

# THE RISK OF ATTACK OF RESPIRATORY ILLNESS AMONG PARENTS OF CHILDREN OF VARIOUS AGES

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**T**HERE are some well-established facts in the epidemiology of minor respiratory diseases. General morbidity surveys have shown that slightly more than 40 per cent of all illness during a year is due to these diseases (1, 2). The "common cold," which is the acute respiratory disease most frequent in occurrence, is considered the most highly infectious of the communicable diseases. It is also known that children suffer more frequently from respiratory illness than do adults. The incidence of such illness is highest in children under 10 years of age and declines regularly as age increases, except for a slight increase at the young adult ages.

The purpose of the analysis presented in this report is to learn whether adults in family units with young children have a greater risk of illness from respiratory diseases than do those in families with no very young children.

## DATA AND METHOD OF STUDY

The data used in this study include records of respiratory illness obtained over a three-year period from families in two communities, Pleasantville and Mt. Kisco, in Westchester County, New York.

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.

<sup>1</sup> From the Milbank Memorial Fund. This is the third of a series of papers dealing with a study of acute respiratory illness in two communities in Westchester County, New York.

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 twenty-eight 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 the 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.

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.

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, bron-

chitis 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 excluded.

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.

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 community there were about 900 school-age children and 180-200 pre-school-age children.

Earlier analyses have shown that the two communities were similar with respect to the weekly incidence of acute respiratory illness in each of the three school years studied (3, 4). Therefore for the study being reported upon, the total three school-year experience of the two communities has been combined.<sup>2</sup> The families have been grouped according to the ages of the children in them. The groups are as follows:

*Group 1.* Those families having only children 9 years of age or younger;

*Group 2.* Those families having both children over 9 years of age and those 9 or younger;

*Group 3.* Those families in which the children were over 9 years of age.

<sup>2</sup> The population is expressed as persons and not person years. It is the summation of the total persons observed in each school year in each community. Each school year includes the nine months, September-May. The cases of illness included are those which had their onset within the nine-month period, September-May, in each school year.

OCCUPATIONAL CLASS	FAMILY GROUP		
	Group 1, Children 9 Years of Age or Younger	Group 2, Children Over 9 Years and Those 9 or Younger	Group 3, Children Over 9 Years of Age
	PER CENT		
TOTAL	100.0	100.0	100.0
Professional and Managerial	50.9	40.9	42.2
Clerical and Skilled	27.5	30.8	30.7
Semiskilled and Unskilled	21.6	28.3	27.1
	NUMBER		
TOTAL	844	851	1,057
Professional and Managerial	430	348	446
Clerical and Skilled	232	262	325
Semiskilled and Unskilled	182	241	286

Table 1. Occupational class of the heads of the households in the three family groups. Pleasantville and Mt. Kisco, 1946-1949.

### CHARACTERISTICS OF THE FAMILIES

The distribution of the heads of the household by occupational class<sup>3</sup> within each family group is shown in Table 1. The Group 1 families were slightly weighted by the professional and managerial class. In this group the professional and managerial class constituted about 50 per cent of the families. Approximately 40 per cent of the Group 2 and Group 3 families were in this class. Conversely, these latter groups had a higher proportion of families in the clerical and skilled class and in the semiskilled and unskilled class, approximately 31 and 28 per cent respectively.

<sup>3</sup> Coding of occupational class was based upon the Alphabetical Index of Occupations and Industries. U. S. Department of Commerce, Bureau of the Census, Sixteenth Census of the United States: 1940.

The previous reports on the study of acute respiratory illness in Westchester County have shown that the higher the occupational class the higher was the incidence of acute respiratory illness (3, 4). It was concluded that there was no reason to believe that acute respiratory illness is selective of persons in one particular social class compared with another. Rather, it was believed that these differences were due to a subjective factor—family attitude toward illness. Therefore, to assure comparability, the three family groups classified by age of children were each divided according to the occupation of the head of the household: (1) professional and managerial; (2) clerical and skilled workers; and (3) semiskilled and unskilled workers.

