**Lab**

**Concepts of Causal Mediation Analysis**

**P1822 – Statistical Methods for Causal Inference**

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Mediation – Concepts and Identification

1. Consider the following population of individuals and suppose we knew all the potential outcomes, let’s review the definition of causal contrasts relevant in mediation analysis:

Type M0 M1 Y00 Y10 Y01 Y11

IN CLASS

1 0 10 1 0 1

2 1 1 0 1 0 0

3 0 1 0 0 0 1

NEW

4 1 0 1 1 0 1

5 0 1 0 1 1 1

6 0 0 0 0 1 1

A snp: 1 carries 1 or 2 alleles and 0 no alleles

M smoking status: 0 non smoker 1 smoker

Y lung cancer status: 0 no disease 1 disease

M0 potential smoking status when A=0

M1 potential smoking status when A=1

What Y1 is? NOT IN THE TABLE

Y1=Y1M1

For individuals of type 4, 5 and 6 (1, 2 and 3 were analyzed in the lecture),

1. Give the outcomes that would have actually occurred if persons of that type were exposed.

Y1M1 since M1=0 then Y1M1=Y10=1

1. Give the outcomes that would have actually occurred if persons of that type were unexposed:

Y0M0 since M0=1 then Y01=0

1. Then calculate
2. the total effect,

Y1-Y0=Y1M1-Y0M0=1-0

1. both controlled direct effects, and

CDE(m=0)=Y10-Y00=1-1=0

CDE(m=1)=Y11-Y01=1-0=1

1. the natural direct and indirect effects for individuals of types 4, 5 and 6.

NDE=Y1M0-Y0M0= 1-0=1

NIE=Y1M1-Y1M0 =1-1=0

Y1M0=Y11=1

2. Consider the causal diagram below.

A

M

Y

C

L

1. Are the controlled direct effects (CDE) identified in this causal diagram? Why or why not?

Yam

1. NUCA A-Y need to adjust for C
2. NUCA M-Y need to adjust for A, C
3. Are the natural direct (NDE) and indirect effects (NIE) identified in this causal diagram? Why or why not?
4. NUCA A-Y need to adjust for C
5. NUCA M-Y need to adjust for A, C
6. NUCA A-M need to adjust for C
7. No M-Y confounders are affected by A (none of the M-Y confounders are mediators of the A-Y relationship) YES ok!!

We can identify the effects

1. Could this diagram have come from a trial in which treatment A was randomized within strata of C? Why or why not?