

Day 2

Module 3

APPRAISING EVIDENCE

OVERVIEW

 **MODULE OBJECTIVES**

At the end of this module participants will:

- Identify characteristics of basic research designs and methods
- Describe the types of evidence generated from different designs
- Know characteristics and questions to use for appraising the strength of a research paper/article – and a body of evidence.
- Demonstrate assessing levels and measures of strength of evidence for their policy issue.
- Describe how characteristics of critical thinking apply to assessing quality of evidence

 **TIME**

3 hours 30 minutes

 **ACTIVITIES**

Recap

- A. Research design primer: Presentation and gallery walk [55 min]
- B. Types of evidence: Interactive presentation [15 min]
- C. Critical Thinking: Group Discussion [15 min]
- D. Assessing the strength of evidence: Interactive presentation and group discussion [35 min]
- E. Practical Application Exercise 3: Appraising your evidence [1 hour] and receive [40 min]
- F. Module Reflection and Evaluation [15 min]

 **MATERIALS**

- Module 3 PowerPoint
- Flipcharts printed for gallery walk
- Flip charts for small groups
- Markers
- Case Study and Handouts

Module 3

RECAP THE PREVIOUS DAY OR SESSION

ACTIVITY OBJECTIVES

At the end of this activity participants will:

- Elicit and recap concepts and information from the previous day or session.
- Aid absorption and retention of information.

TIME

15 min

ACTIVITIES

Select and conduct a method for the recap activity from the options below.

Note to facilitator: You will have a sense of what material or learning was easy or challenging for the majority of participants and can choose a recap methodology (or use several) or duration that encourages more time or more details.

With all activity options, you can allow for looking in notes and materials or not. Similarly, with team exercises, you can decide if comparing with other groups in the end is allowed to be sure all answers are there.

MATERIALS

In some cases you must prepare questions or statements ahead of time.

STEPS

Activity options:

- A. **Summaries.** The recap done by the facilitator himself or herself by providing a summary of the most important points that have just been covered. You can also elicit the participants' summary, by prompting and drawing out summary points from participants. This makes the recap even more interactive and engaging for

participants.

- B. **Blockbuster game.** On a flip chart, draw a grid of 4 by 4 squares, each square has a letter in it. You will need two packs of post-it notes in different colours (i.e. orange and green) and a set of questions, which you devise beforehand. Divide the group into 2 teams (doesn't matter if you have unequal numbers) and ask them questions, the answers to which begin with the letters you have written in the grid. e.g. 'what A is a key function of....?'
- C. The quickest team to press their 'buzzer' (be imaginative here) gets to answer the question and if correct, they get a post-it note of their team colour stuck onto the relevant letter. It's fun and noisy and they do learn from it.
- D. **Mind map.** Ask the participants (can be individual, pairs, small group, or large group) to draw on chart paper a mind map of what was covered on the day or session in review. They can use colour, lines, or images to represent concepts; keywords radiate out from the central to show the association / relationship between terms. Mind maps records the information in the same way that our brains' structure and store information - through linked associations. The non-linear graphical manner encourages a brainstorming and eliminates the hurdle an intrinsically appropriate framework to work within.
- E. **Sequence card sort.** Use a process with lots of logical steps. Write each step onto a small card; have 2 or 3 sets, depending on numbers and take a few out of each set (different ones). Then get the groups to put into order, identifying what is missing.
- F. **Right brain drawing.** Split them into groups. Give each group a piece of flipchart and some coloured pencils or crayons. Give each group a major subject from the previous day or session and get them to draw their learning points (no words allowed). This review is fun and gets the right brain working.
- G. **Participants present.** Divide group into small teams and give them the following instructions: "Working in teams, and using notes if needed, put together a 5 minute presentation to the group on your key learning points from the day or session. Your presentation should be creative, innovative, informative and involve all your team. You have X minutes to prepare....."
- H. **Team challenge.** Split into two teams, A and B. On a blank flip chart grid it off into a Team A and Team B scoreboard. Have them

take 5 minutes to write questions for the opposing team from the material in review. When they teams ask the other teams questions if they get the answer correct they get a point. The first team to get a 2 or 3 or X number, “wins”. Use this throughout training to generate a little competition. It’s a fun and effective way to recap learning.

