

## Ensuring Data Quality in Extension Research and Evaluation Studies

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**Abstract:** *This article presents a checklist as a guide for Extension professionals to use in research and evaluation studies they carry out. A total of 40 statements grouped under eight data quality components—relevance, objectivity, validity, reliability, integrity, generalizability, completeness, and utility—are identified to ensure that research carried out by Extension professionals is credible, followed research protocols, was conducted in an ethical manner, and can withstand the test of scrutiny by reviewers. Researchers and Extension professionals can use the checklist to identify the areas that are methodologically sound and the areas that need improvement.*

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## Introduction

The main purpose of ensuring data quality in Extension research and evaluation studies is to present information that is credible. Such research and evaluation studies follow research protocols, conducted in an ethical manner, and withstand the test of scrutiny by reviewers. Data quality is generally understood to be the degree to which data, including research processes such as data collection and statistical accuracy, meet the needs of users (Vale, 2010). Among the critical aspects to consider when assessing data for quality are relevance, validity, reliability, objectivity, integrity, completeness, generalizability, and utility. Ensuring these critical aspects of data quality in Extension research and evaluation studies is of paramount importance if Extension is to implement and improve programming based on sound methods.

Theoretical and methodological rigor needs to be continually enhanced in order to ensure that Extension is delivering relevant and useful programs to important stakeholders (Braverman & Engle, 2009; Dunifon, Duttweiler, Pillemer, Tobias, & Trochim, 2004). Sound research and evaluation methods based in data quality help Extension provide evidence that outcomes are attributable to Extension programs and help Extension to improve its program offerings (Radhakrishna & Relado, 2009).

This article presents a checklist as a guide for Extension professionals to use to ensure quality of data for the research and evaluation studies they conduct. Definitions of data quality vary from discipline to discipline based on relevance, importance, and user needs. Synthesizing important components across various definitions of data quality and keeping in mind the broad philosophical base of agricultural and Extension education, we propose that data quality is composed of eight distinct aspects: relevance, objectivity, validity, reliability, integrity, completeness, generalizability, and utility.

In the following paragraphs, a definition for each of the eight components is discussed in order to provide background to data quality (Figure 1). Based on these definitions, we next present a checklist that usefully operationalizes data quality so that Extension professionals can ensure that their research and evaluation studies are rooted in sound methods, thereby ensuring data quality.

**Figure 1.**  
 Eight Components of Data Quality



### **Validity**

Validity refers to the "closeness between the values provided and the true values" (Organization for Economic Cooperation and Development [OECD], 2003, p.7). Careful development of the questionnaire provides a basis for validity. A thorough examination of previous studies, an ongoing review by a panel of experts, and carrying out a field test makes the case for construct, content, and face validity (Guba & Lincoln, 1981).

### **Reliability**

Reliability is determined by the degree to which measurements are similar (consistent) on repeated measurements (Centers for Disease Control, 2009). Careful wording of the questionnaire and pilot testing the questionnaire with subjects not included in the sample, as well as a high response rate, provide evidence for reliability.

### **Objectivity**

Objectivity of data means that conclusions are based on statistically sound methods (Guba & Lincoln, 1981; Guba, 1981). Careful analysis of assumptions/hypotheses/objectives/research questions and use of appropriate statistical procedures and results provide evidence of objectivity.

### **Integrity**

Integrity is concerned with minimizing errors through the process of collecting, recording, and analyzing data (CDC, 2009). Integrity can be enhanced by properly training those involved with data collection and by reviewing that the data have been properly recorded.

### **Generalizability**

Generalizability is concerned with sound sampling procedures that yield a sample representative of the population on key variables (Guba, 1981; Guba & Lincoln, 1981) and follow-up with non-respondents (Radhakrishna & Doamekpor, 2008; Miller & Smith, 1983).

### **Completeness**

Completeness refers to ways in which missing values that exist in a given dataset are handled (CDC, 2009). When data are missing at random, their incompleteness is due to external events that cannot be controlled, whereas data not missing at random cannot be collected due to known and expected external events (Howell, 2009). The data not missing at random must be considered during data analysis to better understand the limitations and generalizability of the study.

