Community Nutrition in Action An Entrepreneurial Approach 7th edition Boyle Solutions Manual

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Instructor's Manual[1] for *Community Nutrition in Action* 6e
Chapter 2 – Principles of Epidemiology

Learning Objectives

2.1 Define epidemiology.
2.2 Describe various vital statistics used by epidemiologists to monitor a population's health status.
2.3 Explain prevalence rates and how they differ from incidence rates.
2.4 Describe the strengths and weaknesses of various types of epidemiologic studies.
2.5 Explain why the day-to-day variation in an individual's nutrient intake can have important implications for nutritional epidemiologic studies.
2.6 List the advantages and disadvantages of various dietary assessment methods.

Lecture Launcher

Have students volunteer to answer the question: In your own words, what does epidemiology mean to you?

Suggested Video/Audio

- *Nutrition and You: Trends 2011 Webinar*. 23:09 min, the Academy of Nutrition and Dietetics (http://www.eatrightpro.org/resources/media/trends-and-reviews/trends-survey)
- *Why Use Statistics?* (1996) 4-part video series, 20-25 minutes each. http://ffh.films.com/ecHome.aspx. $399.80 for DVD or 3-year online-streaming.
- *2015 CPH Study Session Webinar – Epidemiology*. 2:57:27 min. (https://www.youtube.com/watch?v=6V4Nb_S_CF8).
- *2015 CPH Study Session Webinar – Biostatistics.* 2:12:23 min. (https://www.youtube.com/watch?v=4pybtht03XA).
- *Statistical Follies and Epidemiology*. William Matthew ("Matt") Briggs, Ph.D. 52:44 min. (https://www.youtube.com/watch?v=C42AwvaZ-04).
- *Binge Drinking—Nationwide Problem, Local Solutions* podcast. 1:15 min, CDC Vital Signs (http://www2c.cdc.gov/podcasts/player.asp?f=8622136).
- *Alcohol and Pregnancy: Why Take the Risk?* Podcast. 1:14, CDC Vital Signs (http://www2c.cdc.gov/podcasts/player.asp?f=8640232). Note to instructor: This podcast is part of a recent series of publications from CDC on fetal alcohol spectrum disorders (FASDs). The effort received widespread, harsh criticism for stating that women of childbearing age should not consume alcohol unless they were using contraception, an approach that was viewed as patronizing and treating women as little more than incubators (see, for example, *No Alcohol for Sexually Active Women Without Birth Control, C.D.C. Recommends* at http://www.nytimes.com/2016/02/04/health/no-alcohol-for-sexually-active-women-without-birth-control-cdc-recommends.html?_r=0; *Women Blast CDC's Advice To Use Birth Control If Drinking Alcohol* at http://www.npr.org/sections/health-shots/2016/02/04/465607147/women-blast-cdcs-advice-to-use-birth-control-if-drinking-alcohol; *Protect Your Womb From the Devil Drink* at http://www.theatlantic.com/health/archive/2016/02/protect-your-womb-from-the-devil-drink/459813/. Reviewing both the original CDC materials (http://www.cdc.gov/vitalsigns/fasd/index.html) and the responses to them offers students an opportunity to consider the challenges of communicating the results of epidemiologic research and making recommendations for the public based on those data.

[1] By Melanie Tracy Burns of Eastern Illinois University

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In-Class Discussion Starters

- How would you define *nutritional epidemiology*?
- What are the possible implications of only recording an individual's food consumption for just one day?
- Why would food consumption data be collected using differing methods at the national, household, and individual levels?

Chapter Outline

I. **Introduction**
   A. Epidemiology, the basic science of public health, is the study of epidemics. The epidemiologic method was initially used to investigate, control, and prevent epidemics of infectious disease.
   B. Today, it is also applied to the study of injuries, chronic disease, and social problems.

