

Epidemiology for Homeschoolers

by Sarah Mahmoud, Homeschooling Student, Clonlara School, Ann Arbor, Michigan

Epidemiology is the study of illnesses, epidemics, and the general health of the human population, yet it goes far beyond that. Epidemiologists are science detectives, trying to see connections between causes and effects in illnesses. Epidemiology is also a science that relies upon many other disciplines, such as psychology, statistics, and biology. In short, epidemiology is a science that utilizes many disciplines and without it, epidemics and illnesses would be much harder to understand and bring under control.

Studying the science is fascinating. However, it is a unique experience to study it as a homeschooler. Homeschooling ensures that my experiences studying any subject are interesting. In our house, when undertaking a new subject, I use textbooks, trade books, and online resources to form a basic curriculum. For epidemiology, I have been using text books to get a basic understanding of the material, and then have used other books to make it more interesting. For example, instead of just reading dry facts, I have read several books that chronicle epidemics throughout history and how cures were found. This has helped bring epidemiology to life for me, because I am able to see how it helps to save lives.

I have used *Epidemiology for Public Health Practice*, by Robert H. Friis and Thomas A. Sellers, *Epidemiology for the Health Sciences*, by Donald F. Austin and S. Benson Werner, and *A Dictionary of Epidemiology* by John M. Last. I started my studies by reading *Epidemiology for the Health Sciences*, and

then moved on to *Epidemiology for Public Health Practice*. While reading this book, I answered study questions to prove my knowledge. If there was a term I didn't completely comprehend, I used *A Dictionary of Epidemiology* to make sure I understood.

To make things more interesting, I used trade books documenting epidemics and virus outbreaks. I read about Ebola, Hanta virus, yellow fever, and also modern medical innovations in epidemic control and epidemiological practices.

What's good about being able to assemble my own curriculum is that if the book is too dry, or isn't making a connection, I can find something else to make sure I get it.

The best part, though, is that with homeschooling, I learn mastery - if something doesn't make sense, I keep trying until it does. I am currently in the beginning stages of a research paper for my final project.

I have so far combined the history of epidemics and illnesses with the contemporary procedures. It gives me an interesting standpoint, since I get both sides of epidemiology: the past and the present.

Epidemiology is an engaging study, and by homeschooling, I have been able to understand and enjoy it more than I probably would have otherwise.

The Scientific Method – What You Don't Teach in High School

by Clare Kennedy, Englewood Academy, Englewood, NJ

The school year starts and fresh faces come to biology class. One usual starting point is THE SCIENTIFIC METHOD. Sure, we know the classic approach to studying a problem or question in science. And we want our students to learn to think analytically and see the beauty in a well-designed experiment that excludes extraneous variables.

"But what would happen if I drank some of this liquid in the test tube?" asks a student. I wonder for a moment why it is that at least one student in every class, during every experiment, asks that question. Do they have a death wish? People make poor test subjects in controlled experiments; too many variables. "Let's not find out. Do not drink it."

These are teenagers and they are by nature self-centered and self-absorbed. They are less interested in the fate of pea seeds treated with salicylic acid than they are in how many people have reactions to taking aspirin. So what is a teacher to do? The Answer: teach the study of Epidemiology!

This science of Public Health is the central topic in the program entitled *Detectives in the Classroom* prepared and made available on-line by Montclair State University. This program has benefits for both teacher and student and addresses the issue of getting kids to be interested in scientific methodology. The teacher is given a wealth of resources – PowerPoint

presentations, lesson plans, student worksheets with answer keys, and a whole lot more. The hook for the students is the opportunity to investigate issues that affect them directly. They see how public health workers gather information about human beings in real life situations and assess the risk of certain behaviors. Study designs such as case control, cohort, and cross-sectional are explained and demonstrated in easy-to-grasp language and situations. Hey, experiments don't always start at step one! Sometimes you start with the result and work backwards in time!

I was, and still am, fortunate to have the ability to incorporate the study of epidemiology into a career focus course that is in addition to the core science class. After we covered the basic lessons in *Detectives*, my students designed and carried out studies that answered such questions as: Do pet owners suffer more from allergies? Do athletes eat more or less fast food than other students? How many people really wash their hands after using the toilet?

My future plan is to incorporate some of this program into core sciences classes not only to grab the interest of the students (and perhaps influence some to pursue a career in this field) but also to demonstrate science as a process, not an accumulation of facts, and one that extends beyond the classic controlled laboratory experiment.

