Grade 7
Science
Unit 7: Health and Diseases

Time Frame: Approximately four weeks

Unit Description

This unit will focus on how human life can be influenced by external factors and genetics. It will discuss the effects lifestyle choices such as the use of tobacco and drugs can have on the body. Common communicable and noncommunicable diseases and the methods by which they are transmitted, treated, and prevented are among topics covered.

Student Understandings

Good health is the result of heredity and care and respect for the human body. It is also important that students be able to describe how diseases are contracted and to select behaviors that prevent the spread of disease. In the study of science, students should be able to explain germ theory. Students will participate in a historical research project of how society has acted to prevent or control certain diseases with particular attention given to science and its role in finding cures or preventive measures. Students will also address the issue of nutrition by creating charts that will allow them to evaluate the nutritional knowledge of teens.

Guiding Questions

1. Can students list the physical and emotional effects of poor nutrition, smoking, drug use, and the lack of exercise?
2. Can students describe appropriate lifestyle changes that can prevent serious illness?
3. Can students describe diseases that are influenced by genetic as well as external factors?
4. Can students differentiate between communicable and noncommunicable diseases?
5. Can students describe the methods by which communicable diseases are transmitted, treated, and prevented?

Unit 7 Grade-Level Expectations (GLEs)

GLE #	GLE Text and Benchmarks
Science as Inquiry	
Note: The following Science as Inquiry GLEs are embedded in the suggested activities for this unit. Other activities incorporated by teachers may result in additional SI GLEs being addressed during instruction on the Health and Diseases unit.	
11.	Construct, use, and interpret appropriate graphical representations to collect, record, and report data (e.g., tables, charts, circle graphs, bar and line graphs, diagrams, scatter plots, symbols) (SI-M-A4)
12.	Use data and information gathered to develop an explanation of experimental results (SI-M-A4)
18.	Identify faulty reasoning and statements that misinterpret or are not supported by the evidence (SI-M-A6)
19.	Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)
26.	Use and describe alternate methods for investigating different types of testable questions (SI-M-B1)
34.	Recognize the importance of communication among scientists about investigations in progress and the work of others (SI-M-B5)
37.	Critique and analyze their own inquiries and the inquiries of others (SI-M-B5)
38.	Explain that, through the use of scientific processes and knowledge, people can solve problems, make decisions, and form new ideas (SI-M-B6)
39.	Identify areas in which technology has changed human lives (e.g., transportation, communication, geographic information systems, DNA, fingerprinting) (SI-M-B7)
40.	Evaluate the impact of research on scientific thought, society, and the environment (SI-M-B7)
Life Science	
10.	Describe the way major organ systems in the human body interact to sustain life (LS-M-A5)
12.	Explain how external factors and genetics can influence the quality and length of human life (e.g., nutrition, smoking, drug use, exercise) (LS-M-A6)
13.	Identify and describe common communicable and noncommunicable diseases and the methods by which they are transmitted, treated, and prevented (LS-M-A7)

Sample Activities

Activity 1: Diet, by Popular Demand (SI GLEs: 18, 19, 40; LS GLE: 12)

Materials List: copies or synopses of popular fad diets and diet plans, poster board, Internet access

Informally survey students to determine which fad diets and diet plans they are most familiar with and chart this information on the board.

Using the literacy strategy, *professor know-it-all* (view literacy strategy descriptions), provide students with copies or information on popular fad diets and diet plans and instruct them to determine the pros and cons of each. Note: The following two websites provide an overview of weight loss and nutrition myths and information on fad diets: http://win.niddk.nih.gov/publications/myths.htm and http://familydoctor.org/online/famdocen/home/healthy/food/improve/784.printerview.html.

This activity can be completed by forming small groups of four. One group should be assigned to research what is recommended as a healthy diet to follow by eating a variety of foods. Suggestions for healthy guidelines can be found at the following website: http://www.nal.usda.gov/fnic/dga/dguide95.html. The remaining student groups can be assigned one of the other topics at this site. Within a group, each student should become an "expert" on one component of the assigned topics and then inform the other members what he/she has learned. For example, in the group assigned the healthy diet, their topics may include the food group(s) that is being targeted (i.e., low fat, high protein, etc.), the suggested recommended intake of certain food items, and the avoidance of food items, if applicable.

Student groups should sit or stand at the front of the class to represent the diet company and answer questions from their peers about the diets. They should also be prepared to discuss both the pros and cons of each diet. The audience (students not serving as part of the *professor know-it-all* group) should generate 2-4 questions about the content. When the strategy is first employed, demonstrate with the class how the question and answers should be handled.

