

## Resources for Teachers and Students

### In-Person Activities

#### David J. Sencer CDC Museum Tour CDC

Award-winning permanent and changing exhibits on various public health topics. Free to the public and, by reservation, for school groups.

URL: <http://www.cdc.gov/museum/>

#### CDC Museum Disease Detectives Camp CDC

Five-day summer educational program for rising high-school juniors and seniors.

URL: <http://www.cdc.gov/museum/camp/detective/index.htm>

#### Science Olympiad *Disease Detectives* Event CDC

Event cosponsored by CDC and National Science Olympiad is part of an afterschool science competition. Materials from previous events are posted for teaching purposes.

URL: <http://www.cdc.gov/diseasedetectives/> and [www.soinc.org](http://www.soinc.org)

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## Fellowship Programs

### **CDC Science Ambassador Fellowship**

Five-day professional development summer workshop for middle- and high-school teachers at CDC's main campus in Atlanta.

URL: <http://www.cdc.gov/scienceambassador/index.html>

### **CDC Fellowships and Internships**

Available to undergraduate, graduate, and postgraduate students.

URL: <http://www.cdc.gov/Fellowships/>

### **Epidemic Intelligence Service (EIS)**

Two-year postgraduate program in applied epidemiology.

URL: <http://www.cdc.gov/eis>

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## E-Learning

### **CDC Learning Connection (CDC LC)**

One-stop learning resource that can help increase public health knowledge and skills among a broad audience and meet professional development needs among public health workers. Includes quality e-learning, a monthly newsletter, Quick-Learn lessons for mobile learning, and CDC TRAIN public health learning management system (LMS).

URL: [http://www.cdc.gov/learning/?s\\_cid=lecon-002-bb](http://www.cdc.gov/learning/?s_cid=lecon-002-bb)

### **CDC TRAIN**

Gateway into TRAIN National, a comprehensive catalog of public health learning products. TRAIN is a widely used LMS and is a free service of the Public Health Foundation. Target audience is public health workforce but educators and students will find it useful.

URL: <http://www.cdc.train.org/>

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## Online Lectures

### Public Health 101 Series

Six customizable lessons to introduce concepts from the five major fields of public health. Lessons are downloadable as PDFs or PowerPoints.

URL: <http://www.cdc.gov/publichealth101/instructors.html>

### How the “ghost map” helped end a killer disease

TED talk by author Steven Johnson describing how the work of John Snow and public health has shaped modern society. An excellent companion piece to Johnson’s book *The Ghost Map*.

URL: [https://www.ted.com/talks/steven\\_johnson\\_tours\\_the\\_ghost\\_map](https://www.ted.com/talks/steven_johnson_tours_the_ghost_map)

### Tales from the Front Lines: How CDC's Elite Disease Detectives Risk Their Lives to Protect Yours:

Excellent panel discussion led by Dr. Mike Bell. Five former Epidemic Intelligence Service Officers present engaging descriptions of outbreak investigations they have worked on.

URL: <http://www.milkeninstitute.org/events/conferences/summit/atlanta-summit-on-public-health/panel-detail/4753>

### YouTube Videos

- There are a lot of good videos addressing topics such as what is epidemiology, study design and experimental error including bias and confounding on YouTube and other sites. Searching the topic + video generally results in multiple selections. Some of these are rather basic while others are quite advanced.

- CDC’s Streaming Health YouTube Channel 

URL: <https://www.youtube.com/user/CDCStreamingHealth>

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## Lesson Plans and Other Teaching Materials

### Science Ambassador Lesson Plans CDC

More than 60 lesson plans on a variety of public health topics, developed by CDC Science Ambassadors in collaboration with CDC subject matter experts for use in science classes.

URL: <https://www.cdc.gov/careerpaths/scienceambassador/lesson-plans/index.html>

### Epidemiology and Public Health Science Core (EPHS) Competencies for High School Students CDC

A description of the skills and abilities students should be able to demonstrate after completing a course in EPHS. These are organized along the same lines and align with the Next Generation Science Standards (NGSS); the Association of Schools and Programs of Public Health (ASPPH) Recommended Critical Component Elements of an Undergraduate Major in Public Health; and the enduring understandings of epidemiology.

