# THE IMPORTANCE OF MEASLES AS A HEALTH PROBLEM

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DURING the past 40 years the ecological approach to disease has become a basic concept of epidemiology. Among all diseases measles has stood as the classic example of successful parasitism. This self-limiting infection of short duration, moderate severity, and low fatality has maintained a remarkably stable biological balance over the centuries. Those epidemiologists, and there are many, who tend to revere the biological balance have long argued that the ecological equilibrium of measles is solidly based, that it cannot readily be disrupted and that therefore we must learn to live with this parasite rather than hope to eradicate it. This speaker, not so long ago, was counted among this group and waxed eloquent on this subject in print.[1]

Happily, this era is ending. New and potent tools that promise effective control of measles are at hand. If properly developed and wisely used, it should be possible to disrupt the biological balance of measles. Its eradication from large continental land masses such as North America and many other parts of the world can be anticipated soon.

The importance of any disease as a public health problem must be gauged from many angles. For example, using mortality as a criterion heart disease becomes most important. Short-term morbidity makes the common cold rank high. For chronic disability arthritis and mental disease dominate. For public interest and parental concern, in spite of relatively low incidence, nothing has equaled poliomyelitis.

According to these criteria, the importance of measles cannot be compared with any of the diseases mentioned so far, but it should still be classed as an important health problem on two main counts. First, any parent who has seen his small child suffer even for a few days with persistent fever of 105°, with hacking cough and delirium wants to see this prevented, if it can be done safely. Second, at last there is promise that something can be accomplished by organized health action.

As a contribution to this symposium, we of the Communicable Disease Center have brought together some of the basic descriptive statistics concerning measles in the United States. We hope this may serve as a simple frame of reference broadly defining our problem.

Figure 1 presents annual morbidity and mortality for the expanding reporting areas from 1912 to 1959. Note the stability of the morbidity rate and the steady downward trend in the mortality rate. Also, there is the somewhat ominous suggestion of a cessation of this downward trend since 1955 similar to the leveling off of the infant death rates during the past six years. The morbidity figures testify to the stability of the biological balance of measles during the period. The decline in mortality demonstrates the degree to which we have adapted to this balance and have learned to live with this parasite.

Figure 2 presents the familiar curves of cumulative frequency of a history of measles by age. Two large studies published by Collins in 1929[2] and 1942[3] are compared with a recent survey conducted by Epidemic Intelligence Service

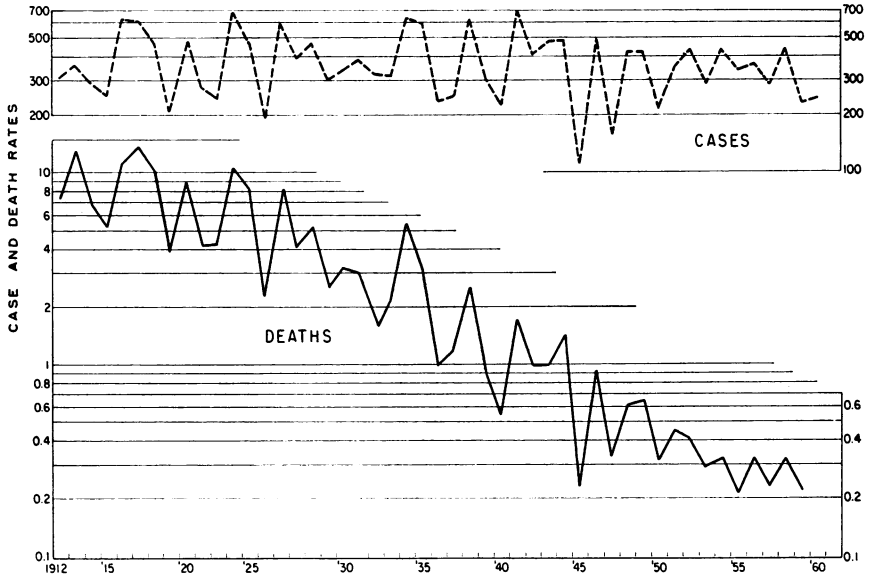


**Figure 1—United States Measles Reported Cases and Deaths per 100,000 Population, 1912-1959**

Officers in Atlanta in the summer of 1961.[5] Also shown is the curve of neutralizing antibodies for measles virus reported by Black from New Haven in 1959.[4] Note the great similarity of the curves and the high level of 90 per cent or greater reached by age 15 in all of the studies. More than 50 per cent give a history of measles by age six years.

These cumulative curves can be converted by relatively simple statistical procedures to estimate age-specific attack rates. These are shown for the Atlanta survey in the upper panel of Figure 3. These estimates are corrected for underreporting. Note that the peak incidence falls in the age group three to four years. This stands in sharp distinction to the six-year peak usually observed in age distributions of reported cases. Presumably case reporting for school children tends to be better than for preschoolers.

