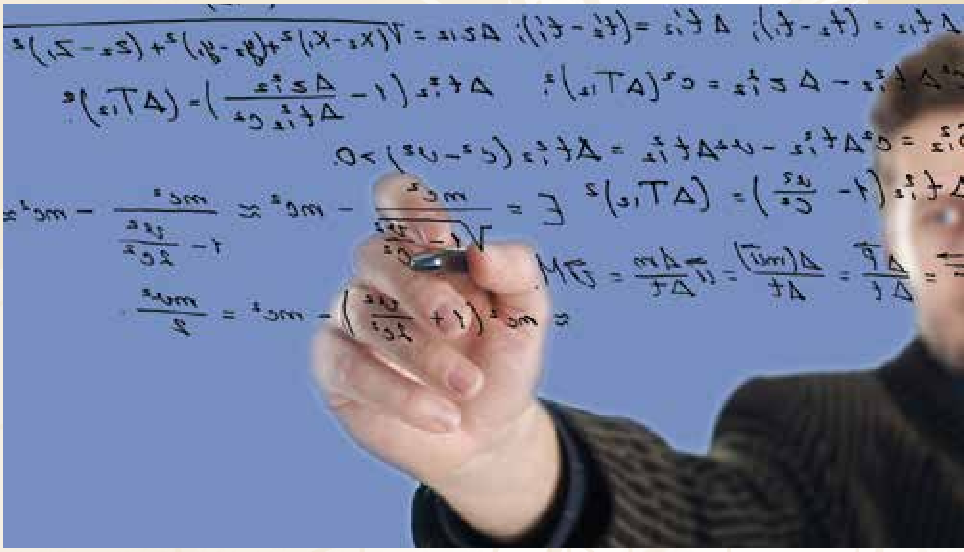
Statistical Design and Analysis



Our statisticians possess expert knowledge and skill in many facets of statistical design and analysis. We apply a variety of innovative statistical methodologies to diverse programs in health and environmental studies, as well as to both government- and private-sector-based program evaluations.

RTI INTERNATIONAL

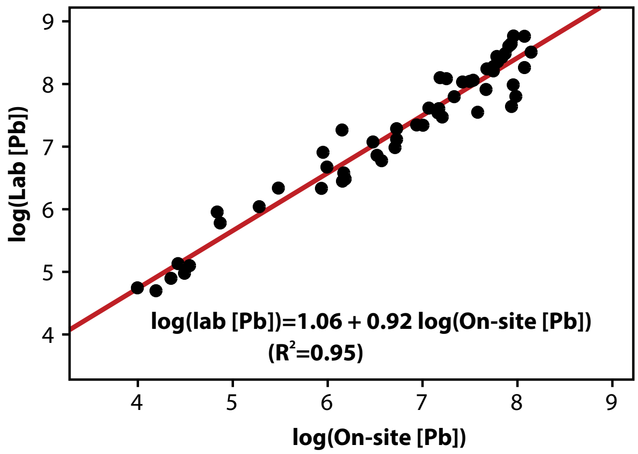
Biostatistics

Biostatistics involves the development and application of methods for quantitative analyses that can derive useful information from data collected in the health sciences. We have been active in collaborative research in the health sciences for more than 30 years, and our capabilities in biostatistics cover a broad array of modern methods in the statistical design, conduct, monitoring, data analysis, and reporting of studies related to human health. These studies span the gamut of public health research, including randomized clinical trials, long-standing registries, and longitudinal and other observational studies on the epidemiology of human diseases.

We synthesize existing literature to assess the feasibility of conducting trials and studies on various topics of interest. Our biostatisticians also play a crucial role in reviewing proposed studies by providing key input on their methodological soundness. We help set the research direction for various collaborative research groups by helping target resources toward scientifically sound studies that have the greatest potential for making a positive impact on human health.

Environmental Statistics

For four decades, we have provided statistical analysis support to government and industry clients to help them address environmental concerns. Our environmental epidemiologists and statisticians work with health and social scientists, economists, toxicologists, biologists, ecologists, engineers, and environmental scientists to provide advice on environmental issues such as species abundance, pollutant plumes, and human exposure and risk assessment.



Our work results in developing methodologies, technical cooperation, data collection, and implementation of environmental, spatial, and spatio-temporal statistics. Since 1980 we have led in designing and implementing studies of human exposures to toxicants, conducting more than 30 field studies concerning multimedia, multipathway, and multichemical exposures.

Program Evaluation

Whether planning effective program strategies, improving existing programs, or accounting for program outcomes, we use multidisciplinary and science-based approaches to tailor a program evaluation design to meet the unique needs of the client and the program under study. We work closely with both public and private health initiatives and clients to design, integrate, and implement practical, rigorous program evaluations using skilled problem formulation with stakeholder input. We employ our expertise in both qualitative and quantitative evaluation, and as appropriate, we triangulate data to achieve a comprehensive understanding of program implementation and impact. Our program staff are skilled in using a variety of methods and tools for conducting research and evaluation with a focus on practical recommendations.

Statistical Genetics and Bioinformatics

Statistical genetics and bioinformatics is a cross-discipline at RTI that combines the research tools and methods of statistical genetics, biomathematics, genetic epidemiology, and genomics (the study of genes and gene sequences) to analyze and manage interrelated information about organisms and biological systems. We use our expertise in bioinformatics to solve information problems in the life sciences by creating extensive electronic databases on genomes and protein sequences.

Experimental Design

RTI researchers embed experimental designs into sample surveys to estimate differences in response rates, differences in alternate levels of incentives, and differences in measurement errors between alternative survey instruments and/or alternative modes of interviewing. We also develop and analyze data from experimental designs for clinical trials, toxicology experiments, and other observational studies in epidemiology and public health to characterize the performance of analytical laboratory procedures.