URL: <https://www.cdc.gov/careerpaths/k12teacherroadmap/pdfs/ephs-competencies.pdf>

### Epi Info™ CDC

Described as “A public health suite of interoperable software tools designed for the global community of public health practitioners and researchers” the user guide and tutorials provide a useful set of resources on epidemiology and biostatistics for educators and students.

URL: <http://www.cdc.gov/epiinfo/index.html>

### Epidemiology Education Movement

Grassroots effort to promote the teaching of epidemiology to middle- and high-school students.

URL: <http://epiedmovement.org/index.htm>

### *Evolving Text*

Website for disseminating *Understanding the Fundamentals of Epidemiology — An Evolving Text* and other learning materials developed for teaching the introductory epidemiology course for majors at the University of North Carolina at Chapel Hill School of Public Health, Department of Epidemiology.

URL: <http://www.epidemiolog.net/>

### *ActivEpi Web*

Free, online electronic textbook for teaching epidemiology and biostatistics. Contains 15 chapters, a full range of learning activities, and instructor materials.

URL: <http://web1.sph.emory.edu/activepi/>

### Epidemiology and the Energy Balance Equation

Epidemiology curriculum focused on physical activity and nutrition for science, mathematics, and health teachers.

URL: <http://www.teachepidemiology.org/EEBE.html>

### Emerging and Re-Emerging Infections

NIH Curriculum Supplement for High School focuses on emerging and re-emerging infectious diseases and their impact on society.

URL: <http://science.education.nih.gov/customers/HSDiseases.html>

### The Science of Healthy Behaviors

NIH Curriculum Supplement for Middle School focused on the scientific study of behavior and how behavioral and social factors influence health.

URL: <https://science.education.nih.gov/customers/MSHealthy.html>

**NIH Curriculum Supplement Series**

**NIH Curriculum Supplements are guides to 2 weeks of lessons on the science behind health topics.**

**URL:** <https://science.education.nih.gov/customers/WebPages/CSHome.html>

**Epiville**

**Web-based learning tool on the principles of epidemiology developed by the Mailman School of Public Health, Columbia University.**

**URL:** <http://ccnmtl.columbia.edu/projects/epiville>

**Young Epidemiology Scholars (YES)**

**Downloadable teaching units for incorporating epidemiology as an interdisciplinary science in high-school classrooms. Units are grouped by discipline (biology, social sciences, environmental science, health education, statistics, English, and chemistry).**

**URL:** <http://yes-competition.org/yes/teaching-units.html>

**John Snow Website**

**Website devoted to all things dealing with the Father of Epidemiology (John Snow not Jon Snow) including a collection of maps of London from 1846, 1856, 1859 and 1872.**

**URL:** <http://www.ph.ucla.edu/epi/snow.html>

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## Case Studies

### Epidemiology Case Studies

Collection of case studies based on epidemiologic investigations of disease outbreaks. Includes computer-based and classroom case studies as well as an outbreak simulation.

URL: <http://www.cdc.gov/epicasestudies/index.html>

### EIS Case Studies in Applied Epidemiology

Collection of student versions of nine case studies used to train new officers in the Epidemic Intelligence Service. Instructor guides available only to trainers or instructors on request.

URL: <http://www.cdc.gov/eis/casestudies.html>

### HuGENet Case Studies

A series of materials designed to sharpen epidemiologic skills and enhance knowledge of genomic variation and human diseases.

URL: <http://www.cdc.gov/genomics/hugenet/CaseStudy/index.htm>

### DPDx Monthly Case Studies

A collection of more than 400 case studies on the laboratory identification of parasitic diseases of public health concern

URL: <http://www.cdc.gov/dpdx/monthlyCaseStudies/2016/index.html>

### Case Studies in Environmental Medicine

A collection of case studies designed to increase primary care providers' knowledge of hazardous substances and aid in the evaluation of patients potentially exposed to hazardous substances.

URL: <http://www.atsdr.cdc.gov/csem/csem.html>

### Avian Flu Case Study: Bird Flu and the 1918 Pandemic

Web-based activity from Emory University's CASES Online contains teaching resources on pandemic and avian influenza. (Note: Educators must register to access the case study.)