II. **The Practice of Epidemiology**
   A. Introduction
      1. The discipline of epidemiology is similar to clinical medicine and laboratory science in its concern with understanding the processes of health and disease in humans, but it differs from these disciplines in its focus on health problems of populations rather than of individual patients.
      2. Epidemiology is defined as the study of the distribution and determinants of health-related states and events in specified populations and the application of this study to the control of health problems.
         a. *Distribution* refers to the relationship between the health problem and the population in which it exists and it includes:
            (i) The persons affected.
            (ii) The place and time of the occurrence.
            (iii) Patient parameters such as age, sex, race, occupation, income and educational levels, and social and environmental features.
         b. *Determinants* refer to the causes and factors that affect the risk of disease; these are typically divided into two groups:
            (i) Host factors such as age, sex, race, nutrition status, and physiologic state, which determine an individual's susceptibility to disease.
            (ii) Environmental factors, such as living conditions, occupation, geographical location, and lifestyle, which determine the host's exposure to a specific agent.
   B. **Investigating Causes of Diseases**
      1. The epidemiologist measures or counts those elements that are common to individuals, so that the magnitude and effects of individual variation within a population can be accounted for in studying a disease process.
         a. **Examining a Community's Health Status.** Epidemiology can be used to describe a community's particular health problems and to determine where its overall health is improving or getting worse.
         b. **Surveillance and Related Activities**
            (i) Public health data have also been used to develop surveillance methods for identifying women at high risk for giving birth to a child with fetal alcohol syndrome and to design and implement prevention activities.
            (ii) Based on vital statistics – such as age at death and cause of death – that are recorded on death certificates, the epidemiologic method can also be used to calculate an individual's risk of dying before a certain age.

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III. **Basic Epidemiologic Concepts**

A. Introduction

1. The basic operation of the epidemiologist is to count cases and measure the population in which they arise in order to calculate rates of occurrence of a health problem and compare the rates in different groups of people.
2. The primary goal is to control and prevent these health problems, typically through the formulation of specific health policies.

B. **Rates and Risks**

1. In epidemiology, a case is a particular instance of a disease or outcome of interest.
2. *Risk* refers to the likelihood that people who are without a disease, but exposed to certain risk factors, will acquire the disease at some point in their lives.
   a. Risk factors may be found in the physical or social environment, or they may be inherited.
   b. Other risk factors may be behavioral, such as smoking, gaining excess weight, or not wearing a seat belt.
3. The relative risk (RR) is a comparison of the risk of a health-related event in two groups and can be differentiated by gender, age, or exposure to a suspected risk factor.
4. An expression of how frequently a disease occurs in a population is called incidence, defined as the proportion of the group initially free of a disease that develops the disease over a period of time.
5. Another common method of expressing the frequency of occurrence of an event is prevalence, or the proportion of a group possessing a disease at a specific time.

C. **The Epidemiologic Method**

1. The epidemiologic method uses a variety of tools and incorporates a rigorous, scientific approach that includes the following steps:
   a. Observing
   b. Counting cases or events
   c. Relating cases or events to the population at risk
   d. Making comparisons
   e. Developing the hypothesis
   f. Testing the hypothesis
   g. Drawing scientific inferences
   h. Conducting experimental studies
   i. Intervening and evaluating

D. **Hypothesis Testing**

1. The importance of hypothesis testing in the epidemiologic method cannot be overstated.
   a. The investigator identifies a cause-effect comparison to be tested as the research hypothesis.
   b. The statement of a clear, precise hypothesis at the study outset ensures that the appropriate data are collected to answer the research question and avoids the pitfall of drawing spurious conclusions from the data set.
2. An important aspect of the epidemiologic method is determining whether the data are valid; i.e., whether the data represent the true state of affairs.

E. **Explaining Research Observations**

1. Research data can have three possible explanations:
   a. The results of the study are incorrect because they are biased.
   b. The results are due simply to chance and do not represent the true state of affairs.
   c. The study results represent the truth.

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2. Different types of bias include: selection bias (participants were self-selected), measurement bias (an error in measuring one or more of the outcome variables), and confounding bias (confounding factors such as age, gender, ethnicity, and dietary or lifestyle factors that make it difficult to distinguish between a response to treatment versus some other factor).
3. To say that the data are valid means that they are neither biased nor incorrect due to chance and that they represent the true state of affairs.