The mean age of the head of the household and of the wife is shown by family group and occupational class in Table 2. The heads and wives in the Group 1 families—those with the youngest children—had the lowest mean ages of the three family groups. The household heads in Group 1 had a variation in mean age from 37 years in the semiskilled and unskilled class to 39 years in the professional and managerial class. The heads of household in Group 2 and Group 3 families were approximately 44 and 48 years of age, respectively. The mean age of the wives in the Group 1 families was 35–36 years. The Group 2 and Group 3 wives were 39 and 43–44 years of age, respectively. The mean ages of the household heads and wives increased regularly as the age of the children in the family increased.

The median size of the family by family group and by occupational class is shown in Table 3. In the professional and managerial class, the Group 1 families had a median size of approximately five members. The Group 2 families which had children both over, under, and including 9 years of age had a larger median size, approximately six members. The smaller median size of the Group 3 families, about four members, was due in part to the fact that some of the teen-age children were away at school and that older children may have left the house-

OCCUPATIONAL CLASS AND FAMILY GROUP	MEAN AGE	STANDARD ERROR OF MEAN	STANDARD DEVIATION
<b>HEADS</b>			
<i>Professional and Managerial</i>			
Group 1, Children 9 Years of Age or Younger	39.3	± 0.36	7.38
Group 2, Children Over 9 Years and Those 9 or Younger	43.4	± 0.34	6.30
Group 3, Children Over 9 Years of Age	47.5	± 0.31	6.42
<i>Clerical and Skilled</i>			
Group 1, Children 9 Years of Age or Younger	38.1	± 0.52	7.77
Group 2, Children Over 9 Years and Those 9 or Younger	43.5	± 0.42	6.73
Group 3, Children Over 9 Years of Age	47.9	± 0.43	7.32
<i>Semiskilled and Unskilled</i>			
Group 1, Children 9 Years of Age or Younger	37.1	± 0.54	7.28
Group 2, Children Over 9 Years and Those 9 or Younger	44.3	± 0.56	8.46
Group 3, Children Over 9 Years of Age	48.1	± 0.49	7.79
<b>WIVES</b>			
<i>Professional and Managerial</i>			
Group 1, Children 9 Years of Age or Younger	35.5	± 0.33	6.70
Group 2, Children Over 9 Years and Those 9 or Younger	39.2	± 0.25	4.65
Group 3, Children Over 9 Years of Age	43.9	± 0.28	5.90
<i>Clerical and Skilled</i>			
Group 1, Children 9 Years of Age or Younger	34.5	± 0.47	7.18
Group 2, Children Over 9 Years and Those 9 or Younger	39.1	± 0.37	6.02
Group 3, Children Over 9 Years of Age	43.5	± 0.33	5.86
<i>Semiskilled and Unskilled</i>			
Group 1, Children 9 Years of Age or Younger	34.5	± 0.55	7.44
Group 2, Children Over 9 Years and Those 9 or Younger	38.5	± 0.46	7.10
Group 3, Children Over 9 Years of Age	43.2	± 0.45	7.41

Table 2. Mean age of the heads of the households and wives by occupational class and family group. Pleasantville and Mt. Kisco, 1946-1949.

OCCUPATIONAL CLASS AND FAMILY GROUP	FIRST QUARTILE	MEDIAN FAMILY SIZE	THIRD QUARTILE
<i>Professional and Managerial</i>			
<i>Group 1, Children 9 Years of Age or Younger</i>	4.1	4.7	5.5
<i>Group 2, Children Over 9 Years and Those 9 or Younger</i>	4.7	5.5	6.6
<i>Group 3, Children Over 9 Years of Age</i>	3.7	4.4	5.1
<i>Clerical and Skilled</i>			
<i>Group 1, Children 9 Years of Age or Younger</i>	4.1	4.6	5.3
<i>Group 2, Children Over 9 Years and Those 9 or Younger</i>	5.1	5.9	7.2
<i>Group 3, Children Over 9 Years of Age</i>	3.7	4.5	5.3
<i>Semiskilled and Unskilled</i>			
<i>Group 1, Children 9 Years of Age or Younger</i>	4.0	4.5	5.0
<i>Group 2, Children Over 9 Years and Those 9 or Younger</i>	5.1	5.9	7.5
<i>Group 3, Children Over 9 Years of Age</i>	3.8	4.5	5.6