The group reporting on the healthy diet guidelines should make their presentation last. Based upon their findings, students should be engaged in a whole class discussion of how their individual diet compared to the recommended guidelines by the U.S. Government. Students may also reference the food pyramid at http://www.mypyramid.gov.

Students should obtain information from their expert group and provide to their peers the suggested weight loss and amount of time required to obtain visible results. Note: Remind students that metabolism has a major impact on the burning of calories; thus, results from following a specific diet will vary, depending upon the individual. Students should also explain how some of the major organ systems of the body respond when an individual is dieting. For example, information on the effects of low-carbohydrate diets on the body's organs may be

obtained at http://www.essentialnutrition.org/body1.php. Discuss the health risks associated with improper use of diets and diet medications.

Using the suggested food items and servings from each diet, create a class list on a poster board of the recommended food groups that appear in most diets. Create a graph, chart, or table to explain these recommended food groups.

At the conclusion, students should address the following statements regarding the various diet plans:

- Identify any faulty reasoning and statements that misinterpret or are not supported by evidence.
- Explain the role of nutrition and how it affects the quality and length of life.
- Cite reasons why it is important to follow a diet that is supported by scientific research when trying to permanently lose weight.

Activity 2: Diet-Related Illnesses (SI GLEs: 19, 34, 37, 38, 40; LS GLE: 12)

Materials List: transparencies or poster board, grade-appropriate research materials, Diet Related Illness BLM (one per student), general description of selected diseases (one per student)

To begin the lesson, write the following scrambled words on the chalkboard: (as adapted with permission from Utah Education Network-www.uen.org) IEANMA (anemia), SIOPESOTSORO (osteoporosis), AERTH IEADESS (heart disease), ETYSIBO (obesity), and EBTESAID (diabetes). After students have unscrambled the terms, provide a brief definition of each and ask what these conditions have in common? (These are diseases that can all be influenced by a person's eating habits, or diet.) Refer students to textbook information or grade-appropriate research on the effects that a person's diet may have on the development of the disorders or diseases listed above. Discuss with students, and lead them to understand that these research findings are the results of many scientists working together and sharing data. Although these conditions may, in some cases, be related to and controlled by diet, students should not be given the idea that a correct diet will cure or prevent them. Heredity plays a major part in the development of these conditions, but other lifestyle and environmental factors may have a greater influence in many cases.

Ask students to define the term *habit* and give examples of some of their own. Some examples of habits may include things such as putting on a seat belt prior to driving, biting fingernails, leg shaking during a test, etc. Tell students that although habits begin as a simple occurrence, the more often they are repeated, the stronger they become and the more difficult they are to break.

Review the cardiovascular, digestive, and skeletal systems from unit three prior to beginning the *GISTing* activity.

Set up a modified version of *GISTing* (view literacy strategy descriptions) by providing each student a copy of a description of a diet related illness (one at a time). Then instruct students to read about the general description and possible causes. One source for this information is the following site: http://www.uen.org/utahlink/lp_res/nucon009.htm. *GISTing* is a literacy strategy that employs a technique to help students read text for main ideas by summarizing selected sections into a predetermined limited number of words or short phrases. In other words, students should read to get the gist of the article. Provide students with a copy of the Diet Related Illness *GISTing* BLM, on which they will record key terms that will be used to write a summary of the information. Using the information, students are also responsible for describing what dietary modifications should be followed for each condition and identify the organs or systems most severely affected by each diet related illness. Have the students produce transparencies or a display of their suggestions. Students will provide written critiques of the displayed results. If students have family members who have any of these conditions, it would be interesting for them to share how their families have made lifestyle changes to meet the needs of those family members; however, be cautious in soliciting and sharing family medical history provided by students.

Have students research and provide written reports of technological and medical advances that have had an impact on the diagnosis and treatment of their assigned, diet-related conditions.

Activity 3: Healthy Menu (SI GLEs: 11, 12, 19, 37; LS GLE 12)

Materials List: Internet access, nutritional values of selected restaurants, copy of food pyramid, Healthy Menu Opinionnaire BLM (one per student)

After a general review and introduction to the current USDA approved food pyramid (this information can be obtained from this website: http://www.mypyramid.gov/), instruct students to create a different lunch menu for five days. The menus should consider the dietary needs of a teenager, not to exceed the suggested fat and sugar intake. Based on the nutritional value and suggested dietary intake, students should review their meals to determine if their meals could be considered healthy. If eaten regularly, can their diet negatively affect their health? Allow students to exchange menus and critique nutrition and popularity of foods.

