# Research Skills

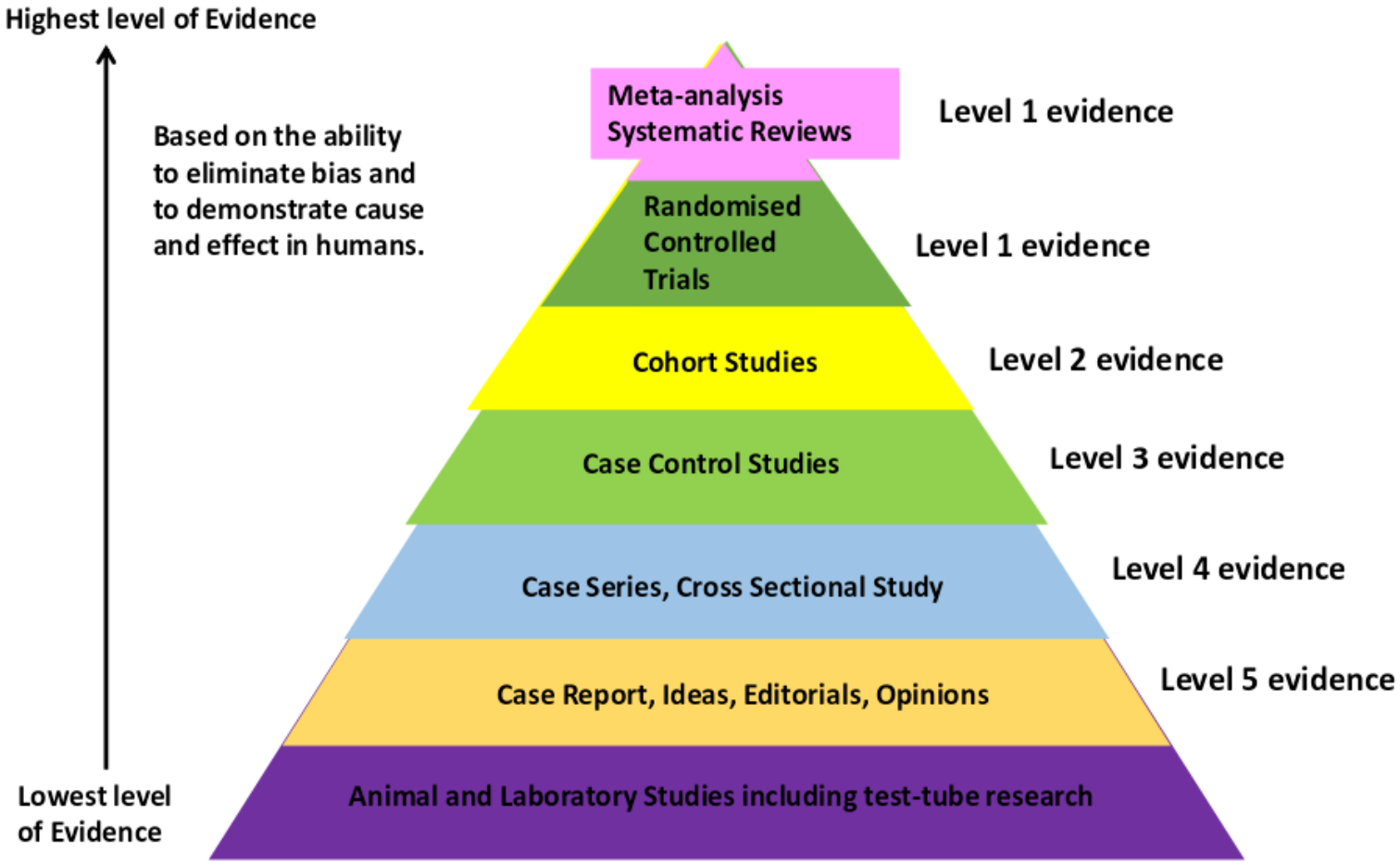
Module 4

- Levels of evidence (Quantitative research)
- Levels of evidence (Qualitative research)



© Natasha Radcliffe 2018
Registered Nutritionist (NSA)
Registered Teacher (SA TRB)