- I. **Partner Quiz:** Participants are paired with someone they have not worked with so far. With their learning materials in hand, the pairs take turns creating quiz questions for each other on the day’s work. The “quizzier” affirms his/her partner’s response and adds to it or clarifies something. Then, the other person creates and poses a question. After sufficient time, the facilitator can pull the group together and field one question from each pair that they would like to explore further. This is a great way for a facilitator to assess learning as it happens and to see where the participants want more explanation, guidance, or practice.
- J. **Team Debate:** The facilitator divides the group into two equal-sized teams (mixing fields of work as much as possible). Using a set of provocative statements related to the day’s content, the facilitator writes the statement on a chart and poses it to one team. This team then has to decide what position to take on the statement and quickly come up with an argument to defend their position and present it to the other team. The team is awarded points on a scale of one to four, with four being an excellent defence of their position. Then it is the other team’s turn with a new statement. The team with the most points in the end wins.

Module 3

ACTIVITY A: RESEARCH METHODS PRIMER

ACTIVITY OBJECTIVES

At the end of this activity participants will:

- Identify characteristics of basic research designs and methods

TIME

55 minutes

ACTIVITIES

- A. Interactive presentation: research designs and why they are important
- B. Gallery Walk

MATERIALS

1. Module 3 PowerPoint
2. Chart paper with research design titles written on them for gallery walk
3. Markers for each participant
4. Module 3 Handout 1 - 12 Major Types of Research Designs

STEPS

Note to Facilitator: Use the 8-page document (in Participants Guide) titled, *Module 3 Handout 1 - 12 Major Types of Research Designs* to review design types and characteristics for yourself and to fill in information during activities. Have this on hand for your reference. This handout is adapted from a University of Southern California resource and covers: definition, purpose, what the type tells you, and what the type does not tell you.

Remind participants that they received a pre-reading document with excerpts from two sources, which cover the basic research designs (also in their Participant's Guide) because we have time for only a brief recap of this material. Multi-day and week trainings are devoted to this topic.

Open the Appraising module by explain that we will broadly describe study designs, qualitative and quantitative research, the type of information the various designs generate, and ways of evaluating the strength of the research.

Interactive presentation: Research Designs

1. Note that the reasons for recapping basic research designs are two-fold:
 - 1) A noted need. A brief primer on research design a requested training topic in our pre-training audience/needs assessments, which informed the curricula.
 - 2) Understanding research designs allows us to better understand quality and appraisal concepts.
2. Remind participants that information research designs was sent out to them prior to the training as part of the pre-reading materials and the hope is that they read these materials, and so the module n will not go in a lot of details.
3. Note what this module will **not**cover: complex statistical concepts, data analysis using data sets and statistical packages, or other concept like standard deviation, measures of central location (mean, mode), etc. While important to understanding research evidence, these topics are beyond the scope of the training. We will, however, briefly cover p-values as a measure of statistical significance in the subsection on Assessing the Strength of Evidence. This was a particular interest of previous trainees.
4. Explain that before getting to the research designs, we will start with several fundamental research definitions and concepts. **Note to Facilitators:** Try not to spend too much time on the definitions. Participants can read more in the Participants Guide.
5. Ask for a volunteer to summarize, in their own words, what research is and why it is important. Answers should cover these characteristics and definitions:
 - a. Research is...
 - b. Process to discover new knowledge
 - c. A **systematic** investigation
 - d. Designed to produce new **generalizable** knowledge/or test an hypothesis
 - e. Research is different from other forms of discovering knowledge (like reading a book) because it uses a systematic process called the Scientific Method.

- f. “Research” comes from Middle French "recherche", which means "to go about seeking.”
- g. “Systematic” is...
- h. A systematic investigation means that a careful plan is followed to gather and analyze information. Done or acting according to a fixed plan or system; methodical
- i. “Generalizable” is...
- j. Applied to other populations
- k. Published and disseminated

6. Recap on scientific method and its role in research. **Note to Facilitator:** Decide if this recap of the scientific method is needed for your audience

Use these points:

- a. Research is different than other forms of discovering knowledge (like reading a book) because it uses a systematic process called the Scientific Method.
- b. The Scientific Method consists of observing the world around you and creating a hypothesis about relationships in the world. A *hypothesis* is an informed and educated prediction or explanation about something. Part of the research process involves testing the hypothesis, and then examining the results of these tests as they relate to both the hypothesis and the world around you.
- c. When a researcher forms a hypothesis it acts like a map through the research study. It tells the researcher which factors are important to study and how they might be related to each other or caused by a manipulation that the researcher introduces (for example, a controlled change such as an alteration of the environment, a program, or a treatment). With this map, the researcher can interpret the information he/she collects and can make appropriate conclusions about the results.

