

Population Education Transition on Excess Body Weight of Indonesian Adults: A Causal Inference

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Global rise in obesity

- Rapid growing in obesity - **affected 1 in 4 people** by 2035 (WOF, 2003)
- Excess body weight contributed to a double increase in global deaths and DALYs from Non-Communicable Diseases
- Low-middle income countries (LMICs) are most affected with the global rise in obesity.
- **Multi-causes of obesity:** biological, social structural, environmental changes, and demographic shift



Formal education is the most potent factor in health

- Average educational attainment is strongly associated with the long-term decline in morbidity and mortality of a population (Smith et al. (2015))
- **“Nutritional Transition (NT)” can shape the direction, consistency, and magnitude of association between education and obesity (Baker, D. P., et al. (2011)).**
- The relationship between education and obesity can
- Only a few studies have assessed the

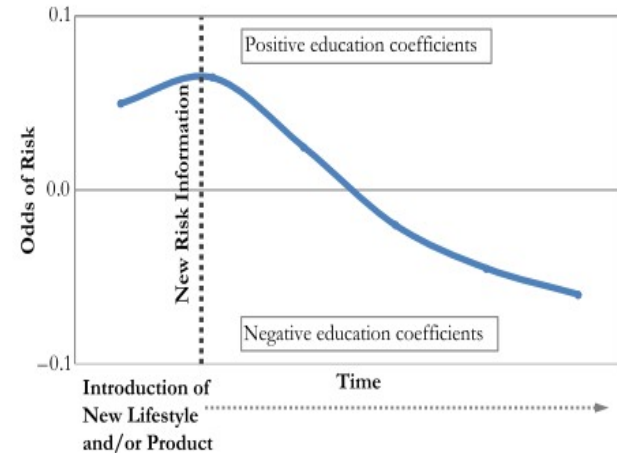


The Population Education Transition (PET) Curve

• Baker et al. (2017)

- education can exhibit **beneficial or harmful effects** on health in different circumstances
- There will be **shifting in the effect of education** toward diseases that are
- The (PET) curve is “a unifying functional form to predict shifting education gradients across the onset and course of a population’s exposures”

Hypothetical PET curve



Aim and Research Questions

Aim:

Investigate population education pattern by quantifying the effect of schooling on excess body weight over period 1993-2014

Research questions:

1. What is the causal effect of schooling on excess body weight in Indonesia over time?
2. Do the speed of schooling (education) transition effect on excess body weight vary across sub-



Indonesia Context

Health Profile

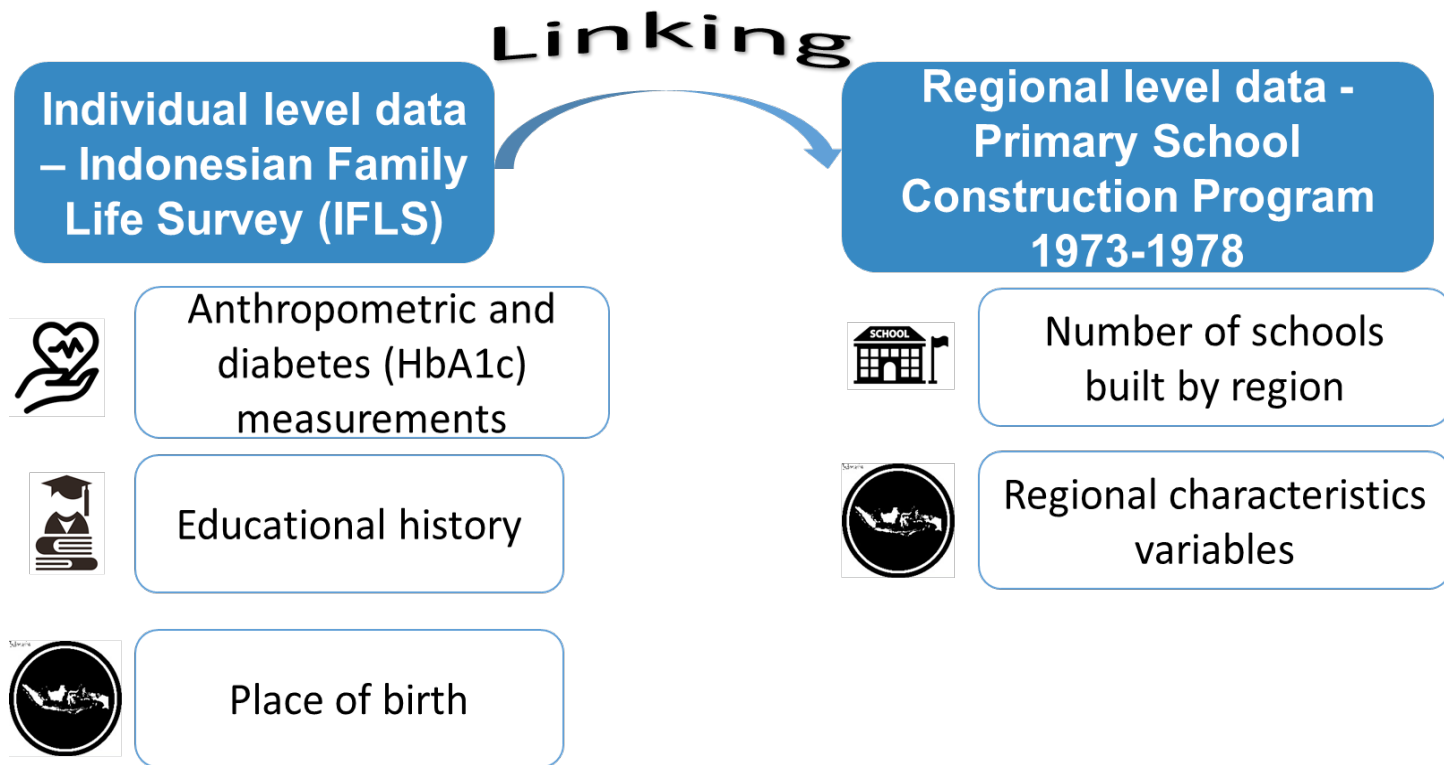
- Over **one third of adults** age 18+ were overweight or obese (*Riskesdas, 2018*)
- The prevalence of obesity is expected to rise due to growing aging population and increasing the cases among

Food environment changes related food policies

- Subsidising food commodities with low nutritious foods (e.g. cooking oil and sugar) and food diversification strategy (e.g. introducing wheat flour) have increased

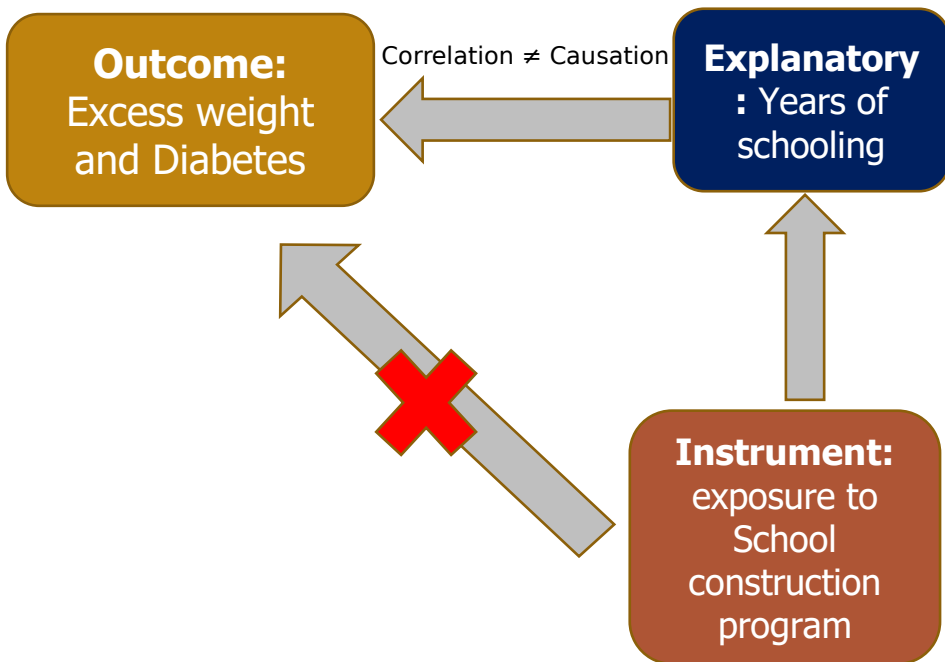


Data Sources



Methods: Instrumental Variable Estimation

Instrumental Variable Approach



2 Steps of Analysis

1st

- Simple probit models



2nd

- Two-stage least squares regression analyses for binary outcomes
- **Instrument:** exposure to primary school construction program (SD INPRES) from 1973-1978



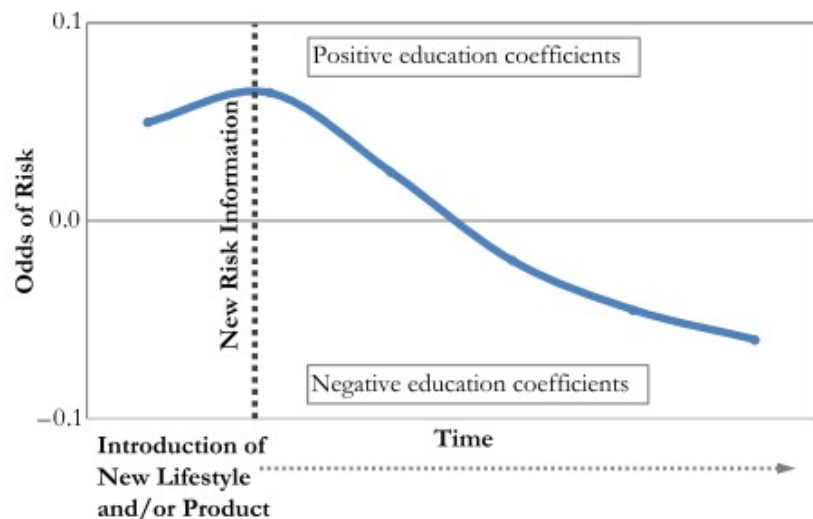
Instrument Variable – INPRES

- **INPRES was a massive school construction program in Indonesia 1973-1978 aiming to improve access to education**
- The program increased population years of schooling in poor and low population density areas by reducing distances to school (Duflo, 2001).
- **Instrument variable** : individual exposure to the program measured by the average number of schools built per 1,000 children in the region of birth
- **Identification strategy** following Duflo (2001):
 - 1. Birth cohort:** exposed group (1962-1973) and control group (1950-1961)
 - 2. Place of birth**
 - 3. Intensity of exposure:**
 - ✓ Number of school constructed in region of birth
 - ✓ Individual age in 1974 to determine partially or fully exposed

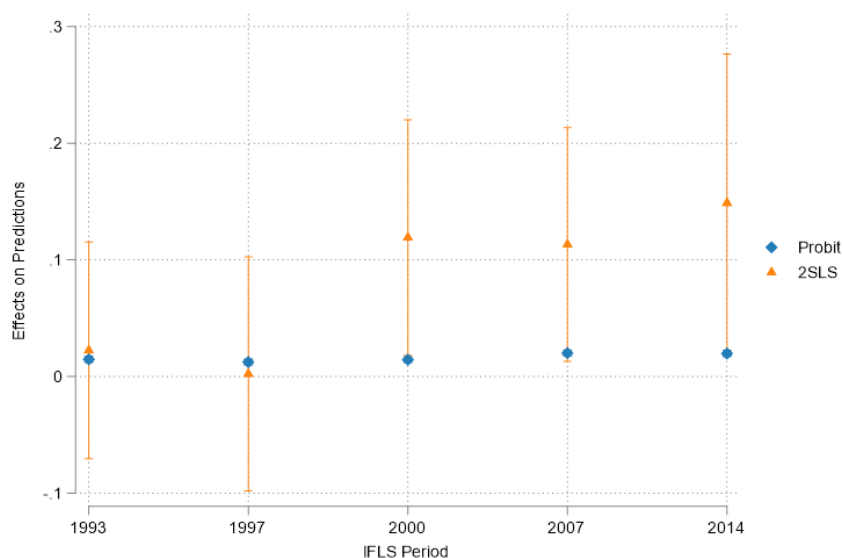


Transition Effect of Schooling on Excess Body Weight

PET Curve



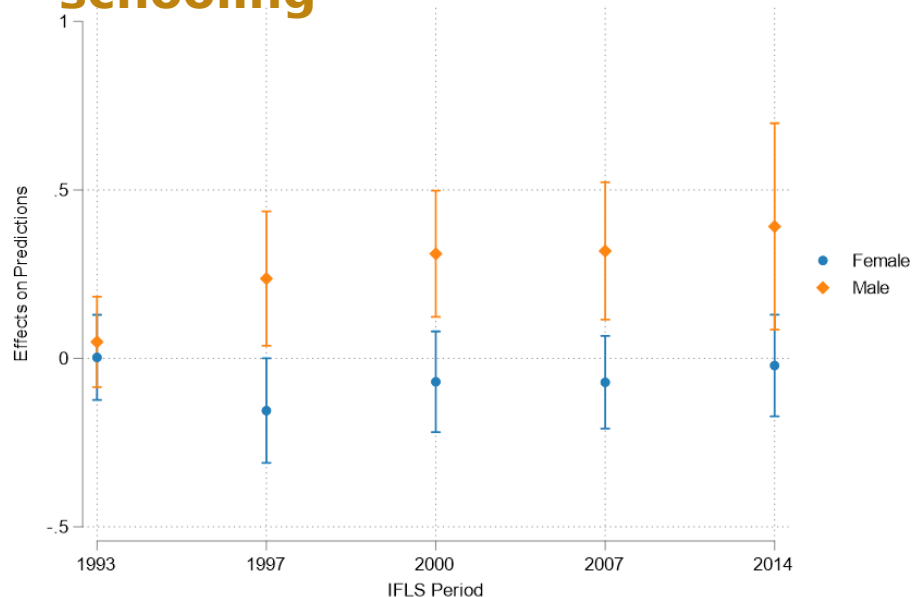
Education transition



Heterogeneity Effect of Schooling on Excess Body Weight

1. The positive effect is stronger in men
2. No heterogeneity
 - Household wealth status
 - Urban or rural
 - Geographical location (Java vs non-Java islands)

Average margin effect of schooling



Food Consumption and Physical Activities Link Schooling to Excess Weight

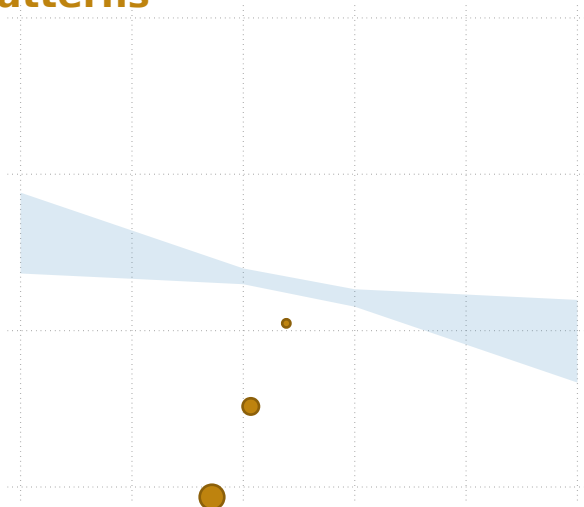
1. Food pattern

- Significant increasing meat consumption
- Significantly reducing consumption of ultra process food: instant noodle and fried snacks

2. Physical activities:

- Positive effect on duration of walking
- No effect on vigorous and moderate activities

Schooling effect on food consumption patterns



All exposed
with different
intensity



Conclusion

- This study finds that **schooling has a positive causal effect** on excess body weight
- From 1993-2014, the positive effect of schooling just emerged in the middle of observation period with **the magnitude increase over time.**
- Heterogeneity in education transition by sex
- It advance our understanding on the application of PET theory based on evidence from panel data
- If the relationship between education and obesity follows PET curve theory, we can anticipate and accelerate the shift in the education effect through population-level intervention



THANK YOU

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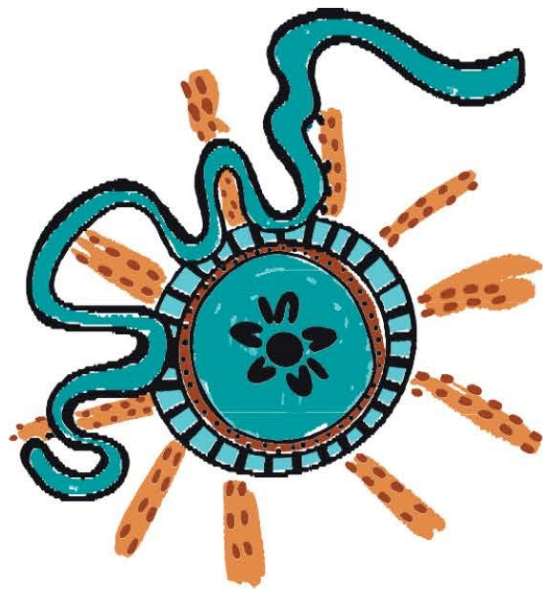
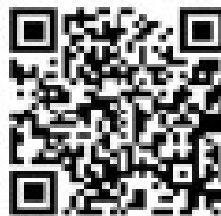
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