Part 3:

PROPENSITY SCORE MATCHING APPROACHES FOR OUTCOME EVALUATIONS OF SBCC

A two-step approach for addressing confounding

1. Match exposed and unexposed individuals with similar background characteristics

2. Assess likelihood that unmeasured characteristics will confound the association between exposure and the outcome
   - If no confounding, equivalent to a RCT

Step 1: Use propensity scores to match similar exposed and unexposed individuals

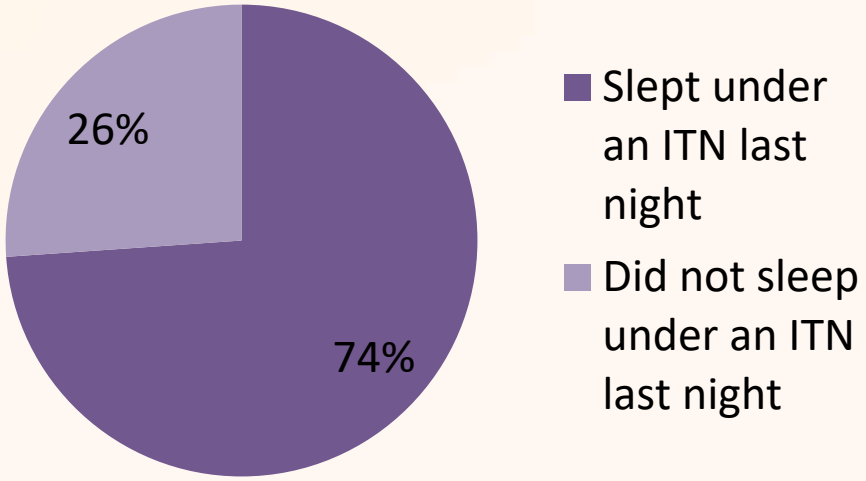
- Propensity score = an individual's likelihood of being exposed, based on background characteristics (e.g., age, education, etc.)
- Use a regression model to calculate each respondent's propensity score
- Match exposed and unexposed respondents with the same propensity score
  - This matching removes possibility that these variables confound the exposure-outcome relationship

Step 2: Are there any unmeasured confounders present?

- Estimate two regression models simultaneously
  - One that predicts exposure (the propensity score model)
  - One that predicts the outcome
- Each regression model has a residual term that contains all unmeasured influences
- Correlation between the two residual terms indicates presence of a confounder

Consider a scenario in Zambia

Percentage of women sleeping under an ITN the previous night in households with at least one ITN, Zambia 2010



Did SBCC messages influence this behavior?

How did SBCC messages influence this behavior?

Source: 2010 MIS

Step 1: What factors did we match on?

Categories	Variables
Demographic	Age Has a child under the age of 6
Education	Number of years of education
Socioeconomic status	Wealth quintile calculated from household possessions
Location	Province of residence Urban/rural residence IRS District

***These 7 variables accounted for 35% of variance of exposure**

Comparison of covariates by exposure status with and without matching

	Prior to Matching			Following Matching		
	Exposed	Unexposed	p-value	Exposed	Unexposed	p-value
Agecat2	0.22	0.42	0.001	0.21	0.21	0.949
Agecat3	0.32	0.34	0.415	0.33	0.33	1.000
Educ 2	0.36	0.52	0.001	0.36	0.36	1.000
Educ 3	0.64	0.16	0.001	0.63	0.63	1.000
Newprov2	0.29	0.44	0.001	0.30	0.31	0.955
Newprov3	0.04	0.13	0.001	0.03	0.04	1.000
Newprov4	0.35	0.35	0.863	0.36	0.36	1.000
Child6	0.60	0.66	0.003	0.60	0.60	1.000
Wealthcat	0.65	0.47	0.001	0.66	0.66	0.956
IRS_district	0.84	0.89	0.001	0.86	0.86	1.000
Urban3	0.29	0.17	0.001	0.28	0.28	0.954

Nearest neighbor matching
With replacement
Caliper = 0.005

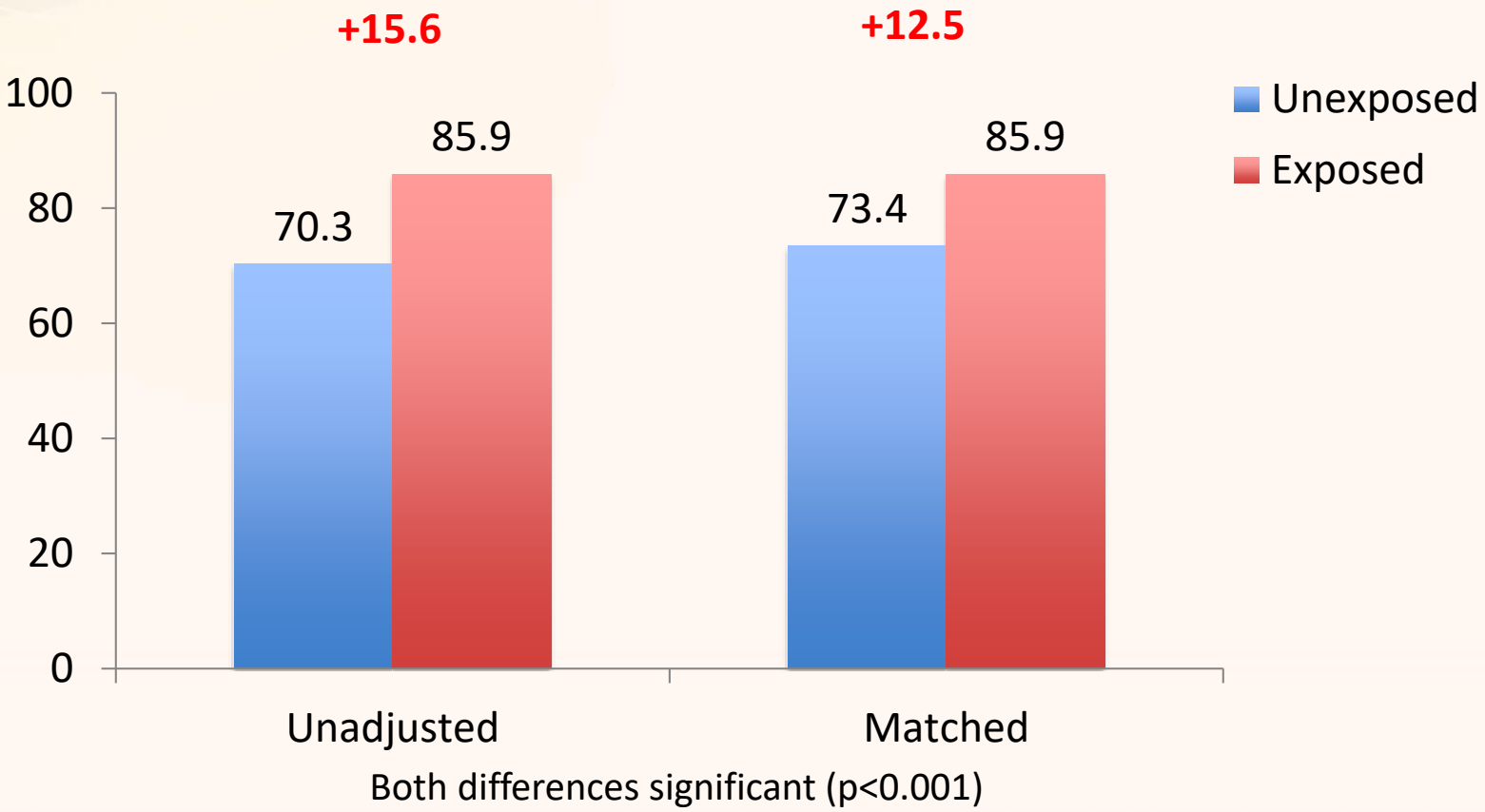
Step 2: Use a two-equation system to identify any other confounders

- Exposure = Constant + Measured Covariates + $Residual_E$
- Behavior = Constant + Exposure + $Residual_B$

- rho = correlation between $Residual_E$ and $Residual_B$
- If rho = 0, indicates no unmeasured confounding
  - Estimate of rho = 0.035
  - Test that rho ≠ 0: p = 0.656

Compare the outcome behavior with and without propensity score matching

Percent of women sleeping under an ITN the previous night among households that own a net, by SBCC exposure, Zambia



Both differences significant (p<0.001)