



Introduction to research:
Developing research questions
Research design

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Goals for today

Overview research process

- Describe what makes a good research question
- Share some methods for generating research questions
- Overview research logic
- Review common research designs
- Give a “real life” account of a community engaged research project
- Practice developing/evaluating research questions and designs

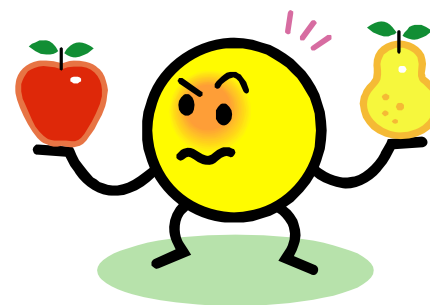
What is research?



Most likely you are already a researcher...

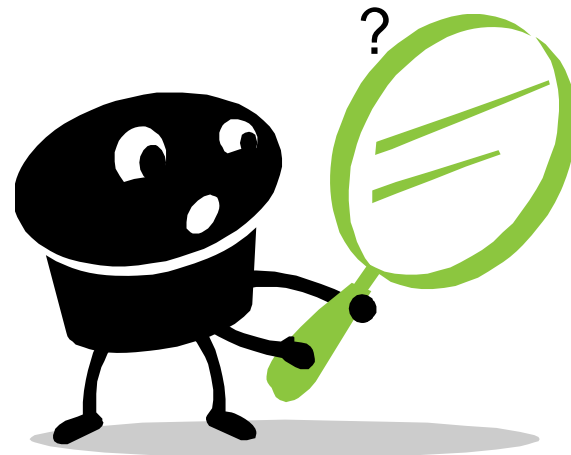
Have you ever....

- Shopped for a cell phone plan?
- Looked for a job?
- Hired someone?
- Rented an apartment?

