

Subgroups can be defined by—

- Gender
- Education
- Family size
- Race or ethnicity
- Age
- Health condition
- Benefits status
- Employment status
- Geographic location

And many other dimensions

(subgroups should be defined on status prior to random assignment)

Why are impacts on separate subgroups of interest?

- If overall impact is positive and statistically significant,
 - To focus scarce resources on those most helped
- If overall impact is not statistically significant,
 - To determine whether some groups are nonetheless helped and should receive the intervention

A kidney-cancer vaccine illustration

- A large, expensive clinical trial of the vaccine
- Key findings
 - Overall effect was positive, but small and non-significant
 - In examining the data more closely, it was found that there was a statistically significant effect on one important subgroup: those whose tumors had not penetrated their veins
 - A reasonable story could be told as to why this was true
- The US Federal Drug Administration would not approve use of the drug for the subgroup unless the study was replicated
- Is this reasonable? The drug company didn't have the money to run another trial and doing so would also take time, perhaps resulting in deaths

Issues raised by subgroup analysis

- Small sample sizes resulting in a finding of non-significance for a particular subgroup where a true difference exists (total sample may be powered to determining a statistically significant overall impact, not subgroup impacts)
- Impact on some subgroup is likely to be found statistically significant by chance alone (the cancer vaccine example?)
- If impact of a welfare-to-work programme on one subgroup appears to be larger than impact on another, is this due to the differences between the subgroups or because they were treated differently?

Minimizing problems with subgroup analysis

- Test whether the differences among groups are statistically significant, not just whether the impact on a particular subgroup is statistically significant
 - The former is more policy relevant
 - The latter is highly subject to false negative findings and to false positive findings—the fishing issue
- Prior to random assignment, determine whether effects on specific subgroups are likely to differ in theory (confirmatory analysis versus exploratory analysis)
 - The cancer vaccine example

Minimizing problems with subgroup analysis (continued)

- For a confirmatory analysis,
 - Determine likely direction and magnitude of differences
 - Allow for sufficient sample size to test for difference (possible stratification of randomisation)
 - Treat findings with caution
 - With insufficient sample size, false finding of non-significant differences among subgroups is high
- If exploratory analysis is conducted,
 - Treat important findings with great caution
 - Conduct a replication study of important findings