Freshman Biology + Senior Statistics = The Epidemiology of Sleep Deprivation

by Jeff Killmer, Chair, Mathematics Department, Cary Academy, Cary, NC

How do you make epidemiology seem relevant to high school students? The answer seems obvious but the process can be quite radical for our educational system. Case in point: Heidi Maloy, science teacher, and Jeff Killmer, mathematics teacher, decided to collaborate in order to cover an epidemiology unit. However, they sought to combine their freshman biology classes and their senior statistics classes, something that is rarely done. The first step in this cross-discipline, cross-grade level project was to find a topic that would appeal to the students and the duo settled on sleep deprivation in American high school students. The students were immediately captivated since many of them were experiencing or had experienced this phenomenon personally.

The second step had the students keeping a sleep diary that asked questions like: How many hours of sleep did you get? How many times did you wake up during the night? How much caffeine did you consume? The diary lasted 10 days and was repeated the first week of school, a week in September and the last week of October. Students' enthusiasm rose as they looked at the sleep diaries and began to wonder how they were affected by sleep deprivation and proposed questions for more research.

With that data in hand, we moved to step three, analysis and proposing further studies. As our teams of students looked at the diary results, they wondered: How does sleep deprivation affect road rage? How does sleep deprivation affect food choices and obesity? How is sleep deprivation related to learning? Students began to see trends in the school and in teenagers in general. Some made efforts to change their sleeping habits while others wondered what could be done to

effect change on a larger scale.

The fourth step involved the freshman biology students doing research on existing studies and looking for biological explanations of the questions. Meanwhile the senior statistics students were designing instruments, choosing random samples, and collecting data to answer their questions. Interest remained high as the students went about gathering data and researching the biological explanations. Some data were available on the internet but much of their research involved collecting the data directly from students. The students experienced the difficulties of gathering accurate data but also the rewards as trends and patterns became evident.

Finally, the freshman and seniors came together to present their findings, looking at both biology and statistics. Presentations were often quite involved and detailed, reflecting an interest and passion that is absent from too many other projects and assignments. Students had found something that kindled their excitement, roused their interest and got them intimately involved in a real world study that brought the topics from freshman biology and senior statistics to life.

Epidemiology provided a means for students to be exposed to biological research and statistical data production that are often tedious or esoteric at best. However, this was not easily done, requiring the cooperation of departments and grade levels, as well as the cooperation of the administration to even allow the chance for collaboration. Still, the efforts proved worthwhile as the students used sleep deprivation to get an insight into epidemiology and make their learning much more authentic.

News Briefs

The Movement at APHA

Based on the Epidemiology Education Movement's roundtable discussion at last year's American Public Health Association Meeting, in Boston, the Movement will be presenting at an Invited Session at this year's meeting in Washington, DC, on Wednesday, November 7, 2007, from 12:30-2:00 PM. The session, entitled the "Future of Epidemiology - Epidemiology Education in Grades 6-12: The Epi Ed Movement," will be similar in format to last year's roundtable when participants involved in epidemiology-related 6-12 classroom activities shared their experiences. Dorothy Washington-Calvin from the University of Illinois in Chicago shared her experiences in implementing an epidemiology curriculum to eighth grade students via public health graduate students. <http://www.uic.edu/sph/diversity> Brian Szklarczuk, Research Promotion and Outreach, Public Health Agency of Canada, demonstrated materials that are used in middle school exercises in Canada to help children experience a food borne epidemic. Lynn Tarant and Jeanne Murgolo, from School 9, Paterson, NJ, related their experiences in adapting *Detectives in the Classroom* exercises. Ms. Andreea Seicean, a 2005 Young Epidemiology Scholars (YES) Competition winner, from Bay

Village, Ohio, enthusiastically related her experiences A Significant Association between Short Sleeping Hours and Teens Overweight / Obesity: Results from Bay High School. http://www.collegeboard.com/yes/fs/winners_0405_firstplace.html

Council of State and Territorial Epidemiologists

Mark Kaelin and Wendy Huebner were invited to present at the June 25, 2007 Annual Meeting of the Council of State and Territorial Epidemiologists (CSTE) <http://www.cste.org/> in Atlantic City, NJ. The presentation was entitled, "Epidemiology Education Grades 6-12: Its Potential for Initiating Public Health Career Choices and Improving Scientific Literacy." CSTE members were interested in learning about the Movement and several in the audience told of their experiences teaching epidemiology to younger students. The presenters also discussed ways to develop specific epidemiology lessons for children that would help them understand the role of epidemiologists in the field of public health and create excitement about possible public health careers.