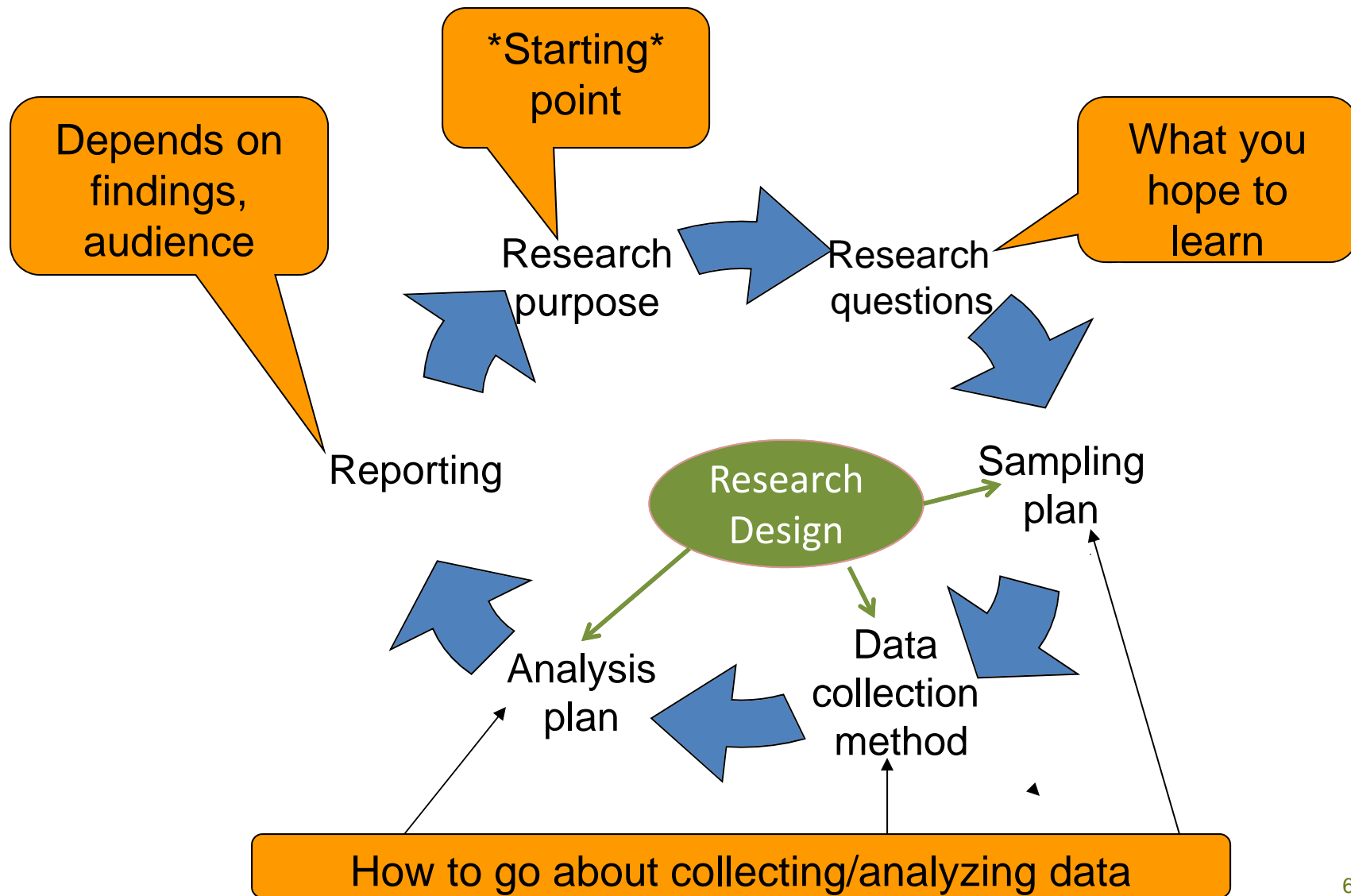


Research is...

Systematic investigation involving collecting and analyzing data to develop or contribute to knowledge.



The research process



Why do research?



- Understand causes of a problem
- Improve program/services
- To market program/services
- Assess needs
- To access Re\$ource\$
- To be able to offer new programs/services
- Develop partnerships
- Contribute to scientific knowledge
- Achieve social change



Questions so far?

Research Questions



What is a research question?

- A question that specifically states what the researcher will attempt to answer.

What do research questions do?

- Drive the research design:
 - what data is collected
 - data collection methods
 - data analysis methods
- Set up how you will communicate findings
- Good indicator of how relevant findings will be to your organization



Research question development: Process matters

- What helps?
 - Right mix of people at the table...
 - Vision for using results
 - Engaging experts
 - Having a “champion”
 - Creating a process that evolves



Starting research question development

- ***In a group meeting...***

- *Brainstorm but...follow rules*
 - *Nothing is too silly, basic, etc.*
 - *Everybody's ideas count*
 - *Combine/extend ideas*

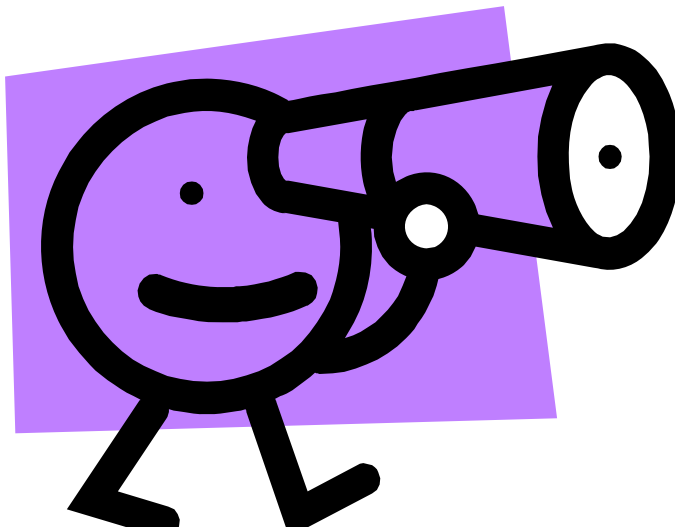


- ***Working w/individuals...***

- Ask co-workers, program participants, etc.. to finish this sentence: “I want (more) information on _____....” and turn in anonymously...