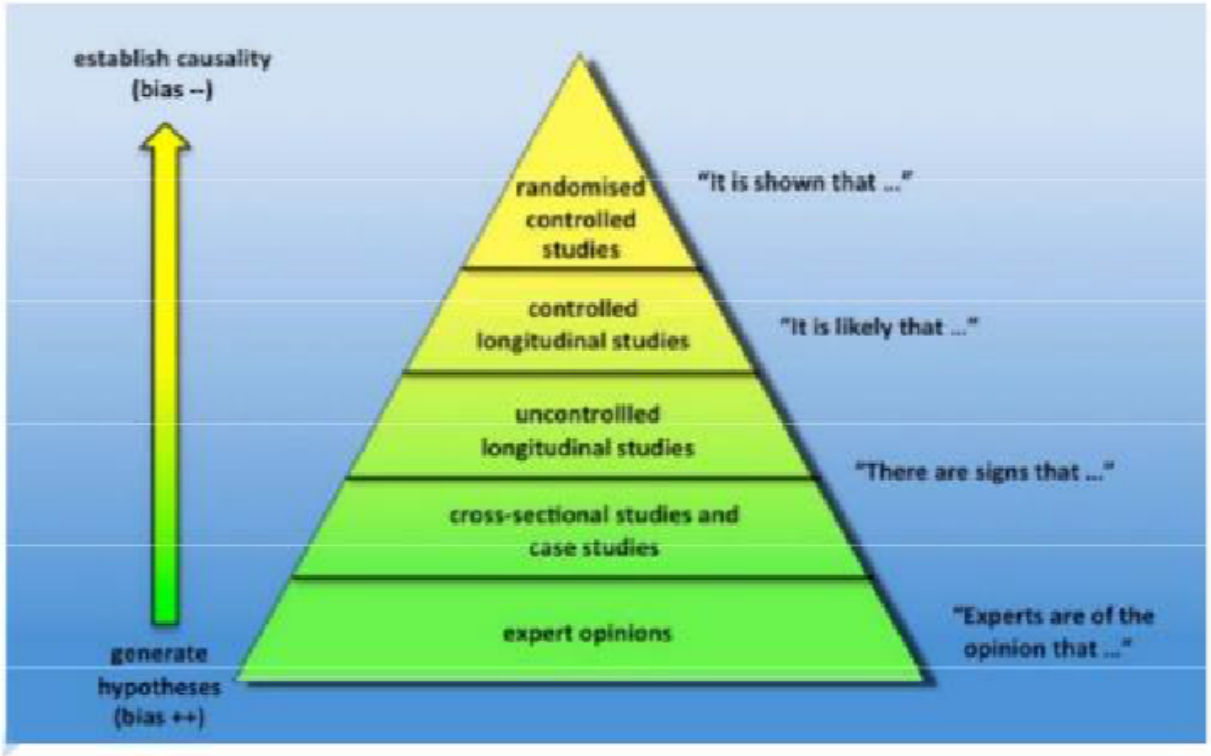
# The Evidence Pyramid for Quantitative Research




Based on the Oxford Centre for Evidence Based Medicine, Levels of Evidence

# Levels of Research

## Which level is the basis for your decisions?




Recker, J. Writing scientific research papers. Queensland University of Technology. 2014. Available from: http://www.slideshare.net/janrecker/writing-scientific-research-papers

# Quantitative Research Designs Explained

## Level 1 evidence

**Meta-analysis**: A statistical method that consists of systematically combining results from different studies to obtain a quantitative estimate of the overall effect of a particular variable.
http://htaglossary.net/meta-analysis

**Systematic review** – systematic location, appraisal and synthesis of evidence from scientific studies.
https://www.nhmrc.gov.au/_files_nhmrc/file/guidelines/developers/nhmrc_levels_grades_evidence_120423.pdf

**Randomised controlled trial** – the unit of experimentation (e.g.. people, or a cluster of people) is allocated to either a the factor under study group or a control group, using a random mechanism (such as a coin toss, random number table, computer-generated random numbers) and the outcomes from each group are compared. Cross-over randomised controlled trials – where the people in the trial receive one intervention and then cross-over to receive the alternate intervention at a point in time – are considered to be the same level of evidence as a randomised controlled trial, although appraisal of these trials would need to be tailored to address the risk of bias specific to cross-over trials.
https://www.nhmrc.gov.au/_files_nhmrc/file/guidelines/developers/nhmrc_levels_grades_evidence_120423.pdf

## Level 2 evidence

**Cohort study** – outcomes for groups of people observed to be exposed to the factor under study, are compared to outcomes for groups of people not exposed.
*Prospective cohort study* – where groups of people (cohorts) are observed at a point in time to be exposed or not exposed to the factor under study and then are followed prospectively with further outcomes recorded as they happen.
*Retrospective cohort study* – where the cohorts (groups of people exposed and not exposed) are defined at a point of time in the past and information collected on subsequent outcomes.
https://www.nhmrc.gov.au/_files_nhmrc/file/guidelines/developers/nhmrc_levels_grades_evidence_120423.pdf