7. Walk through an example of how the scientific method works using smoking as an example:

- a. An example of a hypothesis is when a researcher thought that there might be a causal relationship between smoking and lung cancer. In other words, is a person who smokes cigarettes more likely to get lung cancer than a person who does not smoke?
- b. In the smoking and lung cancer example, the researcher (after forming her hypothesis) would then design a research study to test the hypothesis. She might take a group of people who have been regular smokers for at least five years and follow them for 10 more years to see

how many of them got lung cancer. She would follow another group, a group of non-smokers for the same time and see how many of the non-smokers got lung cancer. Then she would compare the lung cancer rates between the two groups.

- c. If there is more lung cancer in the group of smokers, then her hypothesis would be supported.
8. Set up the next sub-topic on designed by asking, Why do we do research?
 - a. To find the truth (or get closer); expand knowledge
 - b. To get at the truth, the research has to be designed in a certain way
 - c. The research design is part of the protocol
 - d. The protocol is the set of rules/activities to be followed
 9. Transition to research design primer.

Research Design – Why important? [slides ###]

1. Ask: What is a research design and why is it so important? Answers may include:
 - a. The design is the logical structure that gives direction and systemizes the study.
 - b. A research design is a framework in which a research study is undertaken. It employs one or more research techniques to collect data and analyze data.
 - c. Serves to ensure that we obtain relevant information to answer the research question in a convincing way
 - d. Choice of study design is critical:
 - Affected by type of research question
 - Dictates the type of conclusions that can be drawn
 - Influenced by Availability of resources and Time needed to accomplish the task
2. Explain that no matter what topic is being studied, the value of the research depends on how well it is designed and carried out.
3. Acknowledge that we have expertise in the room and know that there is a range of experience with research amongst us. We'll be drawing on that expertise.
4. Remind participants that they received a pre-reading document with excerpts from two sources, which cover the basic research designs (also in their Participant's Guide) because we have time for only a brief recap of this material. Multi-day and week trainings are devoted to this topic.
5. Show **slide** of the main research designs. Acknowledge that there may be a few other designs but these are the primary ones we'll

work with in this training. Note that we're just looking at the list, but will be going into more depth with these in an activity.

12 Major research designs [slides]:

- 1) Action Research Design
- 2) Case Study Design
- 3) Causal Design
- 4) Cohort Design
- 5) Cross-Sectional Design
- 6) Descriptive Design
- 7) Experimental Design
- 8) Exploratory Design
- 9) Historical Design
- 10) Longitudinal Design
- 11) Meta-Analysis Design
- 12) Observational Design

6. Set up for the Gallery Walk next by asking participants to think about the characteristics that define each of the research designs. They were given the definitions already received the pre-training reading.

Gallery Walk: Research Designs

1. Ensure chart papers (one for each) with the 12 designs are posted around the room. Make sure chart papers are spread far enough apart to reduce significant crowding. Chart papers should have the design name and prompt questions written on them, for example, "What are/Identify characteristics of a case study design?"
2. Explain instructions to the participants. This activity requires participants to physically move around the room the "gallery" and help complete descriptions of the various types of research designs by writing on chart paper around the room. They will use markers/pens to write on the chart paper whatever knowledge they have about that research design on the chart paper in front of them. At intervals, they will switch and move to the next design/chart paper. At the next chart paper, they scan what others have written and add content of their own.
3. Explain that words, fragments, phrases, bullets, sentences are all good additions. It's also OK, if participants do not know anything about the design type.
4. Give them about 10 minutes to tour the room. Explain that with the short amount of time, they will not get to all the designs, probably only 3-4 designs.
5. Start off by clustering participants around the room, ensuring all

design types have someone working there. **Note to Facilitator:** You can have participants work individually or in small groups.