Starting research question development within an organization or team...

- Sleuth -- Do some research of your own, look around at what is going on in your community, your organization, your programs and bring it to others for reaction...

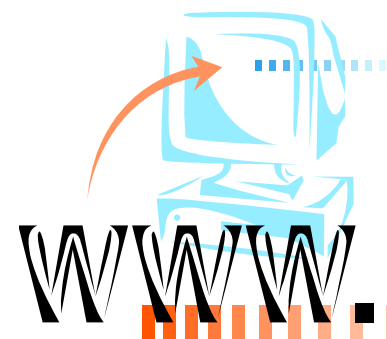


Starting research question development within an organization or team...

Look at existing research

Try the Internet

Google Scholar



Look at

resources/publications sections of national organization websites

(e.g. American Diabetes Assoc, American Heart Association, National Cancer Institute, etc)

Concept mapping:
a tool for developing research questions

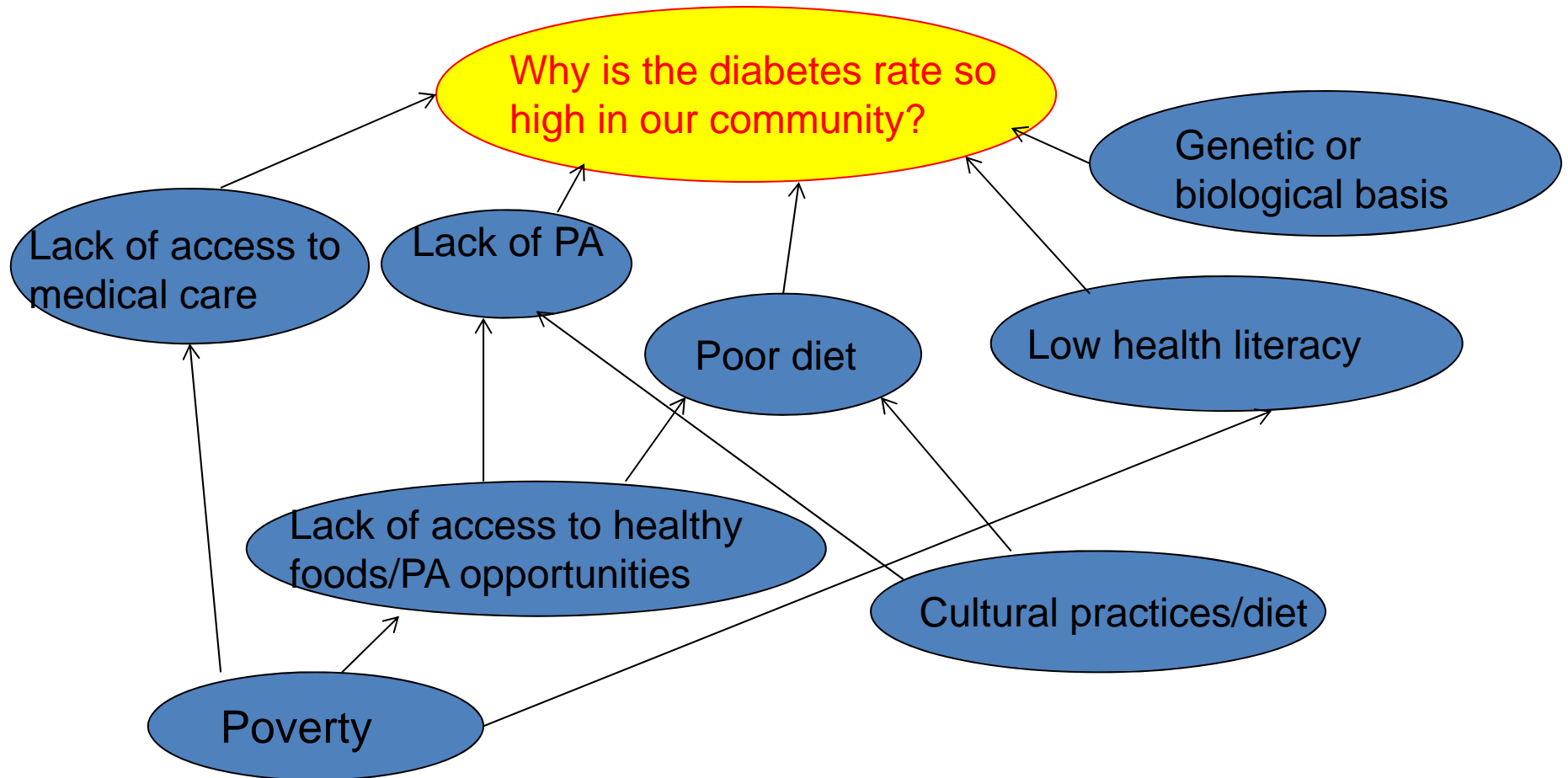
- Take a problem area or general question:



Why is the diabetes rate so high in our community?

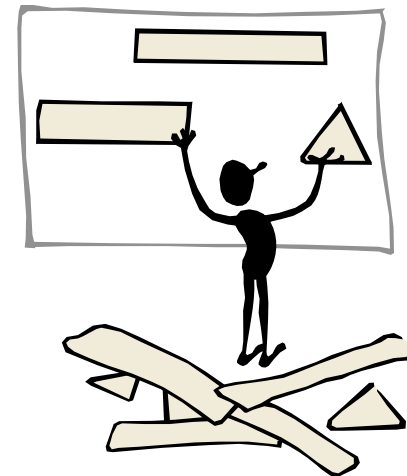
Concept mapping:

Sketch out things you think are related



Concept mapping: use your “map” to form a specific research question...

- Will providing health literacy instruction to community members at risk of developing diabetes reduce their likelihood of developing diabetes over a two-year period?
- Don't be afraid to refine, refine, refine...



Exercise

- Your organization wants to develop a question to research based on an interest of the board of directors.

What **processes/techniques** could you use to go about coming up with a research question?

What makes a good research question?

Is it on **F.I.R.E.**?

- **F**easible
 - Is it answerable?
 - Is it in scale with resources available?
 - Do you have the technical expertise needed?
- **I**nteresting
 - Does it provide information you plan to use?
 - Do people in your organization have an interest in it?, are they supportive?
- **R**elevant
 - To your organization's plans and goals
 - To scientific knowledge
- **E**thical
 - Cause no harm to participants
 - Benefit participants directly or indirectly



What makes a better research question?

- **Specifics!**

- What group, population, community are you looking at?
- What phenomenon are you interested in?
- What time period does it apply to?



Example:

Good: why are amputees readmitted to the hospital?

Better: What is the primary diagnosis for lower extremity amputees' first post amputation hospital admission?

Best: For non-institutionalized elderly (aged 65 and older) lower extremity amputees' who experienced their first amputation within the last five years (2006 to 2011), what is the primary diagnosis for first hospital admission in the 12 month period post first amputation discharge?

Exercise: revising an initial research question

Scenario 1:

You work for a local chamber of commerce and have observed a number of recent business closures. A board member wants you to look into this.

Your team comes up with the following question to guide your research:

Why are businesses in our target area closing?

How can you improve upon this question?

Exercise: revising an initial research question

Scenario 2:

You have a long-time relationship with a University-based researcher who is interested in understanding “food acquisition patterns of low income families living in communities designated as ‘food deserts.’” She has proposed a joint project with this central research question “Using cost-distance analysis methods for measuring distance traveled, what is the average distance single parent Hispanic families with children between the ages of 2 and 5 travel to buy fruits and vegetables for home preparation and consumption?”

Your organization is interested in identifying local sources of fruits and vegetables for all families in your community.

Suggest some ways for modifying the original question in order to meet both of your needs.

Exercise: revising an initial research question

Scenario 3:

A student from a local MPH program wants to evaluate your organization's after school program, "Forward for Children", serving children aged 6 - 12 for a class project. She has presented your Board with the following research question for consideration:

Is the Forward for Children program a good program?