Detectives in the Classroom en español!

by María José García Vizcaíno, Director, Translation and Interpreting in Spanish Program, Montclair State University, NJ

A year ago, when I first was asked about translating the first investigation of *Detectives in the Classroom* ("Why Are These Students Getting Sick?") into Spanish. <http://www.montclair.edu/Detectives/curriculum/SpInvestigation1-1.htm> I just thought that the project seemed to be a cute and clever way to engage middle-school students in the science of epidemiology. Now, a year later, and after having translated the whole curriculum of 34 investigations into Spanish, all I can say is: "Wow!" Over the course of this process, I have realized that that curriculum is much more than a charming middle-school project. *Detectives* is a witty educational program designed to combine perfectly the fun and entertaining factor necessary to attract middle-school students into sciences with the instructive and pedagogical component essential to make students of this age think critically and make decisions based on actual evidence and facts. In a few words, I think this curriculum not only makes students acquire scientific knowledge and concepts, but also it makes students grow personally and intellectually in a community.

The mere fact that the curriculum design team of this project decided to offer *Detectives* in Spanish is indicative of the modern and global approach of this program that not only intends to reach bilingual students in the US (or students who are more fluent in Spanish than in English), but also other Spanish-speaking communities around the world.

As the translator of *Detectives en la clase*, I have faced a double challenge: the linguistic problems that all translators encounter when dealing with different languages' grammar and stylistics and the cultural problems that appear when translating from one language / community / society into a different one. As an example of the first type of challenge, I will mention the frequent use of strings of nouns in English, impossible to be translated as such in Spanish and thus requiring the use of prepositions and other linkers that inevitably make sentences longer in Spanish than in English. This is the case of phrases such as "the four basic analytical epidemiologic study designs" which needs to be rendered as "los cuatro diseños de estudio básicos en epidemiología analítica", or "the case-control study flow diagram" as "el diagrama de flujo del estudio de casos y controles."

Also, another feature related to the number of words is the abundance of initials and acronyms in the English language in comparison to Spanish. The English language is synthetic, direct, and straight to the point and loves making initials for every concept and phrase. On the contrary, the Spanish language is more analytical and not as economical with the number of words used. There are not initials in Spanish for ER (emergency room) unless one makes it up for a specific reason, for SUV (sport utility vehicle), or for ATV (all terrain vehicle). Of course, in some Spanish-speaking countries that are geographically close to the influence of the English language (such as Mexico or Puerto Rico), people may understand these initials, but not in others such as Spain or Argentina.

On the other hand, in regard to the cultural challenge posed by translation of *Detectives* into Spanish, I must say that apart from the usual differences between the Anglo-Saxon and Spanish-Latino cultures, in this particular project I faced an additional challenge: the many different varieties of Spanish and many different cultural subtleties in them. Since the curriculum does not just address one particular Spanish community, sometimes I found myself with the dilemma of deciding if I should use one variety of Spanish or another, for example if I should use "manejar" (used in Mexico and most of Latin America) or "conducir" (used in Spain) when translating "drive", or if I should convert pounds and miles into kilograms and kilometers respectively, the first being probably understood in some Spanish-speaking countries, but not in others. My way of solving that problem was trying to be neutral and, at the same time, not excluding any variety of Spanish, so I decided to use both "manejar" and "conducir" in the same contexts since they are synonyms, and I converted the pounds into kilograms by offering the conversion between brackets.

My last challenge in this sense was the translation of the word "cost" in phrases such as "cost-benefit analysis" or "cost to benefit ratio." Although in Spanish two quasi synonyms can be used, "coste" and "costo", there are some differences in connotations that should be taken into account. Whereas "costo" is used much more in Latin America, this word (in its singular form) in Spain also means "marihuana joint." So, when translating phrases such as "for every dollar of cost spent on this risk management strategy ...," you have to make sure you do not mistranslate that by saying "for every dollar of marihuana spent" Therefore, in this case, I chose the Peninsular Spanish usage ("coste") trying to avoid the undesirable connotations of the word "costo."

