 | 49.8 | 82.9 |
| 23–29 | 39.4 | 65.5 |
| 30–Apr. 5 | 73.7 | 56.4 |
| *April* | | |
| 6–12 | 60.6 | 44.7 |
| 13–19 | 50.2 | 46.5 |
| 20–26 | 42.8 | 82.0 |
| 27–May 3 | 62.4 | 56.3 |
| *May* | | |
| 4–10 | 37.6 | 43.5 |
| 11–17 | 68.1 | 32.3 |
| 18–24 | 59.2 | 41.9 |
| 25–31 | 52.7 | 43.1 |

Appendix Table 10. Weekly incidence of intestinal influenza or grippe in Pleasantville and Mt. Kisco. Three school years combined, September, 1946–May, 1949.

| Weeks | Pleasantville | | Mt. Kisco | | Pleasantville | | Mt. Kisco | |
|---|---|---|---|---|---|---|---|---|
| | All Ages | 5–18 | All Ages | 5–18 | All Ages | 5–18 | All Ages | 5–18 |
| | Rate Per 1,000 Population | | | | Number of Cases | | | |
| *September* | | | | | | | | |
| 1– 7 | 0.7 | 0.0 | 1.4 | 1.9 | 4 | 0 | 9 | 5 |
| 8–14 | 0.5 | 0.4 | 0.9 | 1.9 | 3 | 1 | 6 | 5 |
| 15–21 | 0.3 | 0.4 | 1.9 | 3.4 | 2 | 1 | 13 | 9 |
| 22–28 | 1.0 | 2.1 | 0.7 | 1.1 | 6 | 5 | 5 | 3 |
| 29–Oct. 5 | 0.8 | 1.3 | 1.1 | 1.8 | 5 | 3 | 8 | 5 |
| *October* | | | | | | | | |
| 6–12 | 1.1 | 1.7 | 1.7 | 1.4 | 7 | 4 | 12 | 4 |
| 13–19 | 1.9 | 1.7 | 1.4 | 1.4 | 12 | 4 | 10 | 4 |
| 20–26 | 1.7 | 2.1 | 0.7 | 1.1 | 11 | 5 | 5 | 3 |
| 27–Nov. 2 | 1.3 | 1.7 | 2.7 | 4.7 | 8 | 4 | 19 | 13 |
| *November* | | | | | | | | |
| 3– 9 | 3.4 | 5.4 | 1.1 | 1.8 | 22 | 13 | 8 | 5 |
| 10–16 | 3.3 | 2.5 | 5.2 | 6.9 | 21 | 6 | 37 | 19 |
| 17–23 | 3.4 | 6.2 | 4.6 | 5.4 | 22 | 15 | 33 | 15 |
| 24–30 | 3.3 | 3.7 | 5.2 | 5.8 | 21 | 9 | 37 | 16 |
| *December* | | | | | | | | |
| 1– 7 | 3.7 | 5.4 | 5.6 | 7.2 | 24 | 13 | 40 | 20 |
| 8–14 | 4.4 | 5.4 | 5.3 | 6.5 | 28 | 13 | 38 | 18 |
| 15–21 | 6.2 | 9.0 | 3.4 | 6.0 | 40 | 22 | 25 | 17 |
| 22–28 | 7.9 | 9.0 | 5.3 | 5.0 | 51 | 22 | 38 | 14 |
| 29–Jan. 4 | 7.6 | 10.2 | 6.6 | 5.7 | 49 | 25 | 48 | 16 |
| *January* | | | | | | | | |
| 5–11 | 8.2 | 7.4 | 7.2 | 9.0 | 53 | 18 | 52 | 25 |
| 12–18 | 5.6 | 8.3 | 6.8 | 10.0 | 36 | 20 | 49 | 28 |
| 19–25 | 7.4 | 10.4 | 6.9 | 10.4 | 47 | 25 | 50 | 29 |
| 26–Feb. 1 | 8.6 | 9.6 | 5.0 | 6.8 | 55 | 23 | 36 | 19 |
| *February* | | | | | | | | |
| 2– 8 | 10.6 | 13.7 | 6.4 | 7.9 | 68 | 33 | 46 | 22 |
| 9–15 | 6.1 | 5.8 | 4.8 | 6.1 | 39 | 14 | 35 | 17 |
| 16–22 | 5.1 | 5.4 | 2.5 | 3.6 | 33 | 13 | 18 | 10 |
| 23–Mar. 1 | 5.7 | 7.0 | 5.4 | 9.0 | 37 | 17 | 39 | 25 |
| *March* | | | | | | | | |
| 2– 8 | 6.7 | 9.9 | 2.5 | 4.7 | 43 | 24 | 18 | 13 |
| 9–15 | 4.6 | 3.3 | 3.7 | 5.4 | 30 | 8 | 27 | 15 |
| 16–22 | 5.4 | 7.0 | 3.4 | 6.4 | 35 | 17 | 25 | 18 |
| 23–29 | 3.7 | 6.6 | 3.3 | 2.8 | 24 | 16 | 24 | 8 |
| 30–Apr. 5 | 4.8 | 10.7 | 2.6 | 1.8 | 31 | 26 | 19 | 5 |
| *April* | | | | | | | | |
| 6–12 | 3.3 | 4.1 | 1.4 | 2.5 | 21 | 10 | 10 | 7 |
| 13–19 | 5.0 | 6.2 | 1.0 | 1.1 | 32 | 15 | 7 | 3 |
| 20–26 | 2.2 | 2.9 | 1.0 | 1.1 | 14 | 7 | 7 | 3 |
| 27–May 3 | 3.3 | 4.1 | 1.5 | 2.1 | 21 | 10 | 11 | 6 |
| *May* | | | | | | | | |
| 4–10 | 1.6 | 1.7 | 2.5 | 2.5 | 10 | 4 | 18 | 7 |
| 11–17 | 2.8 | 4.1 | 1.4 | 1.8 | 18 | 10 | 10 | 5 |
| 18–24 | 0.9 | 1.2 | 1.0 | 0.7 | 6 | 3 | 7 | 2 |
| 25–31 | 1.9 | 3.2 | 1.3 | 2.3 | 11 | 7 | 9 | 6 |