Table 3. Median number of persons per family by occupational class and family group. Pleasantville and Mt. Kisco, 1946-1949.

hold. The same differences in size of family by family group was true for the other occupational classes. It is of interest to note that the median size of Group 1, 2, and 3 families is similar in each occupational class.

The mean number of children per family is shown by age groups in Table 4. The children are classified by the occupational class of the head of the household and by family group. The Group 1 families in each occupational class had a greater concentration of young children aged 0-4 and 5-9 than did the Group 2 families. In the 0-4 year age group, the Group 1 families had a mean number of children varying from 0.66 to 0.76 among the occupational classes compared to a variation of 0.51

to 0.64 in the Group 2 families. In the 5-9 year age group, the Group 1 families had a mean number of children varying from 1.16 to 1.32 among the occupational classes compared to a variation of 0.95 to 1.03 in the Group 2 families. The Group 2 and Group 3 families in each occupational class had fairly similar concentrations of older children aged 10-14 and 15-18. In the 10-14 year age group, the means ranged from 0.98 to 1.13 and 0.73 to 0.83 among the occupational classes for the Group 2 and Group 3 families, respectively. In the 15-18 year age group, the means varied from 0.43 to 0.59 and 0.79 to 0.88 among the occupational classes for the Group 2 and Group 3 families, respectively. It should be emphasized that these means are crude means.

Table 4. Mean number<sup>1</sup> of children per family classified by occupational class and family group. Pleasantville and Mt. Kisco, September-May, 1946-1949.

OCCUPATIONAL CLASS AND FAMILY GROUP	AGE GROUPS OF CHILDREN			
	0-4	5-9	10-14	15-18
<i>Professional and Managerial</i>				
Group 1, Children 9 Years of Age or Younger	0.76	1.32		
Group 2, Children Over 9 Years and Those 9 or Younger	0.51	1.02	0.98	0.43
Group 3, Children Over 9 Years of Age			0.83	0.79
<i>Clerical and Skilled</i>				
Group 1, Children 9 Years of Age or Younger	0.74	1.26		
Group 2, Children Over 9 Years and Those 9 or Younger	0.64	1.03	1.05	0.56
Group 3, Children Over 9 Years of Age			0.73	0.81
<i>Semiskilled and Unskilled</i>				
Group 1, Children 9 Years of Age or Younger	0.66	1.16		
Group 2, Children Over 9 Years and Those 9 or Younger	0.63	0.95	1.13	0.59
Group 3, Children Over 9 Years of Age			0.76	0.88

<sup>1</sup> These are crude means.