Finally, I want to say that I have felt so engaged and involved in the project that I am presenting a paper about the challenges of translating this curriculum into Spanish at the International Conference on Language and Healthcare to be held in Alicante (Spain) in October 2007. Translating *Detectives* has been the most rewarding translation experience that I have ever had in my professional career and I am honored to have contributed to this well-conceived and exciting project. This is why I deeply wish great success to *Detectives in the Classroom* and to its twin sibling *Detectives en la clase*. Both of them truly deserve all the best. ¡Buena suerte, amigos!

After-School Epi Club – Public Health Club at CJR #9

by Lynn Tarant, Charles J. Riley Public School 9, Paterson, NJ

I have been involved in middle school epidemiology education since 2000 and have fallen in love with this science. I dove headfirst into learning the curriculum, teaching it to my middle school students, and training other teachers in my district. I have presented *Detectives* in various venues to help in the dissemination of this curriculum. Last summer I taught epidemiology in an academically gifted and talented program. It was then that I realized that we have academically talented students in my inner city middle school that cannot afford out of district enrichment programs. This was the dawn of the after-school *Epidemiology and Public Health Club*. My colleague, Jeanne Murgolo, who is also teaching epidemiology to the 6th grade students, partnered with me to establish our Club.

Focusing on health-related issues that are relevant to students' lives provides a great motivational tool to intrigue them. This branch of science deals with every day life and has the power to encourage our students to make the future a brighter place for themselves, their communities, as well as possibly the world. The field of epidemiology is a growing career field that is actively seeking new minds to choose this career path.

After getting the approval of our school administration, we began to recruit 24 academically motivated club members in grades 6-8. To date, we have 40 students participating and more asking how they can get into the Epi Club!

We began our *Epi Club* in keeping with an essential question in epidemiology, "Why are some people getting sick, while others remain healthy?" Descriptive epidemiology is the study of the distribution of a disease or other health-related condition. As health and disease are not distributed haphazardly, there are patterns to their occurrence. Currently, we are challenging our students to identify these patterns and to formulate hypotheses about the possible causes of absenteeism in our school.

To accomplish this, we decided to collect the descriptive epidemiology of attendance in our school with the goal of identifying patterns or clusters of absenteeism. Charles J. Riley Public School 9 is a K-8 school comprised of approximately 1,200 very diverse groups of students primarily of Spanish, Arabic, and Middle Eastern descent.

In order to accomplish this mission we began by dividing up the building among six Epi Teams. Using the actual blue-

prints of the building, each team created a larger version of the layout for the section of the building that would be their responsibility. Although the daily attendance is available on the computer, we wanted our students to experience "shoe leather epidemiology." Jeanne and I were given hard copies of the attendance sheets each week for each classroom (over 40). Our task was to re-copy each sheet blocking out the personal indicators of name and student ID numbers. Each Epi Team then had to tally the monthly attendance for each classroom by gender and full day or half day absence. These figures were labeled directly on the floor plan.

As issues arose, we addressed them. Students were the ones who suggested noting the difference between full and half day absence. They decided to count the occasional "S" (suspended) as absent. They designed a tally sheet to make the process of adding up the actual data. One of our 8th graders designed a program for the computer that would model this process (it worked but was too complicated for most of us). Another student created a PowerPoint presentation of our club activities. He collected each Epi Team's data to incorporate the results into one document. Noting that it was difficult to see patterns among each section of the building, a few students ended the year by designing an Excel spreadsheet where all of the data could be displayed and analyzed using various graphing modes. In September the Epi Club will begin by creating their Excel sheets and analyzing their work to identify any patterns of absenteeism during the 2006-2007 school year.

Jeanne and I are looking forward to continuing working with the Epi Kids. We will recruit new students to replace those that graduated. We have many other projects in mind for the future, primarily addressing the growing epidemic of obesity in the younger generation. The Epi Kids will be working as cross-age teachers for younger students to improve nutrition and exercise. They have already begun to brainstorm ideas to implement in the future using pedometers, puppets, Dance Dance Revolution, and encouraging nutritional snacks, to name a few. Our physical education and art teachers have committed to helping us with these objectives.

Who knows, maybe we will start our own website next year. Better than that, maybe one of our Epi Kids will become a future Epidemic Intelligence Officer!