IV. **Types of Epidemiologic Studies**
   A. **Ecological or Correlational Studies** compare the frequency of events in different populations with the per capita consumption of certain dietary factors.
      1. Dietary data collected in this type of study are usually disappearance data, which are the figures for food produced for human consumption minus the food that is exported, fed to animals, wasted, or otherwise not available for human consumption.
      2. Data from ecological studies cannot be used to draw conclusions about the role of foods or nutrients in the development of specific diseases, but they can be used to generate hypotheses which can then be tested with a more rigorous study design.
   B. **Cross-sectional or Prevalence Studies** examine the relationships among dietary intake, diseases, and other variables as they exist in populations at a particular time.
   C. **Cohort Studies** are like moving pictures of events occurring within populations, whereas cross-sectional studies are like a snapshot.
      1. A group of people, called a cohort, who are free from the disease of interest is identified and examined, and then followed for months or even years. During this time, the group members are examined periodically to determine which individuals develop the characteristics of interest and which do not.
      2. Cohort studies may be either retrospective, those that look back in time to reconstruct exposures and health outcomes, or prospective, those that follow a group into the future.
   D. **Case-Control Studies.** In a case-control study, a group of persons with the disease is compared with a group of persons without the disease to compare characteristics, such as previous exposure to a factor, between cases and controls.
   E. **Controlled Trials.** The most rigorous evaluation of a dietary hypothesis is the randomized controlled trial conducted as a double-blind experiment.

V. **Nutritional Epidemiology**
   A. The epidemiologic method lends itself to the study of the relationship of diet to health and disease.
   B. The method can also be used to:
      1. Describe the nutrition status of populations or specific subgroups of a population and develop specific programs or services for members of the group whose nutrition status appears to be compromised.
      2. Evaluate nutrition interventions.
   C. The Centers for Disease Control and Prevention's (CDC's) Behavioral Risk Factor Surveillance System (BRFSS) and Youth Risk Behavior Surveillance System (YRBSS) can be used as sources of information on behaviors that increase the risk for chronic disease and the prevalence of health risk behaviors among young people, respectively.
   D. **The Nature of Dietary Variation**
      1. One challenge to the study of the relationship of diet to disease is the nature of dietary variation and the complexity of our diets.
         a. The primary factor of interest is the long-term dietary intake of foods, which is more important than short-term dietary intake in the development of many diseases, which take years or a lifetime to develop.

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b. People do not eat the same foods every day and nutrient intake varies from day to day; therefore, it is difficult to determine how many days of food intake records are needed to estimate the true average intake of a small number of adults.

2. A variety of methods are available for estimating dietary intake; however, none of the methods is perfect.
3. **Food Consumption at the National Level.** The primary method of assessing the available food supply at the national level is based on food balance sheets that result in a per capita figure.
   a. Food balance sheets do not measure the food actually ingested by a population, but rather, measure the food available for consumption.
   b. They are more often used to formulate agricultural policies than to describe nutritional inadequacies.
4. **Food Consumption at the Household Level.** These methods consider the per capita food consumption of the household, taking into account the age and sex of the people in the household, the number of meals eaten at home or away from home, income, and shopping practices.
5. **Food Consumption by Individuals** can be measured by using a food consumption survey, diet history, 24-hour recall, food record, and/or food frequency questionnaire.

VI. **Epidemiology and the Community Nutritionist**

A. The key roles of the community nutritionist include identifying nutritional problems within the community and interpreting the scientific literature.
   1. The community nutritionist must be able to critically evaluate the scientific literature before formulating new nutrition policies or altering eating pattern messages.
   2. Certain elements can be used in judging the strength of epidemiologic associations.
   3. Interpretation of epidemiologic data basically involves the evaluation of the criterion for a causal association and the assessment of the causal association for the presence of a bias and/or a contribution of chance.