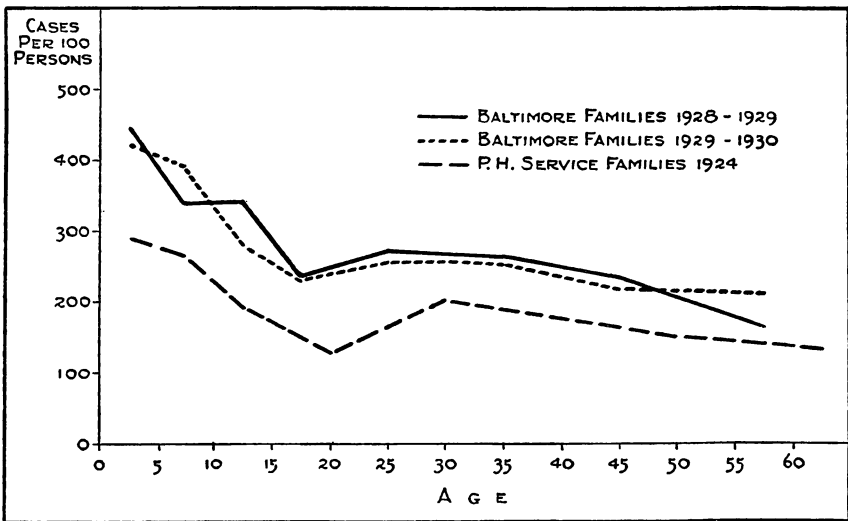


INCIDENCE OF RESPIRATORY ILLNESS

Minor respiratory disease has a characteristic age variation. This is illustrated in Figures 1 and 2 which show the annual incidence of acute respiratory illness by age as recorded in four special studies. Figure 1 shows the incidence by age in the Public Health Service family study (1924) and in the study among Baltimore families (1928-1929 and 1929-1930) (5, 6). Figure 2 shows the same type of data noted in the Cost of Medical Care study (1928-1931) and in the Eastern Health District study (1938-1943) (7, 8). Although these studies were made at different times and in different places, they show striking similarity in the age variation of illness. Respiratory illness has a characteristic age pattern that apparently has not changed with time or place.

In these investigations the acute respiratory illness rate was

Fig. 1. Age-specific incidence, total respiratory illnesses, Baltimore families, November 18, 1928-November 16, 1929, and November 17, 1929-November 15, 1930. Public Health Service Families, January 1, 1924-December 31, 1924.



(This Figure has been reproduced by permission from: Van Volkenburgh, V. A. and Frost, W. H.: Acute Minor Respiratory Diseases Prevailing in a Group of Families Residing in Baltimore, Maryland, 1928-1930. Prevalence, Distribution and Clinical Description of Observed Cases. *The American Journal of Hygiene*, January, 1933, Vol. xvii, No. 1, pp. 122-153.)

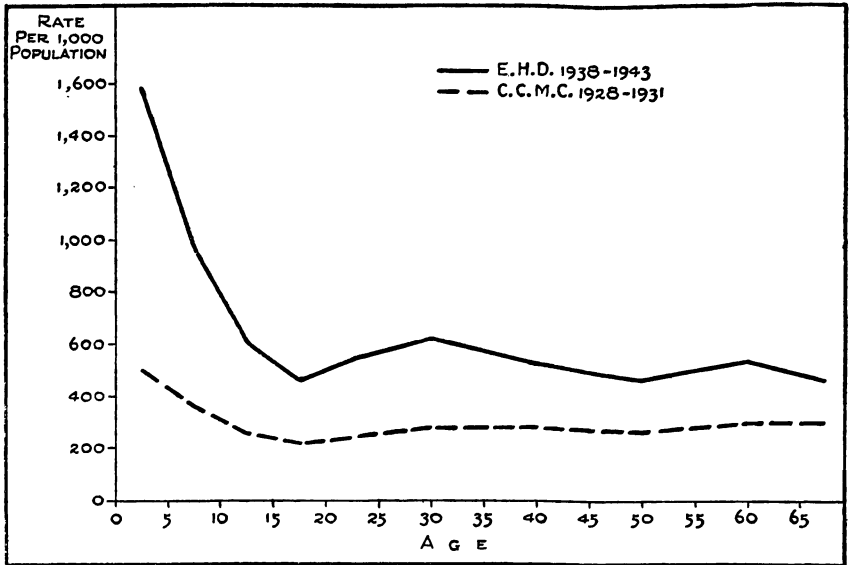


Fig. 2. Age-specific incidence of total minor respiratory illnesses in the population studied by the Committee on the Costs of Medical Care, 1928-1931, and in the sample population of the Eastern Health District of Baltimore, 1938-1943.

highest in young children, declined progressively to the age of 15-19, rose slightly in young adults, and thereafter declined to a relatively constant level throughout adult life. The younger children aged 0-9 had annually from 40-60 per cent more illness than did those children aged 10-19.