6. Start the timer. Allow about 3-4 minutes per design before signalling to move to the next. The amount of time will vary – it should be meaningful but not too long to the point that participants get off task.
7. Once the time is up, participants stand wherever they have ‘landed’ and report back to the whole group what has been written on the chart paper.
8. Check for additions from the group – or add them yourself. As noted above, use the 8-page document (in Participants Guide) titled, Module 3 Handout 1 - 12 Major Types of Research Designs to review design types and characteristics for yourself and to fill in information during activities.
9. Check for questions and clarifications.

Module 3

ACTIVITY C: TYPES OF EVIDENCE

🎯 ACTIVITY OBJECTIVES

At the end of this activity participants will:

- Describe the types of evidence generated from different designs

🕒 TIME

15 minutes

📄 ACTIVITIES

Interactive presentation and discussion [15 min]

📁 MATERIALS

Module 3 PowerPoint
Handouts on Qualitative and Quantitative methods and data

📖 STEPS

Interactive Presentation: Types of research design and associated evidence [15 min] [slides]

1. Point out that it is useful to have an understanding what type of information each type of research produces.
 - a. some designs are better suited for demonstrating the presence of a causal relationship,
 - b. others are more appropriate for explaining such causal relationships while
 - c. some designs are more useful for describing political, social and environmental contexts.
2. Ask participants about how they would broadly categorize types of research based on research design?
3. Ask what are the overarching types of research?
4. Work through content on slides and ensure the definitions and content are covered:

Overarching types of research:

 1. Primary research studies empirically observe a phenomenon at first hand, collecting, analyzing or presenting 'raw' data.
Primary research study tend to employ the following designs:

- Experimental
 - Quasi-experimental
 - Observational
2. Secondary review studies interrogate primary research studies, summarizing and interrogating their data and findings. Secondary research studies tend to employ the following designs:
 - Systematic reviews (see Handout 9 for details on systematic reviews)
 - Non-systematic reviews
 3. Theoretical or conceptual studies: most studies (primary and secondary) include some discussion of theory, but some focus almost exclusively on the construction of new theories rather than generating, or synthesizing empirical data.
 5. Transition to more on research types with qualitative and quantitative research.

Qualitative and Quantitative

1. Ask for volunteers to summarize differences and strengths and weaknesses of qualitative vs. quantitative.
2. Ask for examples of situations where quantitative data has been particularly useful in participants' own work. Ask the same about qualitative data.
3. Review the facts that data collection and data analysis methods can be quantitative (using mathematical techniques to illustrate data or explore causal relationships) or qualitative (collating 'rich' data and inferring meaning).
4. Refer participants to the Handout on Qualitative and Quantitative methods and data in the Participant Guide for more detail.
5. Show slides and ensure the following points are covered:

Qualitative data are usually text based and can be derived from in-depth interviews, observations, analysis of written documentation or open-ended questionnaires. Qualitative research aims to gather an in-depth understanding of human behavior and the reasons that govern such behavior. Qualitative investigates the why and how of decision making, not just what, where and when.

It allows researchers to explore the thoughts, feelings, opinions and personal experiences of individuals in some detail, which can help in understanding the complexity of an issue. Smaller but focused samples may be needed rather than large random

samples.

Qualitative research is also highly useful in policy and evaluation research, where understanding why and how certain outcomes were achieved is as important as establishing what those outcomes were. Qualitative research can yield useful insights about program implementation such as: Were expectations reasonable? Did processes operate as expected? Were key players able to carry out their duties?

Adapted from: Australian Bureau of Statistics (2010). *Understanding statistical concepts and terminology*.

“Qualitative research seeks to understand a given research problem or topic from the perspectives of the local population it involves. Qualitative research is especially effective in obtaining culturally specific information about the values, opinions, behaviors, and social contexts of particular populations.”

Source: Mack, N., Woodsong, C., MacQueen, K., et al. (2005). *Qualitative Research Methods: A data collector's field guide*.

Examples of qualitative research questions:

- a) How can contraceptive use among young women be promoted in this setting?
- b) Under what conditions should serostatus disclosure be encouraged among HIV-infected minors? When should disclosure be discouraged?
- c) How do female sex workers experience stigma?

Quantitative data are numerical data that can be manipulated using mathematical procedures to produce statistics.