VII. **Case Study: Epidemiology of Obesity**

A. Scenario
   1. You have been hired as a nutritionist by a county public health agency to implement new programs for a diverse population.

B. Learning outcomes
   1. Utilize data from epidemiologic research to identify nutrient needs and concerns of a target population.
   2. Identify and prioritize the needs of a target population.
   3. Construct a nutrition diagnosis and an intervention plan for a target population.
   4. Demonstrate the process of program development and monitoring and evaluation that achieve desired outcomes.

VIII. **Professional Focus: The Well-Read Community Nutritionist**

A. Suggestions are provided for keeping up with the plethora of research articles published each month and the accompanying onslaught of new medical, health, and nutrition information.

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Activities

Answers to Global Nutrition Watch Activities
1. a
2. c
3. 18%

Activity 2-1
Identify the vital statistics used in several of the studies featured in "A Sampling of Diet-Related Studies from the National Institutes of Health" (p. 59 in the text).

OBJ: 2.2 Describe various vital statistics used by epidemiologists to monitor a population's health status.

Activity 2-2
Listen to the *Binge Drinking—Nationwide Problem, Local Solutions* podcast (see Suggested Video/Audio section), and then investigate the statistics shared further through published data. Identify which statistics shared in the podcast and your references are prevalence versus incidence rates.

OBJ: 2.3 Explain prevalence rates and how they differ from incidence rates.

Activity 2-3
Go to your library and locate two or three "must-read" nutrition journals, such as the *Journal of the Academy of Nutrition and Dietetics, American Journal of Clinical Nutrition*, and the *Journal of Nutrition Education and Behavior*. Flip through these journals, noting the types and subjects of articles included, variety of methodologies used, and the validity of the results.

OBJ: 2.4 Describe the strengths and weaknesses of various types of epidemiologic studies.

Activity 2-4
Listen to the CDC podcast *Alcohol and Pregnancy: Why Take the Risk?* Podcast. 1:14, CDC Vital Signs (http://www2c.cdc.gov/podcasts/player.asp?f=8640232) and review the associated materials (http://www.cdc.gov/vitalsigns/fasd/index.html). This podcast is part of a recent series of publications from CDC on fetal alcohol spectrum disorders (FASDs). The effort received widespread, harsh criticism for stating that women of childbearing age should not consume alcohol unless they were using contraception, an approach that was viewed as patronizing and treating women as little more than incubators (see, for example, *No Alcohol for Sexually Active Women Without Birth Control, C.D.C. Recommends* at http://www.nytimes.com/2016/02/04/health/no-alcohol-for-sexually-active-women-without-birth-control-cdc-recommends.html?_r=0; *Women Blast CDC's Advice To Use Birth Control If Drinking Alcohol* at http://www.npr.org/sections/health-shots/2016/02/04/465607147/women-blast-cdcs-advice-to-use-birth-control-if-drinking-alcohol; *Protect Your Womb From the Devil Drink* at http://www.theatlantic.com/health/archive/2016/02/protect-your-womb-from-the-devil-drink/459813/. Review both the original CDC materials and the responses to them. Offer alternative ways to present the key message about the dangers of fetal alcohol spectrum disorders in ways that would promote public health rather than provoking mockery.

OBJ: 2.4 Describe the strengths and weaknesses of various types of epidemiologic studies.

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Critical Thinking Questions[2]

A key with sample answers is provided here; note, however, that correct answers will often vary due to the open-ended nature of the questions. These questions are also available for students to complete online and submit to you via e-mail through the book's website.

1. Hometown, USA, population 45,000, had 200 infants born last year. Sadly, 7 infants died at birth and 8 more died before their first birthday. What is Hometown's infant mortality rate?

   Key (p. 46):
   Infant mortality rate = $\frac{\text{Number of deaths to infants <1 yr during year}}{\text{Number of live births in same year}} \times 1000 =$

   $15/200 \times 1000 = 75$

2. The results of a cross-sectional study of older adults shows that a relative risk (RR) of being underweight among those prescribed a modified diet was 2.3 compared to those who were not prescribed a modified diet. In addition, the same study showed that a RR of being underweight among older adults was 0.5 among those who participated in the local OAA Nutrition Program compared to those who did not. As the local community nutritionist, you have been asked by a newspaper reporter to explain these findings. What would you say?