Provide students with copies of the nutritional values for several popular fast food restaurant items. These can be obtained from the website of the restaurants, or in some cases, from the restaurant itself. The following sites may also be used to obtain this information: http://www.childrenwithdiabetes.com/d_08_700.htm or http://www.can-do.com/uci/lessons98/Nutrition.html (to access this information from this site click on the restaurant of choice). Students should plan at least two meals from the restaurant, preferably those they regularly eat, and compare the nutritional values of them to their meals created earlier. The following web sites may be used to find the nutritional value of fast food.

- http://www.fatcalories.com
- http://www.dietfacts.com/fastfood.asp
- http://www.foodfacts.info
- http://www.nutritiondata.com

Using an *opinionnaire*, (view literacy strategy descriptions), provoke student thoughts about school vending machines by posing statements such as "All candy dispensing vending machines should be replaced with dried fruit snacks and granola bars" and "In an effort to promote healthy snacks, all drink machines should contain only water, fruit juices, and low fat milk." Distribute the Healthy Menu Opinionnaire BLM and ask students to complete it. An *opinionnaire* is a strategy that forces students to take positions and defend them. The emphasis is on students' points of view and not the "correctness" of their opinions.

Students will create a class survey to determine how often teenagers believe they are eating a well-balanced meal. The survey should include data from a total of at least one hundred students, if possible. Use the information to create a graph or chart describing the results of their data. If time allows, students may complete the following Rate Your Restaurant Diet survey/quiz available online at http://www.cspinet.org/nah/quiz/index.html. It can also serve as a homework assignment to complete with other family members.

Encourage students to make healthy diet choices, by referring them to "smart snacking" for a list of healthy snack choices: http://www.kidshealth.org/teen/food_fitness/wellbeing/healthy_snacks.html. After reviewing healthy diet choices, discuss the importance of vitamins and minerals as the primary reason for the high requirement of fruits and vegetables in a healthy diet.

Invite a 4-H agent, nutritionist, doctor, or other health care worker to speak to the class about nutritionally related diseases. A psychiatrist or psychologist could be invited to discuss the relationship between eating practices and mental health or a sports nutritionist who could talk about the interrelatedness of diet and physical well-being.

After student research is completed and they have heard from guest speakers, if applicable, ask the class to return to the *opinionnaire* statement and give reasons to revise and/or reconfirm their original opinions. Use this opportunity to stimulate discussion about what was learned about diet and nutrition.

Activity 4: Smoke Signals (SI GLEs: 18, 19, 40; LS GLEs: 10, 12)

Materials List: Internet access; grade-appropriate research material; individual copies of the following handouts: The Smoker, Smoke Signal Fact Sheet, Build a Better Body; markers/colored pencils

Follow the lesson plan available online at (if the Internet is not available for all students, vital handouts and information can be printed and provided to students)
http://school.discovery.com/lessonplans/programs/smokesignals/.

This lesson allows students to explore the effects of smoking, while identifying associated health problems. They will also describe how major organs systems are affected as a result of smoking. Review the organs and function of the respiratory system prior to addressing the effects of smoking.

Upon completion of the online activity, students should research and report on the ongoing issues involving Congress and the tobacco companies. Discuss how scientific research has impacted new smoking laws. Find out what the most recent laws are in Louisiana regarding smoking in public places and list locations where smoking is prohibited. Have students research smoking trends in other parts of the world. What are other countries doing to educate citizens about the hazards of smoking? What populations are smoking in other countries and how are health concerns being portrayed?

Activity 5: Drug Bust (SI GLEs: 11, 19, 40; LS GLE: 10)

Materials List: copies of over-the-counter drug labels, chart paper, graph paper (one per group), selected grade-appropriate research material, Internet access, biology text book (one per group), Drug Fact Card BLM (multiple copies per student)

Provide instruction and review of the nervous system, especially the action and functions of neurotransmitters, prior to this activity. Emphasize that neurotransmitters are chemicals made naturally in the body that transmit messages across synapses from one neuron to the next. Some drugs imitate the function of natural neurotransmitter, but in excess, rather than being regulated by the body. Discuss some medicinal uses for some common over-the-counter drugs and their effects on the nervous system. Distribute photocopies of over-the-counter drug labels and have students work in pairs to read and interpret the labels and their warnings. Mention to students that prescribed drugs must be taken as directed and handled with regard for the damage they may inflict if taken improperly.