The Board is interested but want her to refine the research question.

Suggest some revisions...

Exercise: revising an initial research question

Scenario 4:

A local hospital closed its doors one year ago. You want to understand how this has affected survival rates for trauma victims residing in the Gray Bay neighborhood. Your team has come up with the following question: “are fewer trauma victims surviving in Gray Bay?” Revise this question to make it more “researchable”.

Exercise debrief: revising an initial research question

- What was difficult about this exercise?
- What things did you consider when making suggestions for revision?

What is research design?

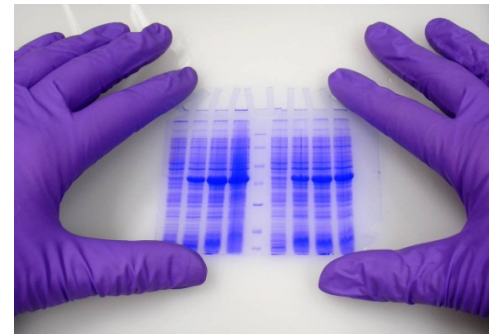
- Blueprint for research



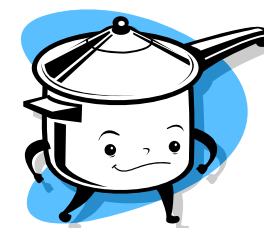
- Turns research question(s) into a “testing project”
- It’s all in the details –what data to collect, how data should be collected, how to analyze

Fundamentals of experimental design

- Involves planned intervention into natural order of events
 - Intervention is carefully controlled
 - Conclusions are based on observation (data)
 - Conclusions are often based on comparisons to populations similar to intervention group
 - Intervention group vs. Control group
 - Intervention group vs. Comparison group
 - Pre-post comparisons in which intervention group serves as it owns control
 - General population/similar population



Experimental design: examples



- Example 1: temperature at which water boils
 - Intervention: atmospheric pressure is varied
 - Observation: at normal atmospheric pressure, water boiled at 100 degrees ©; for every additional 285 meters of altitude (decreased atmospheric pressure), water boiled at 1 degree © lower.
 - Conclusion: atmospheric pressure affects the temperature at which water boils. The higher the atmospheric pressure, the higher the temperature at which water will boil.
- Example 2: association between 30 minutes of daily moderate exercise and blood pressure in non-active diabetic adult males
 - Intervention: 30 minutes daily of moderate physical activity in non-active diabetic adult males over two week period.
 - Observation: post intervention blood pressure is lower than pre intervention blood pressure
 - Conclusion: two weeks of 30 daily minutes of moderate physical activity is associated with lower blood pressure among this population.



Questions so far?

Common research designs

Descriptive

Aim: Observe and Describe

Types of studies:

- Case study
- Naturalistic observation
- Survey

Example: What are the nutritional behaviors of mothers with young children in the Pilsen community of Chicago?

Design: One time survey of young mothers in Pilsen regarding dietary behaviors

Correlational

Aim: Predict

Types of studies:

- Case control
- Observational
- Longitudinal
 - cohort
- Cross sectional



Example: Is attendance at a health focused school associated with BMI outcomes over time?

Design: Annual student BMI at health focused and comparison school.

Common research designs

Semi-Experimental

Aim: Determine Causes

Types of studies:

- Field experiment
- Quasi-experimental design

Example: Does establishing lower speed limits around parks result in fewer pedestrian bike injuries?

Design: Compare CDOT pedestrian injury incidents occurring at selected parks at pre and post enactment of lower limit time points.

Experimental

Aim: Determine Causes

Types of studies:

- Randomized control trial
- Double blind experiment

Example: Does participation in a weight loss program result in weight loss at one year post program completion?

Design: Recruit a pool of study participants meeting study criteria. Randomly assign participants to the weight loss program or a control group. Collect weight status at pre-determined points in time.