   Key (pp. 47-48, 56, 58):
   A brief explanation of a cross-sectional study would be important information to convey. These types of epidemiological studies involve measuring variables (exposure and outcome factors) at one point in time from a specific sample. Usually this is done by survey or interview. These study designs can be used to identify associations but not infer cause and effect.

   Relative risk (RR) is a comparison of the risk of some health-related event (here, the state of being underweight) compared to exposure to a condition. If an RR is less than 1, then those exposed to the condition have a decreased risk. If an RR is greater than 1, then those exposed to the condition have an increased risk. An RR of 1 means that the risk of those exposed and unexposed is the same.

   This study of older adults showed that the risk of being underweight was greater among those prescribed a modified diet compared to those who were not; that is, those prescribed a modified diet were more likely to be underweight. It also showed that the risk of being underweight was lower among those who participated in the OAA Nutrition Program compared to those who did not participate. In other words, older adults who participated in the program were less likely to be underweight.

   Because this was a cross-sectional study, one cannot assume that a prescribed diet causes older adults to be underweight or that participating in OAA Nutrition Programs will protect older adults from being underweight. Causality cannot be determined from these types of epidemiological studies.

3. Assuming that no one has moved away, moved in, or died, is it possible for a community to have had a prevalence rate for heart disease of 5% for 2010 and an incidence rate for heart disease of 8% for 2005-2010? Why or why not?

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[2] Contributed by Carolyn H. La Potin of SUNY Oneonta and Jamie A. Benedict of University of Nevada, Reno

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Key (p. 48):
Yes, it is possible for a community to have had these rates, because a 5% prevalence rate in 2010 means that in 2010, 5% of those in the community had heart disease. An incidence rate of 8% for 2005-2010 means that 8% of those who did not have heart disease in 2005 developed it between 2005 and 2010. These new cases were counted when the 2010 prevalence rate was determined.

The *incidence* is the fraction or proportion of a group initially free of a disease or condition that develops the disease or condition over a period of time. Incidence is measured by a two-step process: 1. Identify a group of susceptible people who are initially free of the disease or condition; and 2. Examine them periodically over a period of time to discover and count the new cases of the disease that develop during that interval.

The *prevalence* is the fraction or proportion of a group possessing a disease or condition at a specific time. The prevalence rate is measured by a single examination or survey of a group.

4. Austin, a community nutritionist, is working with an epidemiologist who is investigating a recent outbreak of foodborne illness among those who attended a large sporting event. Their work to date points to the water used by several of the vendors to make iced tea and lemonade, and to dilute fruit juice concentrates. Which of the steps in the *epidemiologic method* have Austin and the epidemiologist accomplished and which ones do they have yet to do?

   Key (pp. 48-53):
   Steps accomplished:
   1. Observing.
   2. Counting cases or events.
   3. Relating cases or events to the population at risk.
   4. Making comparisons.

   Step currently underway:
   5. Developing the hypothesis.

   Steps yet to be done:
   6. Testing the hypothesis.
   7. Drawing scientific inferences.
   8. Conducting experimental studies.
   9. Intervening and evaluating.

5. Compare the potential for confounding factors/bias to be present in randomized controlled trials and non-randomized controlled trials.

   Key (pp. 54-56, 60-61):
   Confounding factors/bias are/is introduced when a variable or characteristic is distributed differently between the study group compared to the control group. Subjects are randomly assigned to the study and control groups in randomized controlled trials; therefore, it is less likely that a specific variable or characteristic will be different between the two groups (although not impossible). It is not often feasible to randomize subjects. In this case, non-randomized controlled trials are conducted. A limitation of this approach is that the potential for confounding factors/bias exists.

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6. If the community nutritionist wants to study the correlation between the use of certain questionable supplements designed to enhance athletic performance and the development of liver disease in those who take the supplements, what type of epidemiological study is the best choice? Why? Why not any of the other options?

   Key (pp. 55-61):
   He or she should plan a cross-sectional or prevalence study because this type of study examines the relationships among dietary intake, diseases, and other variables (such as age, pre-existing liver disease, and the use of other substances that the liver must detoxify, e.g. alcohol and drugs) as they exist in a population at a particular time.

   Ecological or correlational studies compare the frequency of events (or disease rates) in different populations with the per capita consumption of certain dietary factors. This type of study is less likely to consider other variables that might also result in liver disease.

   Cohort studies examine an identified group of people free of the disease or condition of interest. The members of the cohort are followed for months or even years, during which time they are examined periodically to determine which individuals develop the characteristics of interest and which do not. If the supplement does result in liver disease, permitting people without liver disease to continue to use it for months or years while waiting to see if they develop liver disease is not an ethical option.

   Case-control studies compare a group of persons or cases with the disease or condition of interest with a group of persons without the disease or condition. The hope is that those who have developed liver disease as a result of the use of this supplement are few in number. Also, identifying these individuals may be difficult and may not occur until the persons have become very ill or died.

   Randomized controlled trials or clinical trials that are conducted as double-blind experiments are the most rigorous evaluations of a dietary hypothesis. The primary drawback of the controlled trial is its expense. Deliberately giving subjects a treatment thought to be harmful or even lethal is not an option.

7. Your colleague and fellow community nutritionist wants to determine the food consumption of dual-career families living in New York City using a household food consumption approach. She has asked if you think her plan is appropriate. What response would you give? Be sure to support your opinion with facts.

   Key (pp. 64-65):
   You would suggest that using a household food consumption study is not an appropriate approach because this type of study considers the total amount of food available for consumption in the household, generally excluding food eaten away from home unless taken from home. The group that she plans to study could reasonably be expected to consume a sizeable portion of their food from establishments outside of the home. Therefore, much of their food consumption might not be considered.

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Sample Answers for Case Study: Epidemiology of Obesity

Foundation: Acquisition of Knowledge and Skills

1. Epidemiology is the branch of medical science that deals with the incidence, distribution, and control of disease in a specified population, and the application of this study to the control of health problems.
2. According to the AAP website, children and adolescents with a BMI over the 85th but less than the 95th percentile are considered overweight and those with a BMI greater than the 95th percentile are considered obese.

   The IOM defines children who have a BMI equal to or greater than the 95th percentile as obese.

Step 1: *Identify the Relevant Information and Uncertainties*

1. Results from the 2011-2012 NHANES, using measured heights and weights, indicate that an estimated 16.9% of children and adolescents aged 2-19 years are obese and another 14.9% are overweight. Although there have been significant increases in obesity across age groups since 1971-1974, rates have more recently begun decreasing among children.

   Data are summarized in Tables 3a ("Prevalence of obesity among boys aged 2-19 years, by race and ethnicity: United States, selected years 1988-1994 through 2011-2012") and 3b ("Prevalence of obesity among girls aged 2-19 years, by race and ethnicity: United States, selected years 1988-1994 through 2011-2012") in the 2011-2012 report and in Figures 2 ("Prevalence of obesity among boys aged 2-19 years, by race and ethnicity: United States, selected years 1988-1994 through 2009-2010") and 3 ("Prevalence of obesity among girls aged 2-19 years, by race and ethnicity: United States, selected years 1988-1994 through 2009-2010") in the 2009-20110 report.
2. Some determinants of obesity relevant to this target population, which is 75% Mexican American, may include: genetic predisposition to obesity, lifestyle (if not a migrant worker, may be sedentary with long hours of television viewing), family eating patterns (high intake of carbonated beverages, high saturated fat intake with use of lard in fried foods, cheese, and beef), and limited dental care. A high incidence of baby bottle tooth decay (BBTD) is due to a common practice among this population of giving a bottle of milk, juice, or sweetened beverages until about 4 years of age.

3. Some questions that would need to be answered include:

   - Are the pre-school aged children actually enrolled in a pre-school and/or do they attend day care where snacks and meals are served?
   - Are any of the children still drinking from a bottle?
   - What is the activity level of the children and do they have an “open space” for play?

   (The students may have additional questions that would be appropriate, as long as they help to get a better assessment of the target population.)

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Step 2: *Interpret Information*

1. The memo should include some of the following information:

   In the past 30 years, the occurrence of overweight in children has doubled and it is now estimated that one in five children in the U.S. is overweight. Increase in the prevalence of overweight is also being seen in younger children, including preschool age, and is more common in the Hispanic and African-American populations that comprise the ethnicity of our agency. In general, Hispanic children living in the U.S. carry significantly greater amounts of body fat than do their non-Hispanic counterparts. African-American and Hispanic children are more likely to be overweight than are non-Hispanic white children. Childhood obesity is associated with hyperinsulinemia and hyperlipidemia, which increase the risk of type 2 diabetes, cardiovascular disease, psychosocial dysfunction, and other serious health problems. Further, obese children are more likely to be obese adults. The key is prevention. Thirty percent of the pre-school aged children in our agency are overweight. A nutrition intervention program targeted to this group could help educate and change behaviors among the families of these children to achieve healthy weights.

Step 3: *Draw and Implement Conclusions*

1. Critical nutritional needs of your target population:
   - Overweight/Obesity (NC 3.3), *related to* physical inactivity and/or food- and nutrition-related knowledge deficit, *as evidenced by* 30% of children having a BMI ≥ 85th percentile, no record of any nutrition education given at the agency, and a report that the children do not have a safe place to play; therefore, most spend many hours each week on screen time (TV, videos, etc.).
   - Harmful beliefs/attitudes about food and nutrition-related topics (NB 1.2), *related to* lack of prior exposure to accurate nutrition-related information, *as evidenced by* increased incidence of baby bottle tooth decay.

Step 4: *Engage in Continuous Improvement*

1. Intervention plan:

   There may be a variety of goals and strategies. The dietitian can set up weekly meetings for one month. There may be more than one strategy for each goal. The strategies should be the plan(s) that will help to achieve the goal.

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Goals	Strategies
1. Children and parents will be able to recognize sources of "empty" and "excess" calories.	• Exhibit actual foods and beverages with amounts of fat and sugar, e.g., a soda can displaying 9 tsp. of sugar. • Using food models, demonstrate appropriate portion sizes for preschool-age children, e.g., show a plate of a sample meal.
2. Children will increase physical activity to meet recommendations of 60 minutes of physical activity per day.	• List ideas to increase physical activity by showing pictures of children jumping rope, playing tag or sports, bike riding, and walking. Have one parent keep a log of the child's physical activity. Provide stickers for the parents to give the child when he/she meets individual goals.
3. Children and parents will identify more nutrient-dense foods/ healthier food choices.	• Display an illustration of the USDA MyPlate graphic and the USDA Food Guide. • Using food models, have the parents and children create healthy meals. • Using food models, show what 5 cup equivalents of fruits and vegetables per day looks like, as well as 3 cups of low-fat dairy. • Provide a checklist for parents to mark off cups for fruits, vegetables and dairy.
4. Children over 2 years of age will stop drinking from the bottle and use a cup.	• Show pictures of baby bottle tooth decay to parents. Provide "sippy cups" for them.

Some limitations in carrying out these strategies would include a language barrier. Handouts would have to be in English and Spanish. The parents may be in a pre-contemplative stage of change, so it might be necessary to explain the importance of a healthy diet for the whole family before any of the strategies would be put into practice.

2. Have the children weighed monthly (depends on visits to the agency) and keep a record. At this age, the children should maintain weight if they are overweight. Have the parent bring in a physical activity log and food checklist each week and record progress. Note how many children have substituted a "sippy cup" for the bottle. Then record your outcomes and send to your administrator.

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