Quantitative research is the systematic scientific investigation of quantitative properties, phenomena and their relationships. The objective of quantitative research is to develop and employ statistical models, theories and/ or hypotheses pertaining to phenomena and relationships. The process of measurement is central to quantitative research because it provides the fundamental connection between empirical observation and statistical expression of quantitative relationships.

Examples of quantitative research questions:

- a) What is the difference in the daily calorific intake of American men and women?
- b) Does variation in amount of homework assigned produce a change in students' test performance?

Adapted from Australian Bureau of Statistics (2010). *Understanding statistical concepts and terminology*.
<http://www.abs.gov.au/ausstats/abs@.nsf/lookup/CB2451FFC68FC102CA2577C10011856B?opendocument>

Module 3

ACTIVITY D: ASSESSING THE STRENGTH OF EVIDENCE

🎯 ACTIVITY OBJECTIVES

At the end of this activity participants will:

- Know characteristics and questions to use for appraising the strength of a research paper/article – and a body of evidence.

🕒 TIME

35 minutes

📋 ACTIVITIES

- A. Group discussion: Critical thinking – [15 min]
- B. Interactive Presentation: Assessing the strength of evidence [20 min]

✂️ MATERIALS

- Flipcharts from gallery walk activity
- PowerPoint slides
- Handouts

📄 STEPS

A. Group Discussion: Critical Thinking [15 min]

Note to Facilitator: Stakeholders from early trainings with the SECURE Health project requested a short exploration be added to the training on what *critical thinking* is and what the qualities of critical thinkers. Decide if this approach and activity is relevant for your audience.

1. Start by pointing out that considering our personal and professional skills in appraisal is helpful place to begin before we go in depth on appraising and evaluating evidence.
2. Ask participants for their definitions or understanding of what critical thinking is – as well as characteristics of critical thinkers.
3. Ask what critical thinkers do when analysing content?

4. Ensure that following points and responses are covered by participants in discussion -- or remind participants of the concepts:

Critical thinking involves the use of a group of interconnected skills to analyze, creatively integrate, and evaluate what you read and hear.

To become a critical thinker you must be able to decide whether an author's opinions are true or false, whether he or she has adequately defended those ideas, whether certain recommendations are practical, as well as whether particular solutions will be effective.

Critical thinkers are:

- curious about the world.
- creative questioners.
- frequently asking "why?" and seeking reasons to defend a position.
- interested only in credible sources of information.
- able to take into account the total situation or context when interpreting something.
- always looking for alternative explanations, positions, or arguments.
- open-minded and who seriously consider points of view other than their own.
- willing to change a position when the evidence is sufficient to make them do so.
- able to withhold judgement when the evidence is insufficient.
- able to realize the limits of knowing; hence they look for probability rather than proof.
- able to realize the role of personal bias in the process of knowing something.
- able to deal in an orderly manner with the parts of a complex whole and anticipate the next step in a process.
- able to apply critical thinking abilities to a wide variety of subjects.

What do Critical Thinkers do when Analyzing Content?

- A. order the material to distinguish dominant from subordinate ideas.
- B. distinguish statements of evidence from hypotheses.
- C. see what assumptions or presuppositions the author makes.
- D. find evidence of the author's purposes.
- E. note how one idea relates to another.
- F. categorize information received.
- G. set up comparisons among things.

Source: Reichenbach (2000). *An Introduction to Critical Thinking: Six steps of critical thinking.*
http://mhhe.com/socscience/philosophy/reichenbach/m1_chap02studyguide.html

5. Reiterate that considering our personal and professional skills is helpful to reflect on with regards to appraising and evaluating evidence.
6. Ask participants: to reflect privately in their own head which characteristics they feel they do well and which they want to strengthen Or to discuss how critical thinking relates to the task of appraising evidence.
7. Transition to next sub-topic on appraising research – both single studies and bodies of evidence.

B. Interactive presentation: Assessing the strength of evidence - single studies [20 min]

1. Recap that the goal of evidence-informed policy is not simply to increase reliance on research results, but to increase reliance on “good” (i.e., rigorous) research. A first step in using evidence-informed policy is learning how to objectively weigh information to determine its value as evidence.

In this module we will talk about both single studies and bodies of evidence. In some cases, the questions or criteria for assessment could be the same, e.g., does it identify a research method? Who published the report?