# Quantitative Research Designs Explained

## Level 3 evidence

**Case-control study** – people with the outcome (cases) and an appropriate group of controls (people without the outcome) are selected and information obtained about their previous exposure/non-exposure to the factor under study.
https://www.nhmrc.gov.au/_files_nhmrc/file/guidelines/developers/nhmrc_levels_grades_evidence_120423.pdf

## Level 4 evidence

**Case series** – An uncontrolled observational study of an exposure to a given factor, and of its outcome in a series of subjects. http://htaglossary.net/case+series

*Post-test* – only outcomes after factor under study is introduced are recorded in the series of people, so no comparisons can be made.
https://www.nhmrc.gov.au/_files_nhmrc/file/guidelines/developers/nhmrc_levels_grades_evidence_120423.pdf

*Pre-test/post-test* – measures on an outcome are taken before and after the factor under study is introduced to a series of people and are then compared (also known as a 'before-and-after study').
https://www.nhmrc.gov.au/_files_nhmrc/file/guidelines/developers/nhmrc_levels_grades_evidence_120423.pdf

**Cross-sectional study** – a group of people are assessed at a particular point (or cross-section) in time and the data collected on outcomes relate to that point in time i.e. proportion of people with asthma in October 2004. This type of study is useful for hypothesis-generation, to identify whether a factor is associated with a certain type of outcome, but more often than not the causal link cannot be proven unless a time dimension is included.
https://www.nhmrc.gov.au/_files_nhmrc/file/guidelines/developers/nhmrc_levels_grades_evidence_120423.pdf

## Quantitative Research Designs Explained

### Level 5 evidence

**Case Report**: In *clinical research,* an uncontrolled observational study of an intervention or of exposure to a given factor, and of its outcome in a single individual. http://htaglossary.net/case+report

**Case Report**: In *social research,* an empirical research method that studies a contemporary phenomenon in its natural context, when the relationship between the phenomenon and its context is complex, and when a number of data sources are needed in order to understand the relationship. http://htaglossary.net/case+report

## Qualitative research methods include:

**Focus groups** *(a group of people assembled to participate in a discussion about a product or issue/topic)*

**Interviews** *(a conversation where questions are asked and answers are given)*

**Recording behaviour** *(writing down what occurs, usually monitoring for previously specified behaviours/actions and documenting the number of times they occur)*

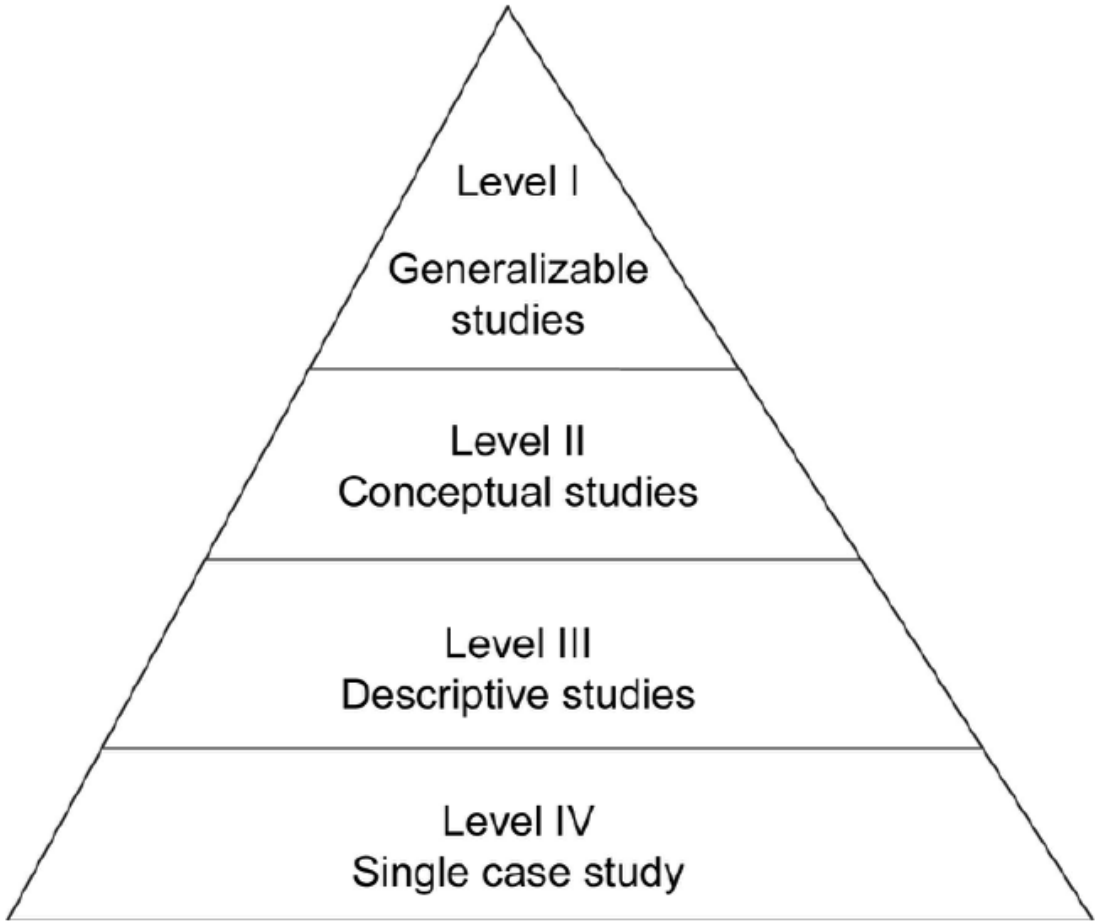
**Unstructured observation** *(watching what people/animals/plants do)*

