Public Health Sciences (PHS) is the home in the Biological Sciences Division to biostatistics, epidemiology and health services research. These core fields in public health research share a focus on the development and implementation of complex analytic methods to understand the determinants of health, the efficacy of experimental treatments, and the structure of health care at the population level. Bringing together these fields in one department underscores their commonality and enhances opportunities for interdisciplinary research. Faculty members lead local, national, and international studies, and also welcome opportunities to collaborate with faculty across the Biological Sciences Division and the University. Substantively, our research themes include social and environmental determinants of health, genetics and disease, the economics of health care, and the evaluation and implementation of new technologies in public health and clinical care. In terms of methodological expertise, areas in which our faculty has developed innovative approaches include: risk factor measurement; multilevel, clustered and longitudinal data; clinical trials; administrative health data; social networks; and statistical methods to assess the genetic and molecular basis of disease.

PHS has a substantial focus on cancer research, which extends from epidemiologic studies of the inter-relationships between environmental and genomic etiologic factors to clinical trials of treatment and to studies of the implementation, outcomes and economics of screening and therapeutic interventions. However, our research is not limited to cancer and also includes programs and individual projects across a broad spectrum of health and disease outcomes such as mental health, HIV and sexually transmitted infections, healthy aging and birth outcomes.

Several investigators in PHS develop and implement epidemiological, statistical, and computational approaches to study the role of genetic, molecular and “omics” biomarkers in human health and disease. Faculty members establish and leverage large-scale epidemiological biospecimen resources to generate high-dimensional genomic and biomarker data, utilizing state-of-the-art sequencing and high throughput array-based technologies. PHS faculty members also lead analysis teams that integrate and analyze multiple types of genomic/biomarker data (genetic variation, RNA levels, DNA methylation, proteomic data, genome annotation) and develop novel analytic approaches to facilitate the study of human health and molecular phenotypes. Specific areas of interest include: genetic susceptibility to cancer and chronic diseases, genetics of gene expression, epigenetic influences on disease, prognostic and predictive biomarkers, missing data in genomics/proteomics, gene-environment interaction, and integrative genomics.

Another major theme focuses on inferring the causal effects of economic incentives on healthcare quality and outcomes in the United States, and on how innovations, guidelines and new policies affect utilization and costs. In all of our research areas, we prioritize the development of study designs and methods that strengthen our ability to identify causal relationships from observational data. Such study designs include sibling comparisons, natural experiments and the identification of exogenous factors that influence individual exposure risk. New statistical methods that strengthen causal inference include approaches to overcoming selection biases, missing data and informative censoring.

We provide training in biostatistics, epidemiology and health services research through two degree programs: a flexible doctoral program that focuses on any of our three core areas and a MS degree for clinical professionals, designed to provide physicians and other doctoral-level providers with methods to carry out rigorous research in clinical epidemiology and health services. Through our Biostatistics Laboratory, we provide a fee-based collaborative service to investigators throughout the Biological Sciences Division, and sometimes in other Divisions and Schools, to design studies, oversee data collection and analyze and interpret data. Initial consultations and help developing proposals for external funding (when the proposal includes ongoing Biostatistics Laboratory participation) are generally provided without charge.