

# Health and the Urban Environment

## XIII. The Incidence and Burden of Minor Illness in a Healthy Population: Familial Spread<sup>1-4</sup>

MICHAEL D. LEBOWITZ, ERIC J. CASSELL, and JAMES McCARROLL

### SUMMARY

Familial spread was measured longitudinally in a family population and compared to that in similar familial studies. Despite major differences in methods, the studies showed similar results. Major differences in attack rates were found by age of introducer, age of secondary case, and family composition. Although upper respiratory infections were ubiquitous, familial spread did not appear to be large.

The important determinants of familial spread in this study, as in other studies, appeared to be the age of the index case, severity of the illness, the number of other family members and their ages. Family size, by itself, was not a major determinant. For acute illnesses, the family remained the largest source of spread.

### Introduction

Familial spread of acute upper respiratory illnesses has been studied in various localities and by various methods. The families studied have yielded somewhat similar results when the studies overlapped in content, despite the varying methods and cir-

cumstances (1, 2). In addition, each study presented different information, from which it was possible to obtain a broad idea of the nature of the spread of acute illness within a family.

### Materials and Methods

The Cornell Family Illness Study and its methods have been described previously (3). Secondary attack rate was defined as the number of new cases of an illness in a family after introduction of the illness by the index case to the number of persons exposed that occurred within a specified time interval after onset of the index illness. Illness meant both specific illnesses and broad categories of acute illness. Index case re-

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<sup>1</sup> From the Department of Environmental Health, School of Public Health and Community Medicine, University of Washington, Seattle, Washington 98105; and the Department of Public Health, The New York Hospital—Cornell Medical Center, New York, New York 10021.

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<sup>4</sup> Requests for reprints should be addressed to Dr. Michael Lebowitz, Pulmonary Disease Section, University of Arizona College of Medicine, Tucson, Arizona 85724.

ferred to the first case of a type of illness in the family at that time. Interval between illnesses was defined as the period between termination of last known illness and next onset of the same type of illness.

### Results

The secondary attack rates found in this study were generally similar to those reported in other studies (1, 2, 4) when the same interval between onset of the index illness and the secondary cases was used. The over-all rate within a 10-day interval was 20 per cent, and within a 15-day interval, it was 27 per cent (table 1).

When the secondary attack rate was examined by family size and by broad category of illness (table 2), a great deal of variation was found. Secondary attack rates were higher for the broad category of "common colds." The attack rate by family size is given in table 3.

One major determinant of the secondary attack rate was the family status of a subject, and another was the family composition in general (table 4). A method discussed by Badger (5) was used in this study. The mother was used as a standard against which other family members were compared in terms of susceptibility, communicability, and chance of introducing a new illness (table 4). The father was less susceptible, less communicable, and less likely to introduce new illness (table 4). He was similar in this respect to the children 15 or more years of age.

The youngest children were most susceptible, most communicable, and most likely to introduce illness. In these respects, the mother was closer to the children than to either the older children or the father.

Introduction by the youngest children (table 5) was often followed by the highest secondary attack rate (4). In addition, introducers of each class of family members were good sources of infection for at least one class of exposed family members (6). Attack rates also differed by age, with the highest secondary attack rates appearing in the younger family members. When examined by age of introducer, age of secondary case, and type of illness, it was found that children less than 15 years of age always had greater rates of illness than the older members, regardless of who introduced the illness and the type of illness. The highest secondary attack rates occurred in the broad categories of illness with more symptoms as well as those of longer duration (i.e., severity). Generally, there was some age specificity, with children less than 15 years of age spreading the illnesses to other children of the same age group.

As Fox (6) has stated, "This suggests that spread relates chiefly to degree of contact (and, presumably, the immunity status of those exposed)." All of the family studies (1, 2, 4) agreed that the likelihood that a given class of family members would introduce illness was a function of immunity status and degree of exposure to extrahousehold as well as intrahousehold sources of

TABLE 1  
SECONDARY ATTACK RATE BY CATEGORY OF ILLNESS FOR  
3 TIME INTERVALS FOR ALL FAMILY SIZES

Category	Five-Day Rate			Ten-Day Rate			Fifteen-Day Rate		
	Sec- ondary Cases (no.)	Exposed (no.)	Attack Rate (%)	Sec- ondary Cases (no.)	Exposed (no.)	Attack Rate (%)	Sec- ondary Cases (no.)	Exposed (no.)	Attack Rate (%)
Cold	1,030	5,850	17.6	1,460	5,850	25.0	1,946	5,850	33.3
Rhinitis	118	995	11.8	164	995	16.5	203	995	20.4
Cough/sore throat	112	1,433	7.8	193	1,433	13.5	277	1,433	19.3
Gastrointestinal	257	2,264	11.4	382	2,264	16.9	522	2,264	23.0
Other	394	3,409	11.6	594	3,409	17.4	780	3,409	22.9
Total	1,911	13,951	13.7	2,793	13,951	20.0	3,726	13,951	26.7