A hierarchy of evidence-for-practice in qualitative research—summary features

| Study type | Features | Limitations | Evidence for practice |
|---|---|---|---|
| Generalizable studies (level I) | Sampling focused by theory and the literature, extended as a result of analysis to capture diversity of experience. Analytic procedures comprehensive and clear. Located in the literature to assess relevance to other settings. | Main limitations are in reporting when the word length of articles does not allow a comprehensive account of complex procedures. | Clear indications for practice or policy may offer support for current practice, or critique with indicated directions for change. |
| Conceptual studies (level II) | Theoretical concepts guide sample selection, based on analysis of literature. May be limited to one group about which little is known or a number of important subgroups. Conceptual analysis recognizes diversity in participants' views. | Theoretical concepts and minority or divergent views that emerge during analysis do not lead to further sampling. Categories for analysis may not be saturated. | Weaker designs identify the need for further research on other groups, or urge caution in practice. Well-developed studies can provide good evidence if residual uncertainties are clearly identified. |
| Descriptive studies (level III) | Sample selected to illustrate practical rather than theoretical issues. Record a range of illustrative quotes including themes from the accounts of "many," "most," or "some" study participants. | Do not report full range of responses. Sample not diversified to analyze how or why differences occur. | Demonstrate that a phenomenon exists in a defined group. Identify practice issues for further consideration. |
| Single case study (level IV) | Provides rich data on the views or experiences of one person. Can provide insights in unexplored contexts. | Does not analyze applicability to other contexts. | Alerts practitioners to the existence of an unusual phenomenon. |

Daly J, Willis K, Small R, Green J, Welch N, Kealy M, Hughes E. A hierarchy of evidence for assessing qualitative health research. Journal of Clinical Epidemiology. Volume 60, Issue 1, Pages 43-49 (January 2007). Available from: http://www.jclinepi.com/article/S0895-4356(06)00210-1/fulltext?refuid=S0820-5930(09)60234-6&refissn=0820-5930