2. Ask participants to imagine that they had an article/report from a new study in front of them. What is their thought process for deciding whether to read it and take it seriously? What questions are they asking themselves to make a determination?
- 3.
4. Ensure these “Key questions to ask when reading a research report” are covered:
 - What makes the study important?
 - Do the findings make sense?
 - Who conducted the research and wrote the report?
 - Who published the report?
 - Did the researcher select an appropriate group for study?
 - If comparison groups are used, how similar are they?
 - What has changed since the information was collected?
 - Are the methods appropriate to the research purpose?
 - Does the study establish causation?
 - Is the time frame long enough to identify an impact?
 - Could the data be biased as a result of poor research design?

- Are the results statistically significant?

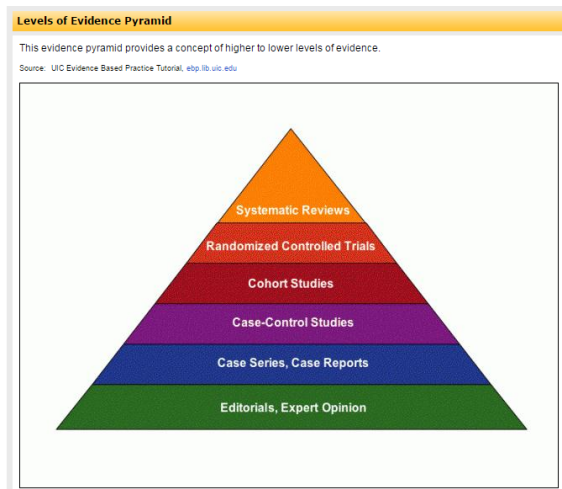
-Source: The Guttmacher Institute (2006). *Interpreting Research Studies*.

https://www.guttmacher.org/sites/default/files/report_pdf/ib_interpreting.pdf

3. Note that appraisal also looks at content quality criteria, besides strength of evidence, such as:

- Uniqueness – is it original?
- Completeness – is any information missing?
- Coverage – what depth does it go into?
- Timeliness – is it up-to-date?

4. Walk through the content of the Levels of Evidence Pyramid graphic on slide.



5. Define systematic reviews and explain why they are preferred in evidence-informed policy-making (EIPM) using the text below, and refer to Handout 9.

A systematic review is defined as “a review of the evidence on a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant primary research, and to extract and analyse data from the studies that are included in the review.” (NHS Centre for Reviews and Dissemination 2001).

Systematic reviews can be invaluable for evaluating available evidence in a methodical manner and providing a critical summary of strength and direction of evidence. They attempt to answer a specific question by systematically searching for, appraising, and synthesizing the results of all relevant studies.

Systematic reviews are preferred in evidence-informed policy-making (EIPM) because they not only provide a meticulous way of finding relevant, high quality studies, but also integrate the findings of these studies to give a clearer and more comprehensive picture of an issue than any single study can do (Gough et al 2013).

6. Point out that less rigorous evaluation methods make up approximately 90 percent of evaluation studies. Such designs can be useful in generating hypotheses about what works, and are a good first step in determining which interventions are ready to be tested more rigorously. They do not provide strong evidence of effectiveness, however, and unless they are used carefully, they may easily lead to erroneous conclusions.

7. Note that even though systematic reviews are shown in the level of evidence pyramid to provide high level evidence, there are some systematic reviews where this may NOT be the case

6. Transition to definitions of strength of evidence.

8. Review the definitions and concepts for evaluating the strength of evidence: validity and fidelity and p-values. [slides]

Internal Validity - The intervention is actually causing the desired outcome. Are the changes observed due to the intervention or due to other possible factors? How confident are we that the observed changes are due to the intervention? Ability to rule-out competing explanations for observed changes

External Validity -The program is replicable, producing similar results in different settings.

P- values -

Note to Facilitator: Previous participants were keen to better understand p-values in particular so we have included some basic description here and in the Participants Guide.

The least you should know:

1. P value is a short form for *probability value* and another way of saying significance value.
2. It tells you if the relationship is strong enough to pay attention to.
3. You should look out for p values lower than .05, or 5%, when reading journal papers.

4. Here is an example of how to interpret p-value:

When you do a statistical test in software like SPSS or Systat, it will tell you the exact p value associated with your specific set data. For instance, it might indicate that the p value of your result is 0.035, or to put it in context, “Men are significantly taller than women, $p=0.035$.” That means there is a 3.5% chance that men are NOT actually taller than women and this result happened only because of random chance.

