

Challenges: Building analytical capacity in statistical genetics/genomics

- Multiple key quantitative disciplines
 - Population genetics
 - Epidemiology
 - Demography
 - Mathematics
 - Statistics
 - Computer science
 - Informatics
- Each is difficult, requiring significant mathematics
 - USA does poorly at keeping students in the pipeline
- Unrealistic to expect mastery across disciplines

Challenges: Building analytical capacity

- Few analytical researchers to provide training
 - Heavily overcommitted
 - Often dispersed geographically
- Recognition of research contributions
 - Statistics depts: methodology
 - Genetics/Med depts: \$\$, publications in “hot” journals
 - Statistical applications: rarely independent projects

Challenges: Study design/statistical issues

- Large number of choices
 - Do not entirely fit standard epidemiological designs
 - Limitations not always understood
- Not enough critical evaluation and discussion of alternative choices
 - Time and effort needed is large
 - Neutral third parties are rare
- Novelty of data collection methods drive studies
 - New methodology requires lead time
 - How to use these new data methods to design studies?
 - What we want to learn and how best to do this?

Possible solutions

- Establish teams with different analytical expertise
- Establish larger analytical groups
 - Provide a critical mass: Establish centers
 - Include research projects in analytical sciences
 - Get participation from non-traditional NIH departments
 - Joint work with analytical scientists & experimentalists
 - Let the data drive the research directions
 - Use experimental work to evaluate analytical approaches as well as analytical approaches to evaluate experiments

Possible solutions

- Recruit from other quantitative fields
 - Career development awards for established scientists
 - Training grants
 - US residents
 - Non-US residents?
 - Research support for upper-level undergraduates
- Provide incentives for methods/analysis funding
 - To use existing data
 - To critically compare/evaluate designs/strategies
- Use hands-on workshops to evaluate designs and methods (examples: GAW, CASP)