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Sommario/riassunto	<p>Epidemiology is a discipline intended to systematically investigate, and ideally quantify, disease dynamics in populations (Perez, 2015). Epidemiological assessments may be divided into four large areas, namely, (a) identification and characterization of a pathogen, (b) development of systems for detection of cases, (c) descriptive epidemiology and quantification of disease patterns, and (d) advanced analytical methods to design intervention strategies. Briefly, there is an initial need for understanding the pathogeny of a disease and condition, which may also include experimental studies and development of new models of infection and proliferation under different conditions. Subsequently, such knowledge may be applied to support the identification of cases, which typically includes the design, evaluation, and validation of diagnostic tests. Disease may then be quantified in a population, leading to the identification of patterns and application of molecular characterization techniques to understand disease spread, and ultimately to identify factors preventing or promoting disease. Finally, those factors may be incorporated into advanced quantitative methods and epidemiological models, which are used to design and evaluate strategies aimed at preventing, controlling, or eliminating disease in the population. Recent years have seen a dramatic increase in the application of science, technology, engineering, and mathematical (STEM) tools and approaches intended to enhance such analytical epidemiology process, with the ultimate goal</p>

of supporting disease prevention, control, and eradication. This eBook comprises a series of research articles that, through current state-of-the-art scientific knowledge on the application of STEM tools to the microbiology of infectious diseases, demonstrate their usefulness at the various components of an integral epidemiological approach, divided into the four large components of (a) experimental studies, (b) novel diagnostic techniques, (c) epidemiological characterization, and (d) population modeling and intervention.

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