Infectious Disease Epidemiology: History, Transmission and Prevention

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Introduction

Written by Victor Trismanjaya Hulu, Salman, Agus Supinganto, Lia Amalia, Khariri, Efendi Sianturi, Nilasari, Nurhayati Siagian, Puji Hastuti & Syamdarniati, given the importance of infectious disease epidemiology in the public health field, it is highly hoped that every health workers can study and understand epidemiology infectious diseases such as epidemiological triad, natural history of disease, transmission and prevention efforts as described in this book. This book was prepared with the aim of providing undergraduate, postgraduate and doctoral students in the field of Public Health Sciences can have new knowledge and basic skills related to infectious disease epidemiology, as well this book can be used as a reference book in preparing final assignments includes thesis and dissertation. The discussion of this book consists of Introduction to Infectious Disease Epidemiology, Measles Epidemiology, Tuberculosis Epidemiology, Polio Epidemiology, Pertussis Epidemiology, Tetanus Epidemiology, Diphtheria Epidemiology, Typoid Epidemiology, Hepatitis Epidemiology and Human Papilloma Virus Epidemiology. Epidemiology is a recent scientific discipline that has developed hand in hand with changes occurring in society and the emergence of new diseases. This evolution has allowed epidemiology to remain a useful tool and relevant in uncovering and understanding diseases and health events. Since its origin over a century ago, there have been many epidemiology definitions has been suggested (Fré Rot et al., 2018). Epidemiology approach for traditional infectious disease control relies on case data and contact-based tracing interviews to estimate key epidemic parameters (e.g. time incubation) and to reconstruct transmission chains (Ladner et al., 2019). The epidemiological triad, the classic model of infectious disease causation, describes the fundamental relationship between disease-causing agents, humans the susceptible and/or host animal, and the environment in which they live and their interaction occurs, with the spread of the infectious agent becoming direct host-to-host transmission or indirect transmission via vector (e.g., mosquito). However each of these components is dynamic with the environment changes, such as daily weather variations and climate change that may influence exposure agents and opportunities. Agent develops during its life and interacts with other agents withinvchanging environment; and hosts are also dynamic, influencing an individual's exposure, susceptibility, and response to pathogens and environment. Also, vectors move and interact with different agents in different environments (Jia et al., 2020). Epidemiology is a science that studies populations. Epidemiology comes from Greek, consisting of three words, namely epi, meaning on/about, demos means population and logos means knowledge. Understanding the basis of epidemiology is that it is a science that studies the distribution, frequency and determinants/factors that influence the occurrence of disease or health problems in population groups. Epidemiology is a science that studies distribution and disease determinants in population/community groups. This term comes from the word 'epidemic', which apparently comes from epidemeion, a word which used by Hippocrates when describing disease, namely with 'visiting people'. The distribution of the disease under study is often geographic, but distribution based on age, gender, social class, marital status, racial group and occupation and so on is also often a concern. Sometimes the same geographic population compared at different times to investigate disease trends. Determinant factors are also factors that determine which disease are disease trigger factors. The study of the distribution of disease

is essentially descriptive, while determinant studies consider disease etiology (Woodward, 2014).

The epidemiology of infectious diseases can be caused by interactions between causes of disease, host and environment both directly and indirectly indirectly which can result in illness or death in community/population groups. When assessing the possible impact of an infectious disease, there are 2 parameters of concern: the possibility of disease transmission (its capacity to spread) and the severity of the disease and its ability to kills or incapacitates those infected. This is rated based on the reproduction rate and case fatality rate. Death rate cases depend on the definition of the disease, namely the accuracy of diagnosis (detection cases) and availability of treatment. Infection is a predisposition to spread infection from host to host. The period of transmission of some diseases starts before symptoms appear, making it much more difficult to controlled (Binns, Low and Kyung, 2020). Epidemiology of infectious diseases is a disease that can be caused by certain infectious agents (viruses, bacteria or parasites) that arise through transmission of an agent from an infected person, animal, or other reservoir to susceptible host, either directly or indirectly through intermediaries including air, water, vectors or through plants

and so on (Last, 2001). Infectious diseases can be transmitted to sensitive humans via several ways that are often referred to as good modes of transmission occurs directly or indirectly from person to person or its spread in population groups in terms of epidemiological aspects (Chandra, 2013). Many infectious agents have only been discovered in recent decades. Etiology of diseases that were once believed to be non-infectious are increasingly becoming recognized. For each infection process that occurs, the pathogen and the host must encounter each other first. Factors such as geography, environment and behavior influence the likelihood of infection. Despite the initial encounter between a susceptible host and an organism that deadly often causes disease, some organisms can stored in the host for years before disease is clinical evident (Kasper and Fauci, 2010).

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