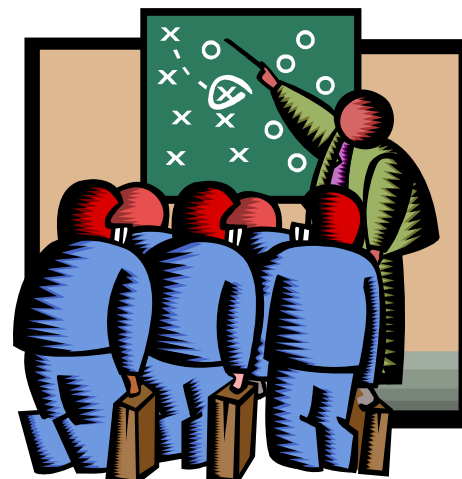
Questions so far?

Research design

Varies by research purpose

- Description
- Prediction
- Causality?
- Change over time?

Different designs for different purposes!



Feasibility is a factor

- Is it possible to randomly assign participants to an intervention or control group?
- Can you control for all the possible factors which may influence the outcome of interest?
- Do you have enough time/money ?
- Are there ethical concerns (esp assigning to groups)
- Will the community/participants support the design (e.g. denying some groups services)

Research design: Issues to consider



Will it allow you to...

- Determine causality
- Determine associations
- Describe the phenomenon/situation in detail?

Can you control access to the intervention?

- Can you control who will receive?
- Can you control or document extent of exposure to intervention?

To what groups can you compare results?

- Similar non participating population
- Same group prior to interference (pre/post)
- Same group at different points in time (longitudinal)

Can you control/document the quality of the intervention?

- Can you make sure the intervention is delivered in an uniform manner?

What observations (data) are you able to collect?

- pre and post intervention
- those receiving interference vs. those not
- Multiple points in time

Questions so far?

Research design exercise

Work with your small group to come up with a research design that can answer the question provided in each scenario

Scenario 1 :

You are working with the Chathill community chamber of commerce on economic development and the board is interested in learning What are the leading reasons for retail business closures in the Chathill community over the last 12 months?

Research design exercise

Scenario 2:

Your local school will be starting a school garden next year. The LSC is interested in obtaining the answers to the following questions: What is the garden's effect on student attitudes towards trying new fruits and vegetables? What is the garden's effect on student fruit and vegetable consumption?

Research design exercise

Scenario 3:

Your organization operates a breast cancer early intervention program in two types of settings -churches and a community health center. The board wants to know the following: For outreach program participants aged 40 and older with no prior history of breast cancer diagnosis, what percent of women have had a mammogram in the last 2 years? Does the mammogram compliance rate differ by program setting?

Research design exercise

Scenario 4:

You are working on a intervention to improve prescription drug instructions to limited English speaking populations. You want to know if providing instruction sheets with pictorial displays of instructions is more effective in prescription compliance than the usual practice of “teach back” in which the patient is asked to repeat directions given them. Design a study that enables you to compare compliance rates among the two interventions.

Exercise debrief: research design

- What was easy about this exercise? Difficult?
- What surprised you?

Case study: research question development

Story of how a collaborative research project developed: specifically, how research questions were identified

Partners:

- Lucy Gomez-Feliciano,
Logan Square Neighbors Association, Chair, Health Kids, Healthy Communities (HKHC) Leadership Team/ARCC Steering Committee Co-Chair
- Maryann Mason,
Northwestern University, Feinberg School of Medicine; Consortium to Lower Obesity in Chicago Children (CLOCC) Community and Evaluation research Director/ARCC Faculty-Community Research Liaison

Case study: research question development

Chicago Partnership

Healthy Kids, Healthy Communities (HKHC)

RWJF funded

Focus on “park centric” policy change opportunities to make parks more accessible, and access healthier foods available at the park.



Case study: research question development

- Leadership team, leads advocacy efforts
- Work includes:
 - Healthier snack and beverage vending
 - Concession stands at Humboldt Park
 - Safe routes to parks: Park Zone
- Lucy identifies an issue would like to know more about:
Poses research question

Case study: research question development

Will training CPD employees in nutrition improve the success of the healthier snack vending policy?