News Brief

Epidemiology Education in the Literature

A Movement-relevant article was published in the May-June, 2007 issue of *Public Health Reports*. http://www.epiedmovement.org/news/Epidemiology_and_Education.pdf Entitled "Epidemiology and Education: Using Public Health for Teaching Mathematics and Science," the article chronicles the increasing recognition of the advantages of teaching epidemiology to even younger students. The authors, Donna F. Stoup and Stephen B. Thacker, argue that "Epidemiology, the basic science of public health, provides a compelling and relevant context for teaching science and mathematics. . .

. (the) integration of epidemiologic frameworks into existing science and mathematics teaching both fosters an opportunity for multidisciplinary learning around specific problems and is an avenue for enabling students to grasp the relevance of real-world application of mathematics and science." The authors also present a detailed table of how epidemiology aligns with and supports various science content standards, and report results of a literature review of existing resources for using epidemiology in classroom education. (Citation: Stroup DF and Thacker SB. Viewpoint: Epidemiology and Education: Using Public Health for Teaching Mathematics and Science. *Public Health Reports*; 2007; Volume 122:283-291.)

Tulsa – Epidemiology and Technology

by Mary Phillips, Associate Professor of Biology, Tulsa Community College, Tulsa, OK

Tulsa Community College was awarded a National Science Foundation Advanced Technological Education program grant entitled: Stimulating Enthusiasm, Exploration and Discovery through Biotechnology Education (SEEDBEEd). Mary Phillips, Associate Professor of Biology, at Tulsa Community College, one of the co-PI's on the grant, subsequently developed an outreach summer academy for middle school teachers. One of the biotechnology modules presented epidemiology concepts and activities from *Defectives in the Classroom* - Module 1. <http://www.montclair.edu/Defectives/curriculum/Module1.htm> Teachers attended a *Defectives* seminar at Tulsa Community College last year. Responses

to "Epi Talk" and other *Defectives* activities were extremely positive. The seminar generated much enthusiasm and supported the weaving together of the epidemiology and biotechnology concepts. In addition, two wonderful, interactive, learning adventure websites were a big success with the middle school teachers. One was *MedMyst* <http://medmyst.rice.edu> which aids understanding of disease and how infectious diseases are spread. The other was *Fingerprint E. coli 0157:H7 bacteria* <http://reconstructors.rice.edu/extra/cdc/> which incorporates biotechnology and DNA gel electrophoresis to track an E. coli outbreak.

News Brief

YES Teaching Units Professional Development Workshops

Asked by The Robert Wood Johnson Foundation to increase the use of the Young Epidemiology Scholars (YES) Teaching Units, Diane Marie St. George and Mark Kaelin held the first two, 30-hour, Young Epidemiology Scholars Teaching Units Professional Development Workshops, at Montclair State University, during the spring and summer of 2007. The YES Teaching Units are a collection of more than twenty modules addressing important epidemiological concepts. <http://www.collegeboard.com/yes/ft/ii/home.html> They were created by teams, each comprised of an epidemiologist and teacher, as "stand alone" units so they would allow high school teachers to fit epidemiology lessons into their existing curricula when the need and opportunity arose.

The Workshops were structured on 12 enduring epidemiological understandings <http://www.montclair.edu/YESteachingunits/EndEpUnd.html> that quickly give teachers, who may have little if any knowledge of epidemiology, a big picture in which to place the epidemiologic content a given Teaching Unit.

Each workshop consisted of a combination of the following, all aimed at a specific enduring understanding, Epi-101 (similar to the content in an introduc-

tory graduate epidemiology course), "In the News" (a review of columns from the popular press), teachers teaching portions of selected Teaching Units to each other, and a culminating guest speaker who described their epidemiologic work. All of this was intertwined with discussions about how teachers can "fit" epidemiology classes into their current teaching assignments.

Highlights of the workshops included Denis Nash, from Columbia's Mailman School of Public Health, speaking about the epidemiologic investigation of the 1999 West Nile outbreak in New York City and Stephanie Brown, from Middlesex County (NJ) Public Health Department, speaking about the epidemiologic investigation of the 2006, e-coli outbreak in New Jersey. In addition, Aman Prasad, from Pocatello, Idaho, spoke about the role his high school science teacher played in his winning the 2006 YES Competition with his project, Activity and Mood in Adolescents. http://www.collegeboard.com/yes/fs/winners_0506_first-place.html

Next summer, a workshop is scheduled at the Centers for Disease Control and Prevention, in Atlanta, June 16-20, 2008. If you would like to hold a YES workshop for high school teachers in your geographic area, please contact Mary Budd at buddm@mail.montclair.edu or 973-655-6872.

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