Longitudinal Analysis

Longitudinal analysis involves studying series of observations obtained from respondents over time and is often used in clinical trials, panel surveys, laboratory experiments, and genetic studies. We use multilevel modeling to account for correlated observations due to sampling design, stratification, clustering, and repeated measures. We use various data analysis methods to handle continuous, dichotomous, ordinal, and nominal outcomes.

Modeling and Simulation

Our team of professional modelers uses mathematical modeling and simulation techniques to evaluate biological processes, environmental exposures, social interaction in disease behavior, and associated health outcomes. These techniques help us understand phenomena such as the global spread of disease in situations where the conduct of empirical research is difficult or impossible. Our mathematical models range in complexity from quick laptop applets to supercomputing simulations.

Psychometrics

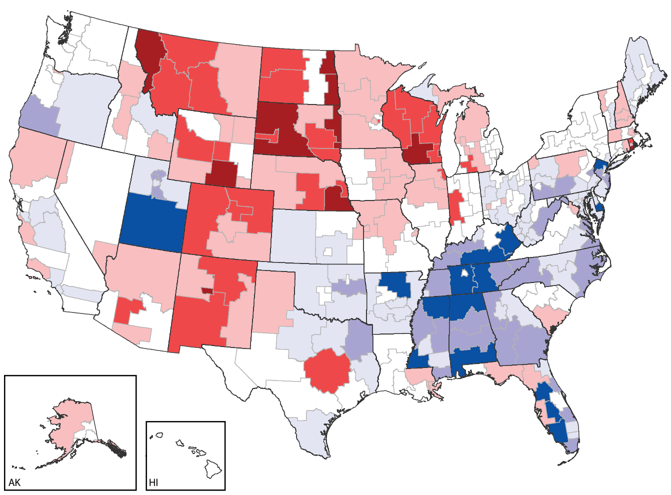
Whether assessing the performance of an existing scale or developing a new scale or test, our psychometricians bring the best modern measurement techniques to bear on such tasks. Careful design and assessment of scales assures survey administrators that their inferences from the data will be as accurate, reliable, and valid as possible. Psychometric techniques provide powerful tools that can distinguish useful from less useful measurements and provide feedback on the success of subsequent changes in items.

Using techniques such as structural equation modeling, we often directly incorporate measurement models into analysis and inference to ensure a proper accounting of all types of error (measurement and structural) found in an analytic model.

Qualitative Analysis

Qualitative analysis is a powerful tool enabling our researchers to explore people's motivations, behaviors, desires, and needs. We use qualitative methods to better understand how people think about a problem so that the survey instrument we develop includes the relevant concepts and appropriate terminology. We also use qualitative methods to follow up on data analysis with in-depth investigations of why certain outcomes were found, often leading to research questions for future projects.

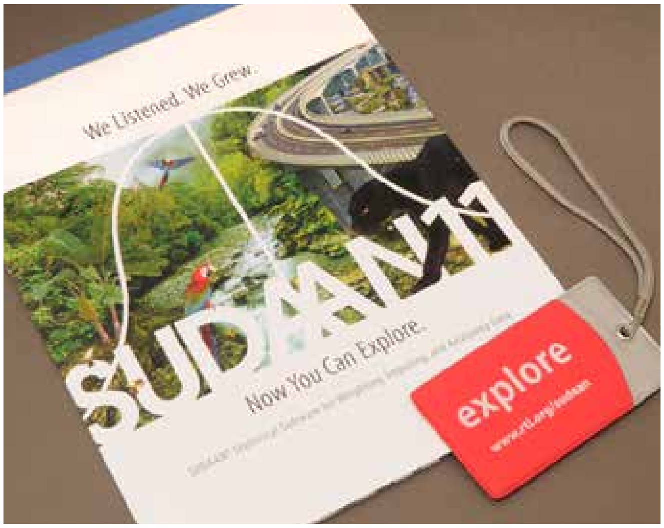
When applied to evaluation projects, qualitative analysis is ideally suited to answering questions about how a program operates and in what ways it affects people. We can document the evolution of implementation processes as well as the ongoing monitoring of programs after implementation. Qualitative research also provides us with a unique means to assess program or policy outcomes, allowing for the study of both anticipated and unanticipated outcomes, changes in perceptions as a result of a program or policy, and the strengths and weaknesses of the administrative or organizational structure that was used to implement the program.



SUDAAN®

SUDAAN is a software product designed and developed by RTI statisticians for analyzing clustered data arising in many applications, including complex sample surveys, randomized experiments, and epidemiological studies. SUDAAN offers procedures for descriptive statistics and for statistical modeling. The modeling procedures include both linear and multinomial-logistic models and a procedure for fitting proportional hazards (Cox) regression models for time-to-event data.

SUDAAN fits marginal or population-averaged models using generalized estimating equations (GEE). It computes robust variance estimates that fully account for intracluster correlation, unequal weighting, stratification, and without-replacement sampling.



SUDAAN offers all three popular robust variance estimation methods in its descriptive and modeling procedures:

- Taylor series linearization (GEE for regression models)
- Jackknife (with or without user-specified replicate weights)
- Balance repeated replication (BRR)

Together, these procedures and techniques provide a powerful variety of analytic tools not available in other software packages.

SUDAAN statistical experts are available for short- and long-term consulting assignments to help prepare your data for input into SUDAAN. We can also assist with SUDAAN programming, determining the appropriate design options for your particular analysis, and interpreting results from SUDAAN.

For more information or to order online, visit the SUDAAN Web site: www.rti.org/sudaan

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