Developing training

Create a lesson plan for each topic

Lesson plans provide the foundation for organizing course content. They include directions to the instructor about suggested content, examples, practice (including classroom and field exercises) and assessment activities. Additionally, lesson plans should include any necessary directions to the instructor on how to prepare and present the course.

A complete training contains four elements:

- Content
- Examples
- Practice
- Assessment

Before developing the final lesson plan, use a table like the one below to make sure each important aspect of the lesson is included.

Content	Examples	Practice	Assessment
Topic: Learning objective 1 Learning objective 2	Example 1 Example 2	Practice activity (may cover more than one objective)	Assessment activity (may cover more than one objective)

Content

Content for the lesson is taken directly from the work already completed on developing topics and learning objectives. List each topic and the learning objectives that make up the topic area. Later, as training materials are developed, develop the content within each learning objective. Training techniques used are noted at the top of the column.

Topic: Measures of Association

Content	Examples	Practice	Assessment
Lecture 1. Discuss the overall goal of measure of association in epidemiology. 2. Draw and label a 2x2 contingency table. 3. Describe and calculate a risk ratio, rate ratio, and odds ratio. 4. Explain how the odds ratio can closely approximate the relative risk when the disease under consideration is rare. 5. Identify measures of association usually calculated with the various study designs (cross-sectional, case-control, and cohort.			

The best approach for writing content is to approach each learning objective individually, creating both the content and further developing the accompanying examples you outlined in your lesson plan. By taking one objective at a time, the task can seem less daunting.

Suppose you are writing the content for the Measures of Association learning objectives, included in the chart above. As an example, to develop the second objective, "Draw and label a 2x2 contingency table," we first create an illustration of a basic 2x2 table and develop a brief text to describe it.

Standard 2x2 Table: Description

	Ill	Well	Total
Exposed	a	b	a + b
Unexposed	c	d	c + d
Total	a + c	b + d	N

The 2x2 table is used to illustrate and present measures of association, as well as measures of impact of disease screening.

Typically, the table created so that the exposure status is on the left (Y-axis) and the disease status is listed on the top (X-axis), although you will see 2x2 tables with the disease status on the left and the exposure status on the top.

N = Total size of the sample
a = Individuals who are exposed and who have the disease
b = Individuals who are exposed but do not have the disease
c = Individuals who are not exposed but have the disease
d = Individuals who are not exposed and do not have the disease

Examples

The content for each learning objective should be explained by one or more examples to illustrate each point. It is preferable to provide multiple examples, including ones that the instructor may add to the instruction if the trainees have particular difficulty with the topic.

Examples should closely reflect the experiences of the trainees, both those they have had in their education and careers and those you expect them to have upon completion of the program. In addition to providing examples related to experience, it is important to also provide examples within a familiar context, such as a particular geographic region.

Topic: Measures of Association

Content	Examples	Practice	Assessment
Lecture 1. Discuss the overall goal of measure of association in epidemiology.	Provide examples of measures of association and their interpretations.		
2. Draw and label a 2x2 contingency table.	Use data from a study to illustrate a 2x2 table.		
3. Describe and calculate a risk ratio, rate ratio, and odds ratio. 4. Explain how the odds ratio can closely approximate the relative risk when the disease under consideration is rare.	Show calculations of risk ratio, rate ratio, and odds ratio. Demonstrate through calculations.		
5. Identify measures of association usually calculated with the various study designs (cross-sectional, case-control, and cohort.	Use data from various studies to calculate the appropriate measure of association.		

For the second learning objective, we stated that we would provide an example, "Use data from a study to illustrate a 2x2 table."

Standard 2x2 Table: Example

In a case-control study conducted following an outbreak of cholera, a total of 66 people were interviewed – 33 cases (ill) and 33 controls (not ill). A suspected exposure was eating outside the home in the past five days. A total of 10 persons ate outside of the home, 9 of whom became ill and one who did not.

	Ill	Well	Total
Exposed	9	1	10
Unexposed	24	32	56
Total	33	33	66

Practice/Classroom Exercises

Practice activities are probably the most important element of training. Content and examples alone provide knowledge, but they do not provide skill. Each learning objective should be accompanied by some type of practice activity.

Preferably, the trainee will be provided numerous opportunities to practice the learning objective. To develop both knowledge and skill is to practice discrete objectives and then to develop complexity by practicing objectives in combination with other related learning objectives. When practice activities are used to apply a series of related learning objectives, the connection among those different elements is emphasized. In addition to classroom-based exercises, the FETP programs uniquely provide field experience to trainees. Consider providing some field experience during the classroom portion of the course. The most commonly conducted field exercise is the field study. (See section 5.4.7 for guidelines on field activities.)