Because the illness rate among adults maintains a fairly constant level at various ages, the adult population in each of the three family groups was treated as a total and not subdivided by age. An adult was defined as a person 19 years of age or older.

The mean annual incidence of acute respiratory illness during the three school years, September to May, 1946-1949, among children by age and occupational class of the family is shown in Table 5. In this study the younger children aged 0-9 also had from 40 to 60 per cent more respiratory illness than the older children aged 10-18. These results correspond with the higher rate of respiratory illness among younger children compared with older children which was noted in earlier studies (5-8).

The children in the Group 1 families aged 0-4 and 5-9 had higher rates of respiratory illness than the children of corresponding ages in the Group 2 families. This was true of each occupational class. These lower rates in the Group 2 family children aged 0-4 and 5-9 may be due to a lowered risk of contracting infection from family contact because of less concentration in the Group 2 families of these young children who are most susceptible to respiratory illness. The children aged 10-18 in the Group 2 and Group 3 families have a similar level in ill-

Table 5. Mean incidence of acute respiratory illness during three school-years of 9 months each among children by family group and occupational class. Pleasantville and Mt. Kisco, 1946-1949.

AGE GROUPING OF CHILDREN	AGE			
	0-4	5-9	10-14	15-18
	Rate Per 1,000 Population			
PROFESSIONAL AND MANAGERIAL				
Group 1, Children 9 Years of Age or Younger	3,100.6	3,061.7		
Group 2, Children Over 9 Years and Those 9 or Younger	2,483.0	2,292.1	1,950.0	1,460.0
Group 3, Children Over 9 Years of Age			1,852.2	1,630.7
CLERICAL AND SKILLED				
Group 1, Children 9 Years of Age or Younger	2,232.6	2,517.1		
Group 2, Children Over 9 Years and Those 9 or Younger	1,928.6	1,765.8	1,384.1	1,290.5
Group 3, Children Over 9 Years of Age			1,780.6	1,606.1
SEMISKILLED AND UNSKILLED				
Group 1, Children 9 Years of Age or Younger	2,041.3	2,231.1		
Group 2, Children Over 9 Years and Those 9 or Younger	1,809.2	1,663.8	1,175.8	909.1
Group 3, Children Over 9 Years of Age			1,282.4	1,174.6

ness rates. It appears that the presence of younger children in the Group 2 families does not increase the risk of attack of respiratory illness among their older siblings.

The mean annual incidence of acute respiratory illness among adults by the occupational class of the family and by family group is shown in Table 6. The adult population was classed by relationship to the head of the household. The parents of the children (heads and wives) who presumably had the most intimate contact with the children in the family showed marked differences in illness rates among family groups (Figure 3). In the professional and managerial class, the household heads in Group 1 had an illness rate 88 per cent higher than the heads in Group 3. The wives in Group 1 in the same occupational class had an illness rate 40 per cent higher than those in Group 3. In the clerical and skilled class the household heads of the Group 1 families had a rate exceeding that of the Group 3 household heads by 17 per cent. The wives followed the same pattern as

Table 6. Mean incidence of acute respiratory illness during 3 school years of 9 months among adults by family group and occupational class. Pleasantville and Mt. Kisco, 1946-1949.

OCCUPATIONAL CLASS AND FAMILY GROUP	RELATIONSHIP		
	Heads	Wives	Other Related Adults
<i>Professional and Managerial</i>			
Group 1, Children 9 Years of Age or Younger	1,349.9	1,761.1	965.5
Group 2, Children Over 9 Years and Those 9 or Younger	973.8	1,513.0	666.7
Group 3, Children Over 9 Years of Age	718.3	1,255.2	810.0
<i>Clerical and Skilled Workers</i>			
Group 1, Children 9 Years of Age or Younger	911.1	1,547.8	744.7
Group 2, Children Over 9 Years and Those 9 or Younger	689.2	1,100.0	668.7
Group 3, Children Over 9 Years of Age	776.6	1,134.4	624.0
<i>Semiskilled and Unskilled Workers</i>			
Group 1, Children 9 Years of Age or Younger	733.3	1,226.5	347.8
Group 2, Children Over 9 Years and Those 9 or Younger	497.8	1,110.6	555.1
Group 3, Children Over 9 Years of Age	504.0	762.8	632.2