Provide a brief introduction to the categories of commonly abused drugs such as

- stimulants
- depressants
- narcotics
- hallucinogens
- anabolic steroids

Divide the class into groups and have each group research one of these categories and produce a three minute infomercial with dialogue on a specific drug within that category. To create the infomercial, provide students a copy of the Drug Fact Card BLM to record information pertaining to their specific drug. This BLM is designed as a *split-page note taking* sheet (view literacy strategy descriptions). *Split-page note taking* sheets are used to allow students to record important information in a split-page format which can be used as a discussion and review sheet. In addition to the information listed on the BLM, students should include the potential addictive properties of the drug, other health hazards, neurotransmitters involved, and a diagram or model of how it affects the nervous system.

Students should also include, when available, statistical information showing the number of teens abusing the drug. This information will be added to a class chart to identify the most popular abused drug among teens. Some student groups may be assigned to research current treatments and other related research findings for specific addictions. The following site provides information to fulfill the research requirements:

http://www.lifebytes.gov.uk/drugs/drugs_facts.html. If Internet access is unavailable, this information can be printed and provided to student groups. Students may also conduct research using high-school biology textbooks, selected reference books, the library, or other Internet sites, if available. Have each group critique and analyze each presentation by providing a blank copy of the *split-page note taking* sheet, Drug Fact Card BLM, to complete during each class presentation. The completed cards will serve as class notes to be used as a review.

At the Internet sites, http://www.lifebytes.gov.uk/drugs/drugs_emergencyjohn.html and http://www.lifebytes.gov.uk/drugs/drugs_emergencynita.html, students should read and respond to the story describing John and Nita's experience of drug use. Student responses should include information explaining the long- and short-term associated health risks.

Consider inviting a guest speaker to talk to the class on this topic. A pharmacist could be a good resource on the chemical nature of drugs and their use and misuse; doctors, nurses, or law enforcement officials, such as DARE officers, make excellent guest speakers on drug abuse, as well.

Activity 6: To Share or Not to Share (SI GLEs: 11, 26, 34, 37, 38, 39; LS GLE: 13)

Materials List: Glow Germ® powder or liquid, UV light, colored chalk dust, ten pencils or pens, fingernail polish, poster

Prior to students entering class, the teacher should place some Glow Germ® powder or liquid on his/her hands. (Purchasing information can be obtained through an Internet search or purchased from many scientific supply companies). If this resource is unavailable, you can substitute colored chalk dust.

As students enter the classroom shake hands with a few of them or touch objects within the classroom that students will be in direct contact with but make no reference to the powder or chalk. Ask students to generate a list of diseases they believe can be contracted from others (communicable) and diseases they think cannot (noncommunicable). Allow students to share their lists with the entire class, and explain why they grouped each disease as they did. Help students to identify faulty reasoning and statements that they misinterpreted or are not supported by factual information. Add some of the more common communicable and noncommunicable diseases to the list if they were not included. Examples of communicable diseases include hepatitis, mononucleosis, West Nile, and the common cold. Examples of noncommunicable diseases include asthma, tetanus, and skin cancer.

After discussion of these diseases and their methods of transmission, identify the students and objects that were initially touched with the Glow Germ® liquid using an UV light. Ask students to discuss what the Glow Germ® material represented. Note: If colored chalk is used it is not invisible like the Glow Germ® but it can serve the purpose. Upon completion of this activity lead into a discussion on bacteria and viruses, providing students with an explanation of each, describing how they relate to communicable and noncommunicable diseases.

Point out to students that they can think of the classroom as a natural barrier that prevents the "disease" from being spread into a larger population (the rest of the school) because it contains a relatively small number of individuals. Point out that the spread of some diseases are controlled in this same way. This is also a good time to introduce and distinguish the terms *epidemic* and *pandemic*.

In cooperative learning groups of four, have students design an experiment that would illustrate the transfer of diseases. For example, this could be as simple as marking ten pencils with a dot of fingernail polish which can serve to identify this pencil as the "source" of the disease. Throughout the day students would allow their peers to borrow the "contagious" pencils and then record the number of individuals who contact the disease during one school day. Just as scientists communicate about investigations in progress and the work of others, students should discuss their designs to ensure each group has a unique way of identifying their disease.

After teacher approval (and administrative approval, if necessary), students should begin spreading their "disease" throughout the school. At the conclusion of the investigation, students will analyze their results and the results of other groups to determine which method of transmission was most effective. These results should be interpreted through the use of graphs, tables, and charts. Students should also use this information to develop a plan to reduce transmission.