The central panel of Figure 3 shows age-specific mortality rates for measles for the three-year period 1957-1959, the latest available national statistics. The highest mortality occurred in the age group 6 to 11 months, after which it fell progressively, but significant numbers of deaths are still recorded in the three- to six-year age group where incidence of cases is highest.

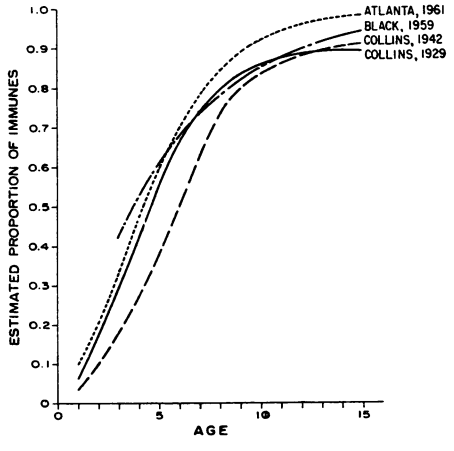


**Figure 2—Estimated Proportion of Measles Immunes by Age, in Four Studies**

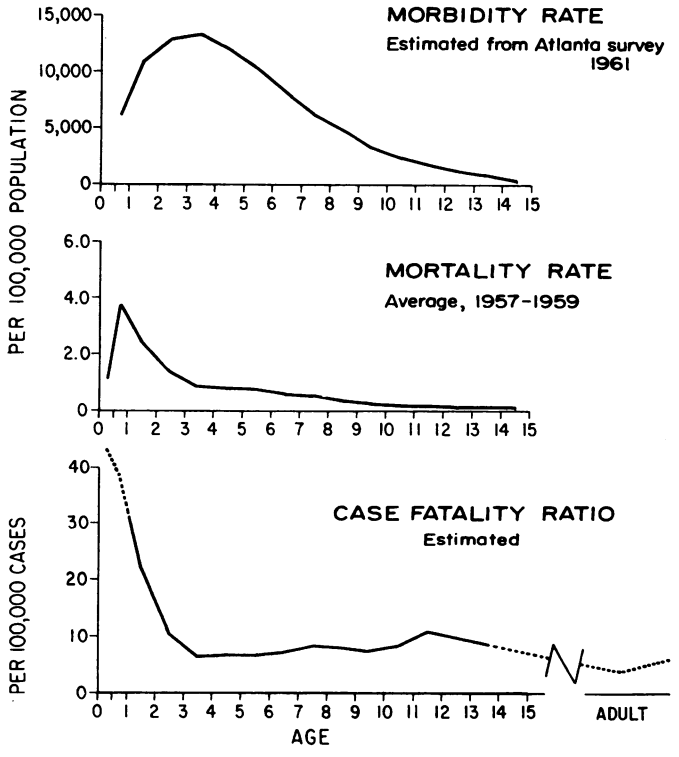


**Figure 3—Measles Rates by Age**

In the lower panel of Figure 3, the data in the upper two panels have been combined to provide approximate case fatality ratios. These cannot be separated for infants under six months and for those 6 to 11 months of age because the survey data do not permit estimates of the low incidence in early months of life. Clearly the greatest risk of death from measles exists during the first and second years of life. The slight but apparent rise in the ratio at age 11 years is probably an artifact in the morbidity estimate. There is, however, a small but finite mortality from measles among elderly persons revealing that even in this modern age of extensive communication some persons still may escape infection in childhood.

Thus, in the United States measles is a disease whose importance is not to be measured by total days disability or number of deaths, but rather by human values and by the fact that tools are becoming available which promise effective control and early eradication.

To those who ask me, "Why do you wish to eradicate measles?," I reply with the same answer that Hillary used when asked why he wished to climb Mt. Everest. He said, "Because it is there." To this may be added, ". . . and it can be done."

## REFERENCES

1. Langmuir, Alexander D. "Epidemiology." Chapter in Biological Foundations of Health Education Proceedings of the Eastern States Health Education Conference, April 1-2, 1948. New York, N. Y.: Columbia University Press, 1950.
2. Collins, Selwyn D. Age Incidence of the Common Communicable Diseases of Childhood. Pub. Health Rep. 44:763-826, 1929.

3. Collins, Selwyn D.; Wheeler, Ralph E.; and Shannon, Robert D. The Occurrence of Whooping Cough, Chickenpox, Mumps, Measles and German Measles in 200,000 Surveyed Families in 28 Large Cities. Special Study Series, No. 1. Washington, D. C.: Division of Public Health Methods, National Institutes of Health, USPHS, 1942.
4. Black, Frances L. Measles Antibodies in the Population of New Haven, Connecticut. Am. J. Hyg. 83:74–82, 1959.
5. Epidemic Intelligence Service. Calculations from Survey Data Collected by 1961 Class of Epidemic Intelligence Service Officers. Atlanta, Ga.: Epidemiology Branch, CDC, 1961.

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