Maryann asks:

- Is this a researchable question as it is stated?
- Which employees?
- What does success mean in this context?

Case study: research question development

What happened next?

Maryann and Lucy talk about...

- What training/promotions will be provided?
- Time line?
- Scale?
- Other partners?
- Funding?
- Who will provide training/promotion?
- Done anything like this before?
- CPD on board?
- Who else involved?
- Most important measures of success?
- What else is known about similar “interventions”?



Case study: research question development

- Meanwhile...

a funding opportunity is identified!

- Seed grant : lead to a bigger fundable project
- Tied to NU faculty status (evaluator built in)
- Timeline: LOI due in a couple weeks
- notification within 6 weeks
- Full proposal due 2 months notification

Case study: research question development

- Next steps:
 - Lucy elaborates vision
 - Maryann proposes a couple of research questions:
- How do healthier vending sales compare to vending sales prior to healthy vending policy?
- How do healthy vending sales in sites receiving staff training and patron taste testing and signage compare to sites without these features?



Case study: research question development

Lucy brings Maryann back to reality with her knowledge of the specifics of the healthier vending policy and CPD capacity

- No prior vending sale data
- Likely not able to control the use/non-use of signage
- There are 250 field houses

Case study: research question development

- Lucy calls a meeting of interested partners to discuss the potential project
- Outcome: **MORE REVISIONS!!**

Based on

- Previous CPD experience w/training employees
- Review of pilot taste test promotions
- CPD administrator knowledge re: CPD healthy vending contracting
- Best practices in health promotion research experience
- Budget considerations



Case study: Research question development: Revised questions

- What is the impact of
 - 1) the intervention on healthy item vending sales as determined by a comparison of item and overall sales at **control** and **intervention** sites and
 - 2) nutrition education training on park staff nutrition knowledge, attitude and behavior through comparison of pre/post scores using a survey instrument inclusive of material covered in education sessions.

Questions?

Case study: Research design development:

- Next we worked together to come up with a design based on the research questions
- Limitations:
 - budget –we only had enough \$ for a pilot study –4 parks
- Settled on quasi-experimental design
 - Quasi-experimental because parks were not randomly assigned to control or intervention from all possible parks (not possible)
 - 2 control/2 intervention (budget limitations)
 - Control/intervention Parks matched on:
 - Park characteristics –size, facilities, foot traffic (provided by CPD)
 - Surrounding community demographics (race/income)
 - park staff data comparisons were pre-post (where pre served as control for intervention parks).
 - Control/intervention park staff data were compared at pre time points to make sure that park staff were not significantly different in nutritional knowledge, attitude and behavior at baseline (another way of trying to isolate intervention effect)

Case study: Research design development

Data collected

- Monthly sales data for all 4 parks (on-going)
- Patron surveys re: likability of vending products/prices @ 2 months post placement)
- Pre-post park staff nutrition knowledge, attitude and behavior for intervention parks (pre only control parks)

What that got us

- Ability to say how snack vending sales volume differs between parks receiving staff nutrition training (intervention) and those not (control).
- Ability to determine if patron's reaction to vending differed as a result of the intervention (comparison of patron response by control/intervention park)
- Ability to determine how park staff nutrition knowledge, attitude and behaviors changed as a result of the intervention (with park change)

Case study: Research design revision

Data collection experience red flagged some things in design that we are now addressing:

- 1) even though parks looked the comparable on paper, in reality, they had much different utilization –in particular one of the control parks was much busier than the intervention park and one intervention park had placed its vending in a hard to reach location
- 2) the intervention turned out to be less relevant to snacking behaviors than the team thought effective

That's OK, that's what a pilot study is for....

Case study: Research design revision

Next steps:

Strategize within the team to address these issues.

Further study design revisions:

1) a more targeted intervention is being developed to specifically address snacking behaviors and the contents of the snack vending machines. To be delivered in Feb 2012.

2) control parks are being converted to intervention parks for this round.

- The data from the first design iteration will serve as control for these parks for this round –still a quasi-experimental design!

Thank you for your time and attention!

For more information contact

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