5. Here are three important points to consider when you're reading scientists' interpretations of their data in research papers:

(1) Statistical significance alone is not enough to prove cause and effect, but it lends credibility to an argument. Statistical significance also does not necessarily mean an association has substantive significance; that is, it does not necessarily make a study finding important. In a large enough sample, a small difference can be statistically significant but of limited real world importance.

(2) Statistical significance by no means indicates practical significance, or the importance of the data in an applied setting. To reach strong interpretations about the practical significance of a study's data, you must deeply understand the motivating research questions and the science that defines the field.

(3) Researchers must report on the results of all hypotheses, regardless of whether or not they reach statistical significance.

P-values in depth:

The handout in the Participants Guide contains even more information. No matter how careful you are, random chance plays a part in everything. If you try to guess whether you'll get heads or tails when you flip a coin, your chance of guessing correctly is only 50%. Half the time, you'll flip tails even if you wanted to flip heads.

In research, we don't like 50/50 odds. We instead only want to risk that 5% or 1% of our predictions are wrong. And, if you just picked 1% or 5%, you've just picked a p value.

A relatively simple way to interpret P values is to think of them as representing how likely a result would occur by chance. We use P-values to determine whether observed differences between experiment and control groups are due to systematic effects of treatments or simply to chance factors.

When a quantitative study uses a sample (as opposed to surveying an entire population), it is important to determine mathematically that there is little probability the result could have occurred by chance—that is, that a different sample could have produced other results.

Adapted from several sources:

Lovestats (2011). *Really simple statistics: p values #MRX*.

<https://lovestats.wordpress.com/2011/03/21/really-simple-statistics-p-values/>

Greene, L. (2008). *A Brief Explanation of Statistical Significance and P Values*.

http://www.colorado.edu/intphys/Class/IPHY3700_Greene/slides/generatingContentInterpret/explainPValue_s.pdf

The Guttmacher Institute (2006). *Interpreting Research Studies*.

https://www.guttmacher.org/pubs/2006/07/27/IB_Interpreting.pdf

Appraising the Quality of Non-Scientific Information

1. Use slide and cover the following:
 - a. There exist extensive guidance on how to appraise the quality of information generated from scientific research processes. However, when it comes to non-scientific information, there is not much guidance on how one should go about appraising its quality.
 - b. Non-scientific information as used here refers to information that was not gathered through a scientific process with a clear a conceptual framework, research design, methods, analytical frameworks, etc. As used here, examples of non-scientific information may include newspaper articles such as feature stories or opinion pieces, blogs, reports of commissions (often established by governments to conduct an inquiry into an issue of public concern), government policy documents or guidelines, among others.
 - c. In the Handouts section of Participants Guide, there is a handout on Appraising Quality of Non-Scientific Information. Go over the questions in the handout with participants as a plenary exercise.

Group activity and discussion – single study appraisal [25 min]

1. Handout or refer to: (1) Module 3 Handout, Checklist of Principles of Research Quality – Single Study, Note that the handout was adapted from DFID's (2014) *How To Note: Assessing the Strength of Evidence* and it is useful for evaluating research quality.
2. Have participants count off into 3 groups. Allocate each group 2-3 principles on the handout (Checklist of Principles of Research Quality), and have them use these to assess the quality of a scientific paper (use the paper provided as Module 3 Handout 4: Scientific Paper on *Facility-level intervention to improve attendance and adherence among patients on anti-retroviral treatment in Kenya – a quasi-experimental study using time series analysis*).
3. Have a facilitator in each group to contribute to the discussions and answer any questions or clarify issues. There is no reporting back to plenary.
4. While participants are still sitting in their groups, refer participants to the article in their Participants Guide: *Twenty Tips for Interpreting Scientific Evidence*. Scan through this article with participants,

highlighting the key points.