URL: [http://www.cse.emory.edu/cases/casedisplay.cfm?case\\_id=1183](http://www.cse.emory.edu/cases/casedisplay.cfm?case_id=1183)

### Obesity Case Study: Wild Goose Chase

Web-based activity from Emory University's CASES Online for the high-school level. Focuses on obesity epidemic research in the United States. (Note: Educators must register to access the case study.)

URL: [http://www.cse.emory.edu/cases/casedisplay.cfm?case\\_id=783](http://www.cse.emory.edu/cases/casedisplay.cfm?case_id=783)

### Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET)

Professional alliance of 55 Field Epidemiology Training Programs (FETPs) around the world. TEPHINET's library has over 3,500 investigative reports, manuals, curricula, training documents such as case studies, and presentation abstracts pertaining to epidemiology and public health.

URL: <http://library.tephinet.org/training-materials>

### AMBIENT: Atmospheric & Marine-Based Interdisciplinary Environmental Health Training

A series of modules including case-studies, exercises and other materials linking environmental and public health sciences.

URL: <http://yyy.rsmas.miami.edu/groups/ambient/>

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## On-line Games for Students

### Solve the Outbreak App

App available for free download allows tablet users to solve different outbreak scenarios. Desktop users can play Solve the Outbreak online.

URL: <http://www.cdc.gov/mobile/Applications/sto/>

### Health IQ App

Smartphone app gives users opportunity to determine if they know more health trivia than a public health nerd. Available in both English and Spanish.

URL: <http://www.cdc.gov/mobile/applications/healthiq/index.html>

### Body and Mind (BAM!)

Interactive science and health education activities targeted at 9- to 13-year-old students.

URL: <http://www.cdc.gov/bam/>

### Outbreak at Watersedge

An interactive game designed to introduce young people to the work of public health through solving an outbreak in the small town of Watersedge.

URL: <http://www.mclph.umn.edu/watersedge/>

### MedMyst: Medical Mysteries on the Web

Interactive learning resource on microbiology and the scientific method using infectious disease epidemiology, from Rice University Center for Technology in Teaching and Learning.

URL: <http://medmyst.rice.edu/>

### Disease Detectives

Interactive activities about infectious diseases, developed by Science Museum of Minnesota with support from an NIH Science Education Partnership Award.

URL: <http://www.diseasedetectives.org/>

### Science Mystery

A collection of online mysteries dealing with a variety of topics including epidemiology, human health and ecology. Each of the nine mysteries is accompanied by a set of teacher notes.

URL: <http://www.sciencemystery.com/>

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## General Public Health Resources

### **CDC.gov** CDC

Homepage includes A–Z index of hundreds of topics, also accessible via specific health-related pages. Information on descriptions of symptoms, treatments, and prevention strategies for many illnesses and conditions, as well as graphs and illustrations suitable for use in classroom settings.

URL: <http://www.cdc.gov>

### **Public Health Image Library (PHIL)** CDC

Online collection of downloadable photos, videos, and illustrations. Most of the images are in the public domain and thus free of any copyright restrictions.

URL: <http://phil.cdc.gov/Phil/home.asp>

### **DPDx Parasite A–Z Index** CDC

Collection of information, photos, and diagrams related to diagnosing and treating parasitic diseases.

URL: <http://www.cdc.gov/dpdx/az.html>

### **Morbidity and Mortality Weekly Report** CDC

A weekly publication by the CDC containing data on specific diseases as reported by state and territorial health departments and reports on infectious and chronic diseases, environmental hazards, natural or human-generated disasters, occupational diseases and injuries, and intentional and unintentional injuries. Archives include initial reports of historic events.

URL: [www.cdc.gov/mmwr](http://www.cdc.gov/mmwr)

### **Emerging Infectious Disease Journal** CDC

A monthly open access journal representing the scientific communications component of CDC's efforts against the threat of emerging infections.