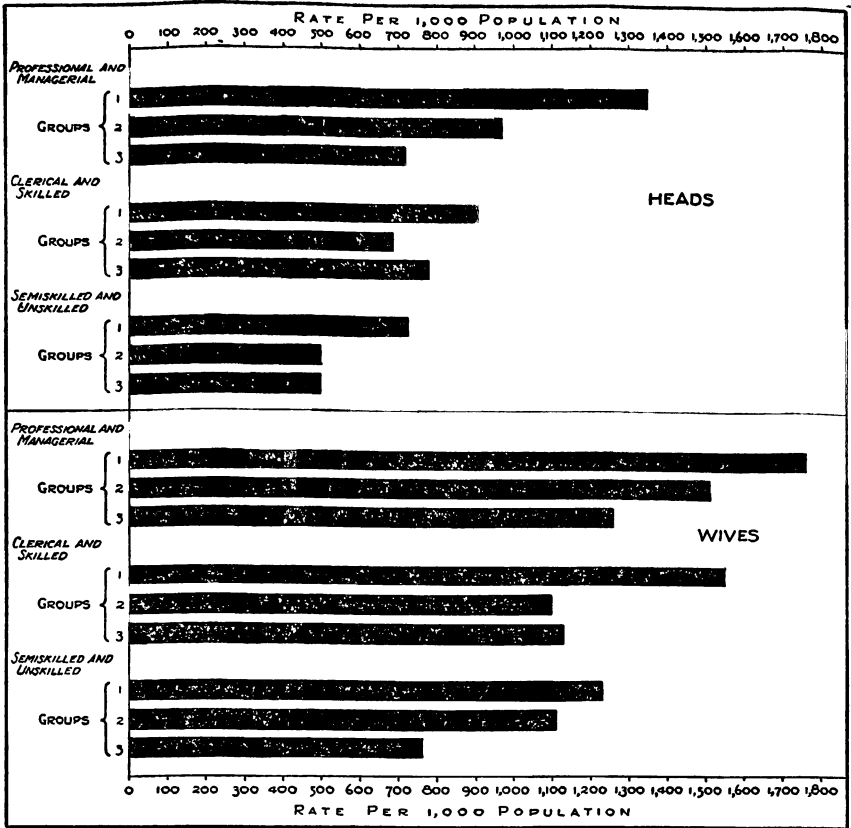


Fig. 3. Incidence of minor respiratory illness among household heads and wives in three groups of families classified according to occupation of the head of household.

the husbands. Those in Group 1 had a rate 36 per cent higher than those in Group 3. The household heads and wives in the semiskilled and unskilled class also showed the same relationship of rates. The household heads in the Group 1 families had a rate 45 per cent higher than Group 3 and the wives in Group 1 had a rate 61 per cent higher than those in Group 3.

The other related adults in the families were mainly adult children or parents of the head of the household or the wife. Although these other related adults presumably had a less intimate contact with the children in the family than the parents, those in Group 1 had 19 per cent more illness than those in Group 3 in each occupational class with the exception of the

semiskilled and unskilled class (Table 6). This exception may be due to the small number of other related adults in the Group 1 families in that class. These data are shown in Appendix Table I.

Thus, the environmental factor of young children in the household seemed to affect the incidence of acute respiratory illness among adults in the family, particularly the parents of the children.

#### SUMMARY

This paper has presented data on acute respiratory illness reported by families residing in Pleasantville and Mt. Kisco, New York, during the three school years September–May, 1946–1949.

Earlier studies in respiratory illness have shown that children aged 0–9 had annually from 40–60 per cent more illness than children aged 10–19 (5–8). In this study corresponding results were obtained. The young children aged 0–9 had from 40–60 per cent more illness than the older children aged 10–18.

