JRST
Journal of Research in Science Teaching
Research Brief
VOL. 59, NO.7, PP.1274-1300 (2022)

Teaching and Learning about Infectious Respiratory Diseases in K-12 Education

Yasmin Kafai, Yue Xin, Deborah Fields & Colby Tofel-Grehl

Overview: We reviewed the past twenty years of literature on helping K-12 students learn about infectious respiratory diseases.

Audience: K-12 Science Teachers; Educational Designers; Grant Funders; Policy Makers

Key Points

- There is little research about how to teach and learn about infectious respiratory diseases like COVID in K-12 education.
- Nearly all instructional efforts have focused on middle and high school students, leaving out younger students.
- Most studies focus on cellular level biology with a lesser number focused on population aspects of infectious diseases; very few studies address viral periods (i.e., overlapping asymptomatic and infectious periods) which are key to understanding epidemics.
- Opportunities for out-of-school learning and teaching are largely untouched.

INTRODUCTION The pandemic outbreak of COVID-19 has highlighted an urgent need for infectious disease education for K-12 students. To gather a better understanding of what educational interventions have been conducted and to what effect, we performed a scoping review.

FINDINGS We identified and examined 23 empirical researcher- and teacher-designed studies conducted in the last twenty years (2000-2021) that have reported on efforts to help K-12 students learn about infectious diseases, with a focus on respiratory transmission.

Our review shows studies of educational interventions on this topic are rare and tend to emphasize cellular level infection over population scale effects on infectious spread (i.e., handwashing, vaccines, herd immunity). Epidemiological topics like viral periods (i.e., asymptomatic infectious periods which are key in rapid disease spread) are almost entirely absent from the literature. Furthermore, efforts to educate youth about infectious disease primarily focused on secondary school students, leaving out primary students.

Studies tend to emphasize interactive learning environments to model or simulate both cellular-level and population-level attributes of infectious disease.

Studies were only mildly successful in raising science interest, with somewhat stronger findings on helping students engage in scientific inquiry on the biology of infectious diseases and/or community spread. Most importantly, efforts left out critical dimensions of transmission dynamics key to understanding implications for public health.

TAKEAWAYS Our scoping review is the first comprehensive effort to summarize what we know about learning and teaching of respiratory infectious disease in K-12 education. The research gaps we identified outlined implications for National Standards, educational research, and classroom practice. An expanded knowledge base in these areas will help to advance robust teaching and learning in order to promote scientific understandings of infectious disease and more informed responses to pandemics.