URL: <http://wwwnc.cdc.gov/eid/>

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## Epidemiology Textbooks

### ***Principles of Epidemiology in Public Health Practice, 3rd Edition***

Developed as a training tool for entry-level public health workers. Describes basic epidemiology principles, concepts, and procedures; provides a foundation for studying and teaching applied epidemiology; explains how to calculate and interpret frequency measures (ratios, proportions, and rates) and measures of central tendency; and explains use of tables, graphs, and charts to organize, summarize, and display data. Highly recommended as a standard reference for Disease Detectives event competitors, coaches and event supervisors.

**URL:** <http://www.cdc.gov/ophss/csels/dsepd/SS1978/index.html>

### ***Basic Epidemiology, 2nd edition***

Originally written by the World Health Organization to strengthen education, training and research in the field of public health. More than 50,000 copies have been printed, and it has been translated into more than 25 languages. Presents public health and applied epidemiology from an international perspective. Good section on experimental error. When used with *Principles of Epidemiology in Public Health Practice* makes a great tool for Disease Detectives event competitors, coaches and event supervisors.

**URL:** [http://apps.who.int/iris/bitstream/10665/43541/1/9241547073\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/43541/1/9241547073_eng.pdf)

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## Data Sets

### CDC Data and Statistics CDC

Links to most of the publically available CDC data sets. A starting place for educators who want to involve their students in analysis of public health data. Some data sets require considerable expertise, but summary reports and other data sets require little or no background in programming and data analysis.

URL: <http://www.cdc.gov/DataStatistics/>

### GIS (Geographic Information System) Exchange CDC

Collection of maps and graphical data on various health problems, and GIS resources.

URL: <http://www.cdc.gov/dhdsp/maps/gisx/>

### Behavioral Risk Factor Surveillance System (BRFSS) CDC

National or state-specific data on behaviors, risk factors, and other topics ranging from alcohol to women's health for each year from 1995 to 2013. Updated annually.

URL: <http://www.cdc.gov/brfss/>

### Youth Risk Behavior Surveillance System (YRBSS) CDC

Data from periodic surveys on behaviors, risk factors, and other topics ranging from alcohol and other drug use to weight control among middle and high school students. Not all states are represented.

URL: <http://www.cdc.gov/HealthyYouth/yrbs/index.htm>

### National Health and Nutrition Examination Survey (NHANES) CDC

Reports and documentation of methods used to collect data for this survey used to monitor the state of the nation's health. Includes tutorials on how to access and analyze data from 1999 and later.

URL: <http://www.cdc.gov/nchs/nhanes.htm>

### National Health Interview Survey (NHIS) CDC

Summary reports and information on the health status of the U.S. civilian noninstitutionalized population obtained through confidential interviews conducted in households by Census Bureau interviewers.

URL: <http://www.cdc.gov/nchs/nhis.htm>

### National Health Care Surveys CDC

Summary reports and information on a group of surveys designed to answer key questions about factors influencing the use of health care resources, quality of health care including safety, and disparities in health care services provided to population subgroups in the United States.

URL: <http://www.cdc.gov/nchs/dhcs.htm>

### Vaccine Adverse Event Reporting System (VAERS)

Downloadable data sets on potential adverse reactions to vaccines, 1990–2015.

URL: <http://vaers.hhs.gov/data/index>

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## Published Journal Articles on Teaching Epidemiology and Public Health Science

Bracken MB. Epidemiology as liberal art: from graduate school to middle school, an unfulfilled agenda. *Ann Epidemiol.* 2014;24:171–173.

URL: <http://www.sciencedirect.com/science/article/pii/S1047279713004766>

Hollm-Delgado M-G. Educating epidemiologists throughout the life course: moving from conversation to action. *Ann Epidemiol.* 2014;24:169–170.

URL: <http://www.sciencedirect.com/science/article/pii/S104727971300478X>

Hlaing WM. Regarding “educating epidemiologists” [letter]. *Ann Epidemiol.* 2014;24:558–559.

URL: <http://www.sciencedirect.com/science/article/pii/S1047279714001483>

Thacker SB, Koo D, Delany JR. Career paths to public health: programs at the Centers for Disease Control and Prevention. *Am J Prev Med.* 2008;35(3):279–283.