The purpose of this particular analysis was to learn if the presence of young children in a family increased the risk of acute respiratory illness among their parents.

The families were divided into three groups according to the ages of the children in them. The families in each of these three groups were classified according to the occupational class of the head of the household in order to eliminate any bias in illness rates arising from differences in family attitude toward illness.

The household heads and wives, the parents of the children, showed marked differences in illness rates when grouped by the age of the children in the family. The fathers in the families having only young children aged 0–9 had from 17–88 per cent more illness than the fathers in the families having children aged 10–18. The mothers in the families having only young children had from 36–61 per cent more illness than did the mothers in the families having older children.

Thus it was concluded that the young children who have a

high incidence of acute respiratory illness seem to present a greater risk of illness to their parents than do the older children.

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Appendix Table 1. Population observed during 3 school-years classed by occupational class and family group. (Pleasantville and Mt. Kisco combined), September to May, 1946-1949.

AGE GROUPING OF CHILDREN	RELATIONSHIP				AGE OF CHILDREN			
	Heads <sup>1</sup> All Ages	Wives All Ages	Other Related Adults, All Ages	Children All Ages	0-4	5-9	10-14	15-18
<b>PROFESSIONAL AND MANAGERIAL</b>								
<i>Group 1, Children 9 Years of Age or Younger</i>	423	427	116	895	328	567		
<i>Group 2, Children Over 9 and Those 9 or Younger</i>	343	347	144	1,022	176	356	340	150
<i>Group 3, Children Over 9 Years of Age</i>	426	435	221	724			372	352
<b>CLERICAL AND SKILLED</b>								
<i>Group 1, Children 9 Years of Age or Younger</i>	225	230	94	464	172	292		
<i>Group 2, Children Over 9 and Those 9 or Younger</i>	251	260	166	861	168	269	276	148
<i>Group 3, Children Over 9 Years of Age</i>	291	320	242	501			237	264
<b>SEMISKILLED AND UNSKILLED</b>								
<i>Group 1, Children 9 Years of Age or Younger</i>	180	181	69	333	121	212		
<i>Group 2, Children Over 9 and Those 9 or Younger</i>	223	235	227	797	152	229	273	143
<i>Group 3, Children Over 9 Years of Age</i>	252	274	242	468			216	252

<sup>1</sup> Female heads of the household have been counted as wives. Heads of the household observed 8 weeks or less have been excluded.



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Appendix Table 2. Number of illnesses during 3 school-years among persons by occupational class and family group. (Pleasantville and Mt. Kisco combined), September-May, 1946-1949.

AGE GROUPING OF CHILDREN	RELATIONSHIP				AGE OF CHILDREN			
	Heads All Ages	Wives All Ages	Other Related Adults, All Ages	Children All Ages	0-4	5-9	10-14	15-18
<b>PROFESSIONAL AND MANAGERIAL</b>								
<i>Group 1, Children 9 Years of Age or Younger</i>	571	752	112	2,753	1,017	1,736		
<i>Group 2, Children Over 9 and Those 9 or Younger</i>	334	525	96	2,135	437	816	663	219
<i>Group 3, Children Over 9 Years of Age</i>	306	546	179	1,263			689	574
<b>CLERICAL AND SKILLED</b>								
<i>Group 1, Children 9 Years of Age or Younger</i>	205	356	70	1,119	384	735		
<i>Group 2, Children Over 9 and Those 9 or Younger</i>	173	286	111	1,372	324	475	382	191
<i>Group 3, Children Over 9 Years of Age</i>	226	363	151	846			422	424
<b>SEMISKILLED AND UNSKILLED</b>								
<i>Group 1, Children 9 Years of Age or Younger</i>	132	222	24	720	247	473		
<i>Group 2, Children Over 9 and Those 9 or Younger</i>	111	261	126	1,107	275	381	321	130
<i>Group 3, Children Over 9 Years of Age</i>	127	209	153	573			277	296