Divide the class into groups and assign each group either a communicable or noncommunicable disease. The following websites contain information that may be used as reference:
http://edcp.org/html/cdindex.html
http://www.health.state.ny.us/diseases/communicable
http://www.cdc.gov/DiseasesConditions.

Have each group develop a multimedia or poster presentation explaining the symptoms of their disease: how it is transmitted, treated, and prevented; the causative agent and its history; and technology advances that have furthered its treatment and prevention. Presentations should include a summary of the work of scientists that collaborated or worked independently studying the disease.

A generalized discussion of how to prevent the spread of communicable diseases is important, i.e., washing hands before meals and after using the bathroom, using disposable tissues, not drinking/eating after one another, etc. Suggest that students interview health professionals, visit health agencies, and conduct library and Internet research. Students are to critique each other's work. Students will also create Jeopardy®-type questions for a game to follow all student presentations.

With the increasing debate over the distribution of the influenza vaccine, have students use reference books, newspapers, magazines, and the Internet to research the influenza vaccine (or another immunization) and how it affects the immune system. Review the immune system and its organs prior to allowing students to research and create projects. Create a poster that shows the positive and negative effects of getting annual flu shots. Local health units may provide information about the availability in their parish and the state.

Have students complete a "What if" *SPAWN* writing assignment (view literacy strategy descriptions). *SPAWN* is an acronym that stands for five categories of writing prompts: **S**pecial Powers, **P**roblem Solving, **A**lternative Viewpoints, **W**hat if, and **N**ext. The strategy allows teachers to craft a variety of thought-provoking prompts and students to create critical written responses about the chosen prompt. Students should respond to a prompt such as "**W**hat if there was an outbreak of a mysterious communicable disease? Write a story that includes a location for the outbreak and how is it spread. In your story provide a detailed list of the symptoms and write a step-by-step plan of action to stop the disease-causing agent." Based on students' responses to this What If? prompt, they will provide an electronic or paper poster warning the public about the disease.

Sample Assessments

General Guidelines

Assessment will be based on teacher observation/checklist notes of student participation in unit activities, the extent of successful accomplishment of tasks, and the degree of accuracy of oral and written descriptions/responses. Journal entries provide reflective assessment of class discussions and laboratory experiences. Performance-based assessment should be used to evaluate inquiry and laboratory skills. All student-generated work, such as drawings, data collection charts, models, etc., may be incorporated into a portfolio assessment system.

- Students should be monitored throughout the work on all activities.
- All student-developed products should be evaluated as the unit continues.
- When possible, students should assist in developing any rubrics that will be used and should be provided with the rubric during task directions.

General Assessments

- The student will research and prepare a presentation of a diet-related disease condition.
- The student will write an essay analyzing party food.
- The student will write a summary of interviews of a smoker, an ex-smoker, and a nonsmoker.
- The student will present a report on the effects of a specific drug.
- The student will create a multimedia or poster presentation on a communicable or noncommunicable disease.

Activity-Specific Assessments

- Activity 3: Given a list of diseases, students should identify those that can occur as a result of an improper diet. They are to place the diseases in columns: diet related and non-diet related. Determine if student classifications are under the correct headings.

- Activity 5: Provided descriptions of drugs discussed in the activity, students will identify the associated long- and short-term health risks.

- Activity 6: Provide students with a list of diseases not previously discussed and a description of their mode of transmission. Based on the descriptions, students should determine if the diseases are communicable or noncommunicable.

Resources

- *How Stuff Works: How Your Brain Works*. Available online at http://science.howstuffworks.com/brain.htm
- *Neuroscience for Kids.* Available online at http://faculty.washington.edu/chudler/neurok.html
- *Smoke Signals*. Available online at http://school.discovery.com/lessonplans/programs/smokesignals/
- *Virtual Museum of Bacteria*. Available online at http://www.bacteriamuseum.org/map.shtml
- *Cigarette Smoking and Cardiovascular diseases, American Heart Association, 2003. Available online at* http://www.americanheart.org/presenter.jhtml?idnetifier=4545
- *Motivating Youth to Stay Tobacco free Empowering Smokers to Quit. Available online at* http://www.anti-smoking.org?children.htm
- *The Center of Disease Control and Prevention* http://www.cdc.gov/tobacco/edumat.htm
- *The campaign for Tobacco-Free Kids* http://www.tobaccofreekids.org
- *Drug facts and figures* http://www.wiredforhealth.gov.uk/cat.php?catid=894
- *Health facts and diet related issues.* Available online at http://www.free-online-health.cocm/obesity-illness.htm