URL: <http://www.sciencedirect.com/science/article/pii/S0749379708005308>

Hamner HC, Flores AL, Prue CE, Mersereau P. The Science Ambassador Program: partnering scientists with science teachers. *Am J Health Educ.* 2008;39(4):239–244.

URL: <http://files.eric.ed.gov/fulltext/EJ833233.pdf>

Kaelin MA, Huebner WW, Cordell RL, Szklarczuk B. Professional development for prospective epidemiology teachers in grades 6–12. *Public Health Rep.* 2008;123(2):5–11.

URL: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2431095/>

## Non-Fiction Books

Note: Although the below books are at an adult reading level, most are written for a general audience and suitable for use by high school students. Especially recommended for Disease Detective teams, tying public health in with the social sciences or introducing young people to public health. Many are out of print but all are available through on-line dealers and used book stores.

**Barry, John M.** The Great Influenza: The Epic Story of the Deadliest Plague in History. 2004, Penguin Books, New York. An excellent account of the 1917-1918 flu pandemic put in the context of changes and advances in both medicine and science. The book does a great job of describing the challenges of knowledge gaps and the early careers of investigators, such as Oswald Avery, who later went on to become leaders in the field.

**DeKruif, Paul.** Microbe Hunters. 1926, Houghton Mifflin Harcourt, New York. It is not very often that one finds a book that is almost 100 years old on a list of books for young people. However, this account of the lives and contributions of 13 researchers is a classic and a must-read for serious students.

**Dworkin, Mark S.** Outbreak Investigations Around The World: Case Studies in Infectious Disease Field Epidemiology. 2010, Jones and Bartlett, Sudbury MA. A collection of 19 outbreak-related case studies, ranging from an epidemic of mumps in Iowa to the 2001 anthrax release, written by those involved in the investigations. A modern version of Eleven Blue Men with a Midwestern influence.

**Garrett, Laurie.** The Coming Plague: Newly Emerging Diseases in a World Out of Balance. 1995, Penguin Books, New York. Some consider this book to be to emerging infectious diseases what The Silent Spring was to environmental poisoning. Zika virus is the most recent in a litany of pathogens that have made the news since this book was written in 1995.

**Gaynes, Robert P.** Germ Theory: Medical pioneers in infectious diseases, 2011 ASM Press, Washington DC. An engaging account of the lives and contributions of 13 men and women whose work served as the foundation for our understanding of the role of microbes in disease. Readers get a rich and detailed look at these historic people, some famous in popular culture like Pasteur and Koch, and others whose influence may not be as well known.

**Johnson, Steven.** The Ghost Map: The Story of London's Most Terrifying Epidemic – and How it Changed Science, Cities and the Modern World. 2006. Riverhead Books, New York. An excellent account of the work done by John Snow (often considered the “father” of epidemiology) and Henry Whitehead. This book explains the challenges and the investigation but also points out how it contributed to the development of large cities and urban areas.

**Jones, James H.** Bad Blood, The Tuskegee Syphilis Experiments. 1993 The Free Press, New York. A factual account of the US Public Health Service study that denied proper syphilis treatment to 299 black and led to bioethics and the present policies and laws governing and human experimentation in the US.

**Pendergast, Mark.** Inside the Outbreaks: The Elite Medical Detectives of the Epidemic Intelligence Service. 2010. Houghton Mifflin Harcourt, New York. The history of CDC's Epidemic Intelligence Service (EIS) described through a series of outbreak

investigations. The expansion of public health from communicable diseases to environmental and social issues such as violence is clearly reflected in this book.

**Preston, Richard.** Hot Zone: The Terrifying True Story of the Origins of the Ebola Virus. 1994. Random House, New York. A account of the events surrounding appearance of Ebola virus in a research colony of monkeys in Reston, Virginia. Includes graphic descriptions of the signs and symptoms of Ebola infection in humans.

**Rouche, Bertron.** Eleven Blue Men and Other Tales of Medical Detection. 1965, Berkley Medallion, New York. Though somewhat dated, this collection of New Yorker articles about investigations carried out by New York City health officials during the early-mid 1900's served to introduce many people to public health and epidemiology.