### **Relevance**

Relevance refers to the degree to which data are important to users and their needs (OECD, 2003; Vale, 2010). Among the strategies to ensure a high degree of relevancy are thorough literature reviews and needs assessments.

### **Utility**

Utility includes aspects of timeliness (data collected in a timely manner so that data maintain their relevance to their users), punctuality (release of data), and accessibility (ways in which data are made available to the intended users).

Ensuring these critical aspects of data quality for quantitative data in Extension research and evaluation studies are of paramount importance if Extension programs are to be based on sound research. Careful attention to these data quality components helps reduce errors and ensures that the research is deemed acceptable after the critical scrutiny of reviewers, Extension professionals, and faculty. Striving for data quality will help Extension maintain excellence in its pursuit to accessibly apply research to programs.

### Using the Checklist

Based on the information gathered, review of Extension studies, and our experiences, a data quality checklist was developed in order to guide researchers and Extension professionals through the process of ensuring data quality (Figure 2). By using the checklist, researchers and Extension professionals can identify the areas that are methodologically sound and the areas that need improvement. To use the checklist, indicate the extent to which the data quality components are addressed in a research or evaluation study by recording a score of 4, if it is addressed; 3, addressed, but needs improvement; 2, partly addressed, requires major revisions; 1, not addressed at all; and 0 if it doesn't apply.

Ensuring data quality in all Extension research and evaluation studies is critical in order to design, deliver, and evaluate programs in a manner that is methodologically sound and rigorous. Doing so ensures that Extension will continue to provide programs that are based on sound research and are relevant to stakeholder needs.

**Figure 2.**  
Data Quality Checklist for Research and Evaluation Studies in Extension  
([Click image for a printable pdf](#))

**Data Quality Checklist for Research and Evaluation Studies in Extension**

Listed below are statements related to these eight components. Please indicate the extent to which these components are addressed in the research and evaluation studies by recording a score of 4, if it is addressed; 3, addressed, but needs improvement; 2, partly addressed, requires major revisions; 1, not addressed at all; and 0 if it doesn't apply. Please provide comments (in box) if any of the statements are rated 3 or below.

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**Relevance**

1. Need for conducting the study
2. Study need based on gaps in literature
3. Addresses a significant issue related to Extension
4. Timeliness of the study
5. Study's impact on the profession

**Objectivity**

1. Clear statement of objectives/research/evaluation questions/hypothesis
2. Description of key variables examined
3. Appropriateness of statistical procedures used
4. Statistical assumptions met for using inferential statistics stated
5. Evidence that conclusions are based on findings

**Validity**

1. Questions provide answers to the research/evaluation questions/hypothesis
2. Appropriateness of questions to the audience surveyed
3. Process used to develop the instrument/questionnaire
4. Review of the instrument/questionnaire by a panel of experts
5. Field testing of instrument/questionnaire

**Reliability**

1. Process to establish reliability
2. Evidence of pilot testing the instrument/questionnaire
3. Appropriate reliability types used for constructs
4. Acceptable level of responses (n>20) to estimate reliability
5. Evidence of acceptable reliability for constructs (alpha >.70)

**Integrity**

1. Procedures for data collection
2. Procedures for non-response follow-up
3. Any limitations that might jeopardize data
4. Appropriateness of data analysis to research/evaluation questions/hypothesis posed
5. Assurances for maintaining confidentiality

**Generalizability**

1. Errors that limit generalizability of the study
2. Procedures for appropriate sampling techniques
3. Procedures for generalizing study findings to population
4. Representativeness of the sample to the population
5. Statistical comparisons to generalize study findings

**Completeness**

1. Procedures to handle missing data
2. Alternatives to address missing data
3. Measures to address missing data
4. Appropriate coding of missing data
5. Handling of missing data in reporting results

**Utility**

1. Use of study findings for further research/program improvement
2. Policy implications from study findings/program direction
3. Study implications for educational programming/improving practice
4. Dissemination of findings to key stakeholders
5. Linking study findings to past literature/previous evaluation studies

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