## A hierarchy of evidence for assessing qualitative health research



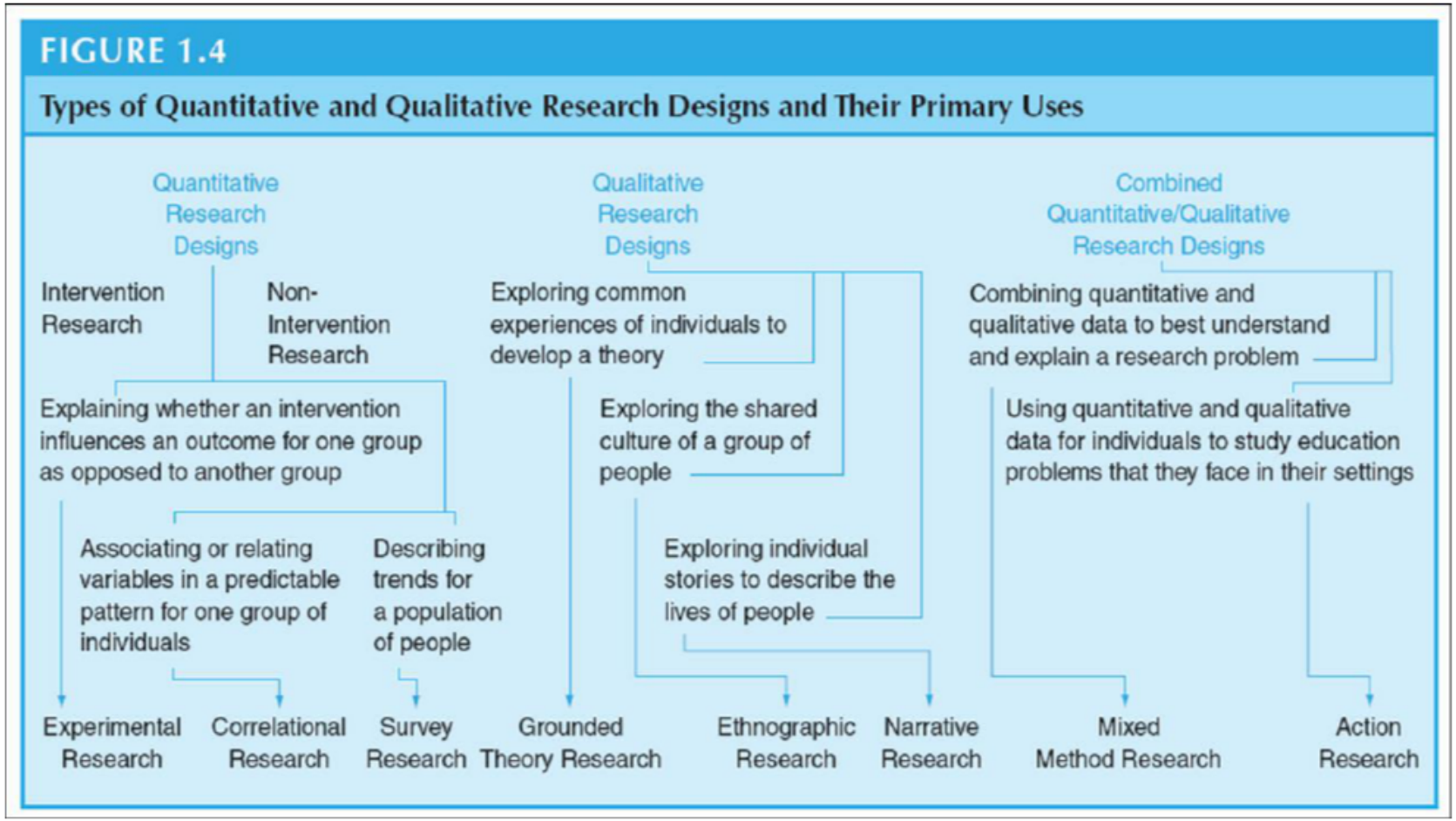

Daly J, Willis K, Small R, Green J, Welch N, Kealy M, Hughes E. A hierarchy of evidence for assessing qualitative health research. Journal of Clinical Epidemiology. Volume 60, Issue 1, Pages 43-49 (January 2007). Available from: http://www.jclinepi.com/article/S0895-4356(06)00210-1/fulltext?refuid=S0820-5930(09)60234-6&refissn=0820-5930

## CHARACTERISTICS AND DIFFERENCES OF QUALITATIVE AND QUANTITATIVE RESEARCH

| Type of Research | Definition | Word Clues | Methods | Search terms | Data | Researcher Role |
|---|---|---|---|---|---|---|
| Qualitative | "Investigations which use sensory methods such as listening or observing to gather and organize data into patterns or themes." (CINAHL) | • Ethnographic study<br>• Field notes<br>• Field research<br>• Focus group<br>• Observation<br>• Open ended<br>• Phenomenological | • Focus groups<br>• Interviews<br>• Recording behavior<br>• Unstructured observation | • Qualitative Studies (CINAHL)<br>• Qualitative Research (MEDLINE) | • Ideas<br>• Interpretive<br>• Narrative description<br>• Text-based<br>• Words | Subjective – involved as a participant observer |
| Quantitative | "Scientific investigations in which numbers are used to measure variables such as characteristics, concepts, or things." (CINAHL) | • Case-control-study Lab-experiment<br>• Clinical trial<br>• Cohort studies<br>• Control group<br>• Experimental group<br>• Intervention<br>• Randomized-controlled-trial<br>• Statistical<br>• Structured-Questionnaire | • Develops hypothesis Determines methodology<br>• Collects data Analyzes data<br>• Uses mathematical and statistical techniques to analyze data | • Quantitative Studies (CINAHL)<br>• MEDLINE uses headings for specific types of quantitative research see the examples listed under word clues | • Measurable<br>• Numbers<br>• Statistics | Objective – separate, observes, but doesn't participate |

Source: https://learn.maricopa.edu/courses/804760/pages/qualitative-versus-quantitative-research?module_item_id=4859571

## Some research you find might use a combination of quantitative and qualitative research methods




Source: https://atsliteacher4.wordpress.com/2013/01/11/types-of-quantitative-and-qualitative-research-designs/