

# OPORTUNIDADES TO REDUCE OVERWEIGHT AND OBESITY IN MEXICO?

---

Mabel Andalon

# Introduction

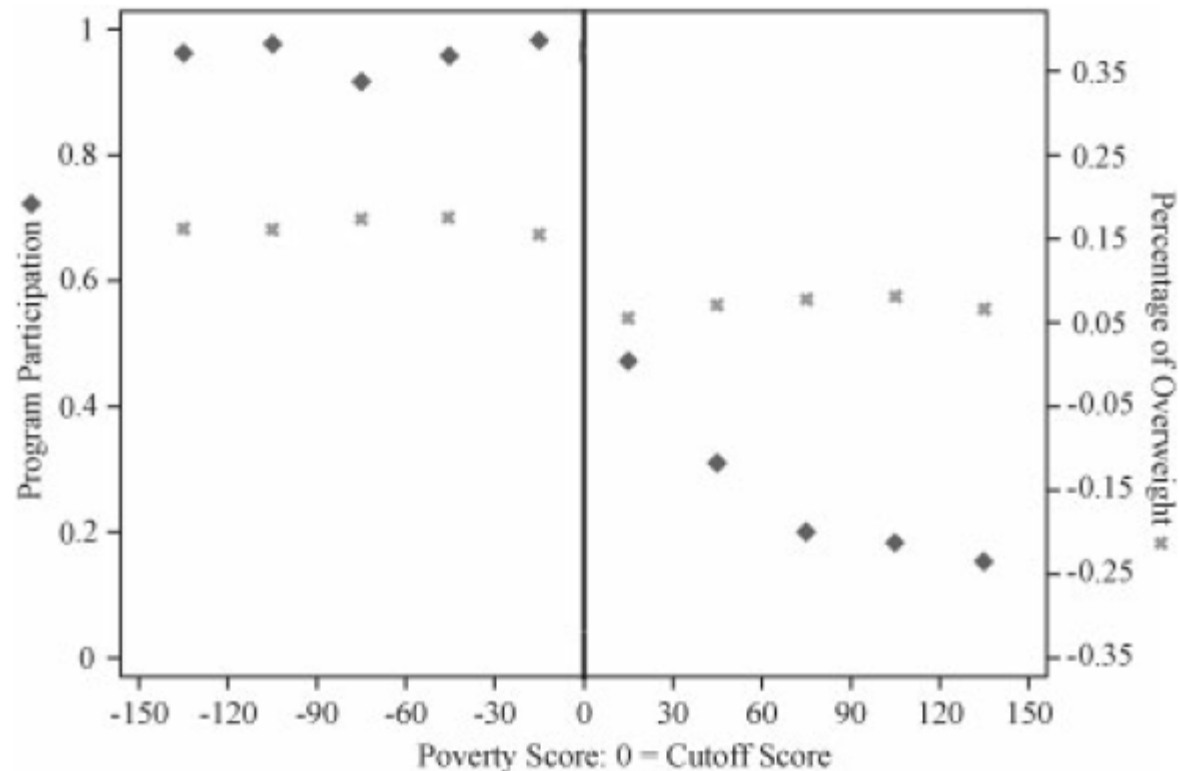
- **What?** causal effect of Oportunidades on overweight and obesity of adolescents living in poor rural areas.
- **Why?** The upward trend in obesity is of great policy concern in developing countries.
- **How? Result?** estimation of reliable local average treatment effects (LATE) of the program via a fuzzy Regression discontinuity (RD) design. The evidence of this paper suggests that Oportunidades decreased obesity among participant women.
- **Policy Implication?** The identified local average treatment effect (LATE) at the threshold for program eligibility suggests that female obesity would decrease if the program was expanded to cover slightly better-off households.

# Description and potential impacts of Oportunidades

- covers 25% of Mexicans and 90% of the extreme poor who live on less than US\$ 1 a day
- subsidy of 150 pesos is handed to the mother contingent upon regular health clinic and health information sessions attendance
- Another subsidy is received subject to children attending school for at least 85% of days per month.
- Extra money leads to consuming more or better quality food, exercise and inset smoking.
- Information can induce better self-care, less teen pregnancy, prevention of smoking.
- Overall impact is ambiguous!

# Eligibility rules and identification strategy

- Rural areas with access to a school and a health clinic.
- Region specific poverty score based on a census survey conducted in 1997.



# Data

- The sample includes adolescents (15–21 years) living in rural treatment-98 localities.
- Standard socio-demographics and self-reported information about health behaviors.
- Height and weight were measured during the interview by trained personnel in duplicate.
- Compute the individual's Body Mass Index (BMI)
- Overweight youths have BMIs above the BMI of the 85th percentile and are obese above the 95th percentile.
- State-level prices are derived from barcode scanning in supermakerts and reported monthly by the Central Bank of Mexico.

# Data

Table I. Descriptive statistics by participation status in *Oportunidades* for the sample of adolescents by gender

Variables	Women			Men		
	All	In <i>Oportunidades</i> ?		All	In <i>Oportunidades</i> ?	
		No	Yes		No	Yes
<i>Panel A. Dependent variables measured in 2003</i>						
Overweight rate (BMI $\geq$ 85th percentile)	0.194 (0.012)	0.223 (0.022)	0.181 (0.014)	0.102 (0.010)	0.150 (0.022)	0.082 (0.010)
Obesity rate (BMI $\geq$ 95th percentile)	0.039 (0.005)	0.064 (0.013)	0.028 (0.006)	0.026 (0.005)	0.040 (0.012)	0.020 (0.005)
Participation in <i>Oportunidades</i>	0.684 (0.014)	0 (0)	1 (0)	0.711 (0.015)	0 (0)	1 (0)
<i>Panel B. Demographic variables measured in 2003</i>						
Age	17.10 (0.051)	17.37 (0.095)	16.97 (0.060)	16.92 (0.055)	17.04 (0.107)	16.86 (0.064)
Single	0.830 (0.011)	0.777 (0.022)	0.854 (0.013)	0.936 (0.008)	0.927 (0.016)	0.939 (0.009)
Indigenous	0.350 (0.014)	0.264 (0.024)	0.361 (0.017)	0.367 (0.016)	0.286 (0.027)	0.401 (0.019)
Years of schooling	7.732 (0.082)	8.043 (0.153)	7.588 (0.097)	8.052 (0.087)	8.286 (0.176)	7.858 (0.099)
<i>Panel C. Covariates associated with overweight and obesity measured in 2003</i>						
Price of Tortilla (in pesos <sup>a</sup> )	5.865 (0.017)	5.743 (0.032)	5.920 (0.020)	5.855 (0.018)	5.756 (0.035)	5.895 (0.021)
Price of oil (in pesos <sup>a</sup> )	9.445 (0.017)	9.523 (0.032)	9.408 (0.019)	9.392 (0.016)	9.454 (0.033)	9.367 (0.019)
Price of beans (in pesos <sup>a</sup> )	14.84 (0.027)	14.80 (0.045)	14.86 (0.034)	14.79 (0.030)	14.79 (0.052)	14.76 (0.036)
Price of rice (in pesos <sup>a</sup> )	7.063 (0.050)	7.171 (0.082)	7.013 (0.063)	6.999 (0.053)	7.221 (0.099)	6.910 (0.063)
Price of milk (in pesos <sup>a</sup> )	7.058 (0.012)	7.048 (0.019)	7.063 (0.014)	7.037 (0.012)	7.031 (0.021)	7.040 (0.015)
Price of soda (in pesos <sup>a</sup> )	9.622 (0.032)	9.507 (0.054)	9.675 (0.040)	9.644 (0.035)	9.507 (0.063)	9.703 (0.042)

# Econometric framework

- Basic regression  $O_i = \alpha + \theta T_i + \varepsilon_i$
- Endogeneity  $\rightarrow$  RD  $\rightarrow$  Fuzzy RD  $\rightarrow$  ATE

$$\theta = \frac{\lim_{p \uparrow 0} E[O_i | P_i = p] - \lim_{p \downarrow 0} E[O_i | P_i = p]}{\lim_{p \uparrow 0} E[T_i | P_i = p] - \lim_{p \downarrow 0} E[T_i | P_i = p]}$$

- Selection rule is the same just above and below the threshold and individual treatment is a monotonic function of poverty score  $\rightarrow$  LATE
- LATE is the effect on individuals who were induced to participate in Oportunidades because their poverty score happened to be slightly below the cut-off poverty score

# Estimation

- The causal effect of interest can be calculated as  $\theta = \pi_1 / \pi_0$

$$O_i = \alpha_1 + E_i \pi_1 + E_i \sum_{d=1}^n \varphi_{1d} (P_i)^d + (1 - E_i) \sum_{d=1}^n \varphi_{1p} (P_i)^d + \varepsilon_{1i}$$

$$T_i = \alpha_0 + E_i \pi_0 + E_i \sum_{d=1}^n \varphi_{0d} (P_i)^d + (1 - E_i) \sum_{d=1}^n \varphi_{0p} (P_i)^d + \varepsilon_{0i}$$

- The preferred estimation will be based on the Schwarz (1978) criterion, which penalizes a larger model for using additional degrees of freedom while rewarding improvements in goodness of fit.



# Effect of eligibility on participation in Oportunidades

Table II. Identification of program effects: discontinuity estimates of participation in *Oportunidades* at the poverty score eligibility cut-off by gender

Polynomial order on both sides of the eligibility cut-off	Discontinuity estimates of participation at cut-off for	
	Women	Men
1	0.494** (0.041)	0.596 <sup>b</sup> (0.044)
2 right, 1 left <sup>a</sup>	0.419** (0.052)	0.503** (0.059)
2	0.410** (0.056)	0.518** (0.059)
3	0.355** (0.072)	0.465** (0.075)
4	0.337** (0.088)	0.424** (0.092)
5	0.359 <sup>c</sup> ** (0.106)	0.382** (0.111)
6	0.351 <sup>b</sup> ** (0.123)	0.365** (0.129)
7	0.353* (0.124)	0.325 <sup>c</sup> * (0.148)
Number of observations	1092	944

# Effect of program participation on overweight and obesity

Table III. Effect of eligibility on program participation and health behaviors and effect of participation in *Oportunidades* on health behaviors by gender. (Estimations based on the preferred flexible parametric specification<sup>a</sup>)

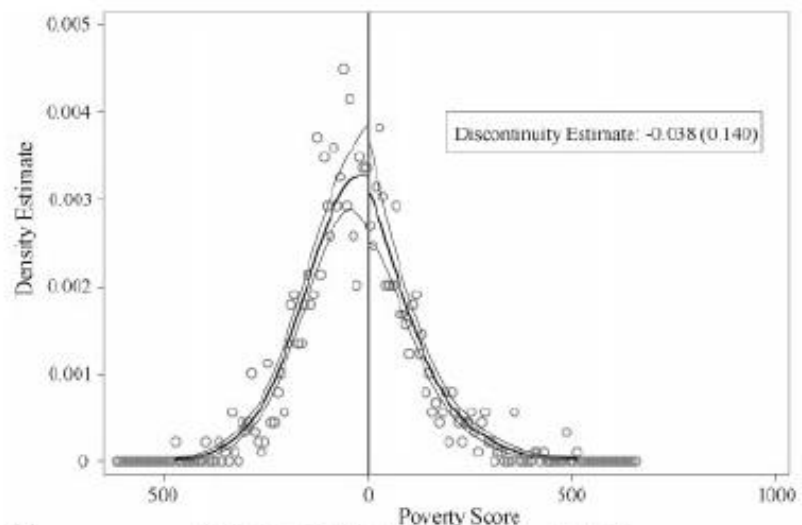
Estimates for	Effect of			Number of observations
	Eligibility on participation $\pi_0^b$	Eligibility on outcome $\pi_1^c$	Participation on outcome $\theta = \pi_1/\pi_0^d$	
Overweight				
Women	0.353 <sup>a</sup> (0.124)	-0.048 (0.109)	-0.137 (0.302)	1092
Men	0.596 <sup>**</sup> (0.044)	0.041 (0.032)	★ 0.069 (0.055)	944
Obesity				
Women	0.359 <sup>**</sup> (0.106)	-0.116 <sup>**</sup> (0.045)	-0.322 <sup>a</sup> (0.157)	1092
Men	0.325 <sup>a</sup> (0.148)	0.051 (0.059)	★ 0.132 (0.163)	944

# Specification checks

Table IV. Program participation on health behaviors: sensitivity estimates

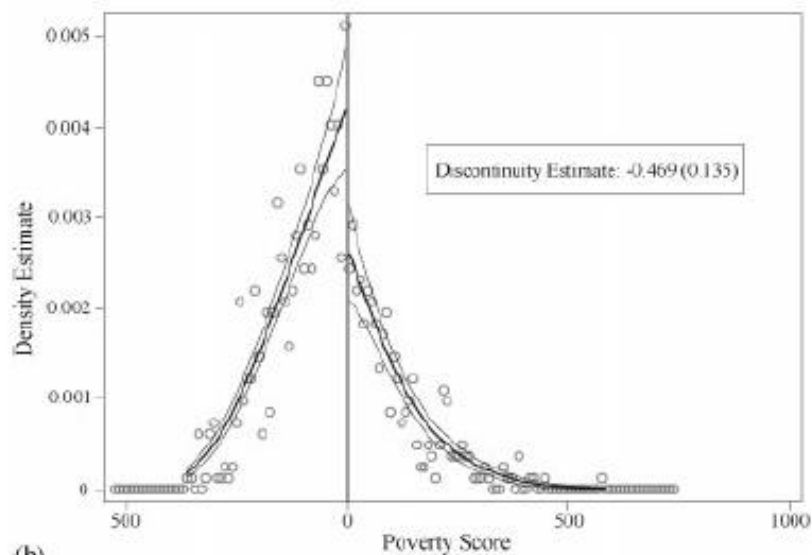
Estimates for	Effect of participation on outcome $\theta = \pi_1/\pi_0^a$		Number of observations
	Schwartz preferred <sup>b</sup>	Second best <sup>c</sup>	
Overweight			
Women	-0.137 (0.302)	-0.154 <sup>+</sup> (0.084)	1092
Men	0.069 (0.055)	0.042 (0.109)	944
Obesity			
Women	-0.323* (0.158)	-0.275* (0.110)	1092
Men	0.132 (0.163)	0.061 (0.139)	944

# INTERNAL VALIDITY OF THE RD ESTIMATES



(a)

The Cut-off for Eligibility is 0; Eligible People Have a Negative Score.



(b)

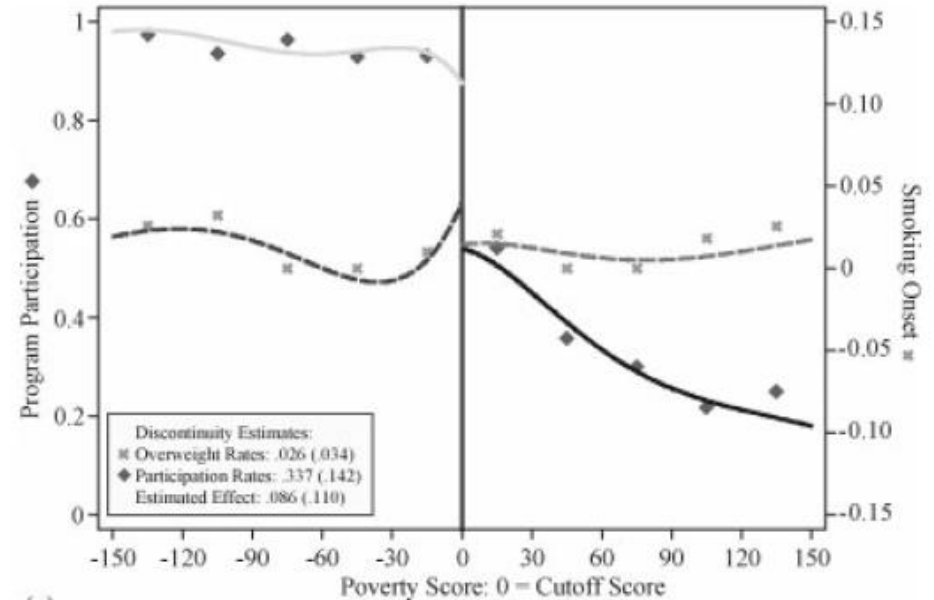
The Cut-off for Eligibility is 0; Eligible People Have a Negative Score.

Notes: These figures provide discontinuity estimates from the test proposed by McCrary(2008, 703). Standard errors are reported in parentheses.

# DISCUSSION

- Increase access to information and purchasing power.
- Apposing effect by gender!
  - More educated women respond faster to diffusion of information on deleterious consequences of certain health behaviors.
  - Reduction of male labor force participation lead to a decrease in physical activity.
- Lower obesity rates among participant rates might have resulted from lower pregnancy rates.
- increases in smoking could help to explain lower obesity rates among participant women.

# DISCUSSION



(a)

The Cut-Off for Eligibility is Zero; Eligible People have a Negative Cut-Off