Presentation: Assessing *bodies* of evidence

1. Share the following points with participants:

- 1) A summary of the technical quality of the body of evidence should build directly upon prior assessment of the quality of single research studies conducted individually or as part of a secondary study such as a systematic review.
- 2) Assessment of the overall strength of a *body* of evidence with reference to a particular policy or business case is directly linked to the quality, size, consistency and context of the body of evidence.
- 3) If you are not able to assess all the individual studies that constitute a body of evidence due to inadequate time or expertise, you should:
 - a. Seek to use evidence synthesis products which *have* assessed the quality of individual studies;
 - b. Commission evidence synthesis products which assess the quality of individual studies or
 - c. Seek to make a judgement about a body of evidence based on the criteria outlined above (i.e. quality, size, consistency and context).
2. Review the handout, Evaluating the overall strength of a body of evidence – Module 3
3. Explain that the five categories proposed in the handout help to determine the overall strength of a *body* of research when it is being applied to a particular policy, program or clinical and protocol. This table is not intended as a formulaic checklist (although we will be using it as a checklist), but instead as an indicative guide to the typical features of very strong, strong, medium and limited bodies of evidence.
4. Conclude by making the point about the particular alignment of systematic reviews with EIPM: Inclusive collections rigorously assessed and synthesized.
Systematic reviews may be preferred in EIPM, as opposed to using single studies.
Systematic reviews sum up the best available research on a question by synthesizing results of several studies

Other Resource for Assessing Strength of Evidence:

What counts as good evidence? Available at:
<http://www.alliance4usefulevidence.org/assets/What-Counts-as-Good-Evidence-WEB.pdf>

Module 3

PRACTICAL APPLICATION EXERCISE 3: APPRAISING EVIDENCE

🎯 ACTIVITY OBJECTIVES

At the end of this activity participants will:

- Demonstrate assessing levels and measures of strength of evidence for their policy issue.
- Describe how characteristics of critical thinking apply to assessing quality of evidence

🕒 TIME

1 hour 20 min

☐ ACTIVITIES

- A. Assess and summarize strength of evidence [40 min]
- B. Facilitators provide feedback to participants [40 min]

✂️ MATERIALS

- Participants laptops
- Internet
- Participant's policy question generated in Module 1
- Participant's search strategy and found evidence
- Handout(s)

📖 STEPS

This exercise builds on the exercise done in Module 2 Accessing research evidence, during which participants searched for research evidence for answering their policy questions. So for this exercise, participants will appraise the various research documents they found during the searching exercise.

Practical Application Exercise 3: Appraising your research evidence

1. Using Module 3 Worksheet – Appraising Evidence
2. Assess the strength of at least one of the research documents you found for answering your policy question
3. Provide a brief, but critical summary of its strength and/or weaknesses, and indicate your decision on whether you will use the research document in your work or not
4. If you have time, assess the strengths of all the documents you found for answering your policy document

Feedback to participants on Exercise 3 [40 min]

Go round with other facilitators providing individualised feedback to participants on Exercise 3.

Module 3

MODULE REFLECTION AND EVALUATION

⌚ TIME

15 minutes

☐ ACTIVITIES

- A. Reflection Notebooks: Reflect and write take aways and/or outstanding questions in notebooks
- B. Complete module evaluation form

✂ MATERIALS

- Notebooks, paper, or Participant Guides for reflection notes
- Module objectives slide
- Evaluation form

📄 STEPS

A. Reflection: Notebook

1. Explain that for this reflection activity, participants will take a few minutes to write down and track key points to remember, how their learning could be applied in their jobs, tasks or “to do’s” for later, and outstanding questions that need more attention.
2. Share that this activity can be 100% confidential if they choose – they do not need to share their notebooks or written reflections.
3. Have participants use blank pages in the Participants Guide, their own notebooks, or other blank pages to reflect and make notes on the module.
4. Explain that there is value in returning to one’s written notes at a later point in time or after the workshop. Points and notes written in their own language may come in handy for: making a debrief at their workplaces; reminding themselves of tasks or priorities they want to continue exploring; or communicating to the facilitators where they need more help.
5. If needed, writing prompts might include the following. Create a slide for these or write on chart paper:

- What did you learn that you can use in your work place?
- What would you share in a debrief at your work place?
- Are there sub-topics from that module you want to explore more?
- What ideas did this module generate for you?
- Are there tasks or “to-do’s” you want to follow up on later?
- Are there topics or areas you want to clarify with the facilitator or group?

B. Module Evaluation

1. Ensure that the slide with the module objectives is shown or otherwise reviewed.

Hand out the evaluation forms and remind participants that their feedback is valued and will be used. The facilitators will review feedback daily. Their names on the forms are optional.