Topic: Measures of Association

Content	Examples	Practice	Assessment
Lecture			
1. Discuss the overall goal of measure of association in epidemiology.	Provide examples of measures of association and their interpretations.	Interpret different measures of association.	
2. Draw and label a 2x2 contingency table.	Use data from a study to illustrate a 2x2 table.	Practice using data from a study to complete a 2x2 table.	
3. Describe and calculate a risk ratio, rate ratio, and odds ratio.	Show calculations of risk ratio, rate ratio, and odds ratio.	Use the information in a 2x2 table to calculate risk ratios, rate ratios, and odds ratios.	
4. Explain how the odds ratio can closely approximate the relative risk when the disease under consideration is rare.	Demonstrate through calculations.	Choose and calculate the appropriate measure of association from the information given.	
5. Identify measures of association usually calculated with the various study designs (cross-sectional, case-control, and cohort.	Use data from various studies to calculate the appropriate measure of association.	Choose and calculate the appropriate measure of association from the information given.	

Often for practice activities and exercises, you will either be using new examples to illustrate the activity or expanding on examples that were presented in the content and

examples portion of the training. This can include finding datasets that you can use to illustrate points of analysis or sample study protocols you can ask students to critique.

Many sources you use for your practice activities will need to be modified to best suit your practice activity. An important aspect of training development is to keep training activities focused. Try to exclude any extraneous content that will distract from the teaching point. For example, if you are using a dataset to illustrate a certain point of analysis, exclude as many extraneous variables as possible so that trainees can focus on the pertinent data.

Practice activities do not need to be elaborate. Using the example content illustrated under Content and Examples, you can simply add an additional page (or slide) to your presentation materials with a question related to the teaching point and ask the trainees to complete the activity. An example of a practice activity is included below:

Standard 2x2 Table: Practice

Complete the table: In a prospective cohort study of exposure to asbestos and mesothelioma with a total of 350 study participants, 170 study participants were exposed to asbestos. By the end date of the study, 97 participants had developed mesothelioma.

	Ill	Well	Total
Exposed			
Unexposed			
Total			

More in-depth practice activities may require more formal development.

1. Collect resource materials to develop the practice exercise (datasets, scientific articles, sample reports or manuscripts, etc.).

2. Adapt resource materials as needed. Here is where you may have to modify a dataset or prepare a sample report if you cannot find one suitable. Also, be sure to get permission from any authors to use their materials and be sure to eliminate any identifying information.

3. Develop any resource tools needed to perform the practice activity or exercise (checklists, answer sheets, etc.).

4. Develop clearly written instructions to the student on how to perform the activity. These may be included on any tools developed, listed in the accompanying

presentation materials on content or, if detailed, listed on a separate instruction sheet.

5. If you are planning to share the activity with colleagues or if you will be assisted by others in facilitating the activity, include directions and suggested answers for facilitators.

Assessment

Assessment in an FETP can take more than one form. In academia, assessment of a student is often done by exam, but may also take the form of completing a paper or developing a project. The primary focus of assessment within an FETP would be completion of the competencies. For each topic area developed, note which competencies address that topic.

Topic: Measures of Association

Content	Examples	Practice	Assessment
Lecture			
1. Discuss the overall goal of measure of association in epidemiology.	Provide examples of measures of association and their interpretations.	Interpret different measures of association.	In-class exam on calculation and interpretation of measures of association.
2. Draw and label a 2x2 contingency table.	Use data from a study to illustrate a 2x2 table.	Practice using data from a study to complete a 2x2 table.	Use appropriate measures of association to describe a set of data collected during a field investigation.
3. Describe and calculate a risk ratio, rate ratio, and odds ratio.	Show calculations of risk ratio, rate ratio, and odds ratio.	Use the information in a 2x2 table to calculate risk ratios, rate ratios, and odds ratios.	(Note that the above two assessment strategies can include all five learning objectives.)
4. Explain how the odds ratio can closely approximate the relative risk when the disease under consideration is rare.	Demonstrate through calculations.	Choose and calculate the appropriate measure of association from the information given.	
5. Identify measures of association usually calculated with the various study designs (cross-sectional, case-control, and cohort.	Use data from various studies to calculate the appropriate measure of association.	Choose and calculate the appropriate measure of association from the information given.	

Outputs from the classroom course include any evidence of the trainee's accomplishment during the course. Commonly, we think of these as tests or exams, but they can also include

- outputs of data analysis,
- checklists of activities performed in the field study,
- instructor checklists of skills demonstrated during presentations, or
- reports or presentations illustrating findings and recommendations.

The majority of programs use applied learning activities to demonstrate competency in one or more areas. Some of the FETPs that are not associated with a university include formal exams as part of the didactic course. While exams are not necessary, it is recommended that each course include some form of measurement or criteria to ensure that trainees who exit the didactic course have gained both the knowledge and skills necessary to complete the field portion of the program. In the Assessment phase of the lesson plan, you can also detail specific assessment questions that address individual learning objectives to use in an exam.

Lesson Plan

The reason for creating a lesson plan that includes more than just lecture activities is to make sure that the trainee has had an opportunity to demonstrate knowledge and skill and that attendance alone does not constitute acceptance into the field portion of the program. If learning objectives have been well-written, it should be simple to create an assessment to test the absorption of those objectives.

Upon completing these steps, a full lesson plan will have been developed that should also include

- the time required to successfully complete the lesson,
- prerequisite knowledge the trainee needs before studying the topic,
- a description of the materials and equipment required to complete the lesson, and
- the resources used to develop content for future reference.

The time required to complete the lesson should be broken down into the time required to complete each segment of the lesson. For example, you may plan 30 minutes for lecture and 30 minutes for a practice activity for a total of a one hour lesson. The timing of the lesson is often dependent not only on the content of the lesson, but also the knowledge and experience of the trainees. A trainee who has previous experience participating in an outbreak investigation, for example, may not need as much time to complete an exercise in surveillance as a trainee who has only taken a basic epidemiology course. You may want to specify prerequisites that trainees must have before enrolling in a course so that all trainees are beginning with a similar background.

Using the outline of content, examples, practice, and assessment that we created on the previous pages for Measures of Association, we have developed a sample lesson plan. The lesson plan is essentially a summary documentation of what will be included in the lesson. A template for a lesson plan is included on the next page, followed by a completed example.

About this Lesson

Description of the Training

Write a description of the training (topic, how it fits into the curriculum, what knowledge gaps it fills).

Time: State the time needed to complete the training.

Instructional Goal

Write the related instructional goal from the FETP curriculum.

Learning Objectives

1. Learning Objective 1.
2. Learning Objective 2.
3. Learning Objective 3.

Training Techniques: List techniques used to present *content* and *examples* and provide *practice*.

Assessment: Describe how achievement of learning will be *assessed*. This can include assessments done in the classroom (e.g., quiz) and in the field (e.g., completion of a specific field activity).

Materials and Equipment

Materials	For the Instructor: 1. Item 1 (e.g., PowerPoint file) 2. Item 2 For the Participants: 1. Item 1
Equipment	1. Item 1 (e.g., Projector, Laptop, Whiteboard) 2. Item 2

Prerequisites: List of goals, learning objectives, or topics that should have been completed prior to conducting this training.

Resources: List of resource materials used to develop the training.

About this Lesson

Description of the Training

Measures of Association describes the standard 2x2 table and the calculation and interpretation of ratio measures from analytic study data.

Time: 6 hours (2 hours content and examples; 4 hours practice activities)

Instructional Goal: Calculate and interpret the appropriate measure of association based upon the study design selected.

Learning Objectives

1. Discuss the overall goal of measure of association in epidemiology.

2. Draw and label a 2x2 contingency table.

3. Describe and calculate a risk ratio, rate ratio, and odds ratio.

4. Explain how the odds ratio can closely approximate the relative risk when the disease under consideration is rare.

5. Identify measures of association usually calculated with the various study designs (cross-sectional, case-control, and cohort).

Training Techniques: Content and examples will be presented using *lectures* and *demonstrations*. Practice will be provided using *practical exercises*.

Assessment: Assessment of the learner will include an *exam* in the didactic component of the course and assessments of analysis using measures of association from data collected during outbreak investigation and epidemiologic study field assignments.

Materials and Equipment:

Materials	For the Instructor: 1. PowerPoint file for the presentation 2. Instructor Guide with notes for presentation and course 3. Handouts (sample questionnaire) For the Participants: 1. Participant guide
Equipment	1. Projector 2. Whiteboard

Prerequisites: Prior to this lesson, the learner should have been introduced to ***Analytic Study Design***.

Resources:

1. Hutin, Y. 2005. The Strength of Association: Measures of Association. MAE-FETP India
2. Page, R; Cole, G; & Timmreck, T. 1995. Basic Epi Methods and Biostatistics: A Practical Guidebook. Jones and Bartlett. Sudbury, MD.
3. Smith, T and Jones, J. 1993. Development of Mesothelioma Based on Asbestos Exposure. Any Journal. Pp 23-29.

(1. represents PowerPoint files from previous training courses, 2. represents a reference text, 3. represents sample data for example and practice problems.)