Domino's Effect: Impact of Fast Food Chains on Urban Health in India

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This Presentation

- **Research Question:** What is the impact of access to unhealthy food on urban health in developing countries like India?
- **Data and Methodology:**
  - We use DHS data for India, along with spatial data from Google Maps to construct DHS cluster-level restaurant-density variables for a sample size of over 0.24 million
  - We also use nightlight data to identify areas of higher economic activity and thus, higher restaurant density
  - Using these, we look at the impact of living near fast food restaurants on BMI, blood pressure and glucose levels
- **Results:** We find large significant impact of higher restaurant density on health outcomes, particularly BMI in the individuals living in nearby areas

Motivation

- Double burden of malnutrition in developing countries like India
  - Even though the number of malnourished children in India is double that of sub-Saharan Africa, India also ranks third in the world in number of obese people and second in the world for type 2 diabetes
  - While there is significant interest in trying to understand issues of malnutrition in rural areas in developing countries, more research is needed on the issues of malnutrition in urban areas in these fast growing economies
- Governments are considering policy options like zoning laws and “sin tax” for restaurants that sell junk food and aerated drinks
  - State government of Kerala - with the second highest obesity rate in India - became the first Indian state to impose a 14.5% tax on food products high in fat and calories in 2016; state of Gujarat also considering a similar policy

Motivation

- Governments face growing pressure from fast food chains which bring in billions of dollars in foreign direct investment
  - In India, the fast food sector is currently valued at USD 57 billion
- To justify any regulatory policy measures, we need more evidence to identify policy tools that may curb obesity
  - Unnecessary taxes or zoning restrictions may reduce consumer welfare

- "We're not the cause of obesity. Ronald McDonald is not a bad guy. He's a clown. He's about fun. I'd ask you all to let your kids have some fun too."
- "We have great side salads. They don't represent a lot of our sales but we have great side salads."

– *Don Thompson, McDonald's CEO, 2013*

- "There's nobody at McDonald's shoving fries in your mouth."

– *Bonnie Modugno, McDonald's Chief Nutritionist, 2004*

Data

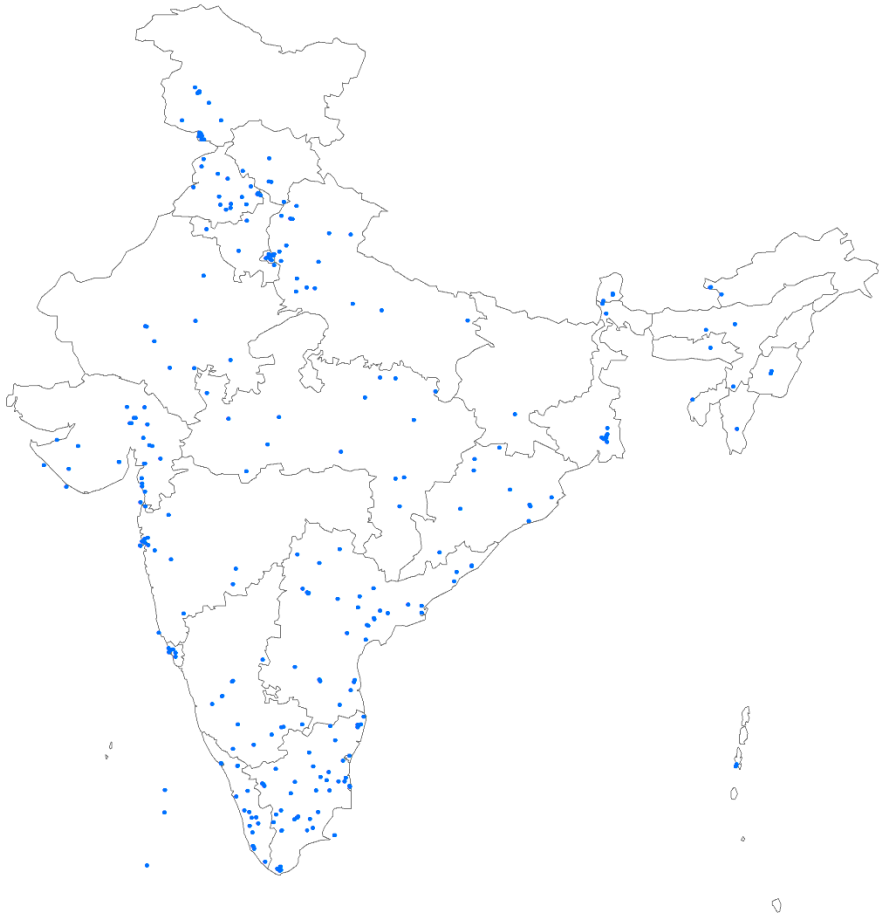
- NFHS 4 (DHS) data on individuals in urban areas across India (*N* > 0.24 million)
  - Outcome variables on BMI, blood pressure, and blood glucose
  - Geocoded at sample cluster level (n > 9000)
  - Also includes other household and individual characteristics (e.g., wealth, smoking/alcohol, education, etc.)
- Restaurant density from Google Maps
  - Match DHS clusters to nearby restaurants (2 km buffer) using Google API
  - Filter restaurants with/without serving “fast food” tags
- Economic activity proxied by Night Lights Luminosity and population density at cluster level
- Satellite data on climate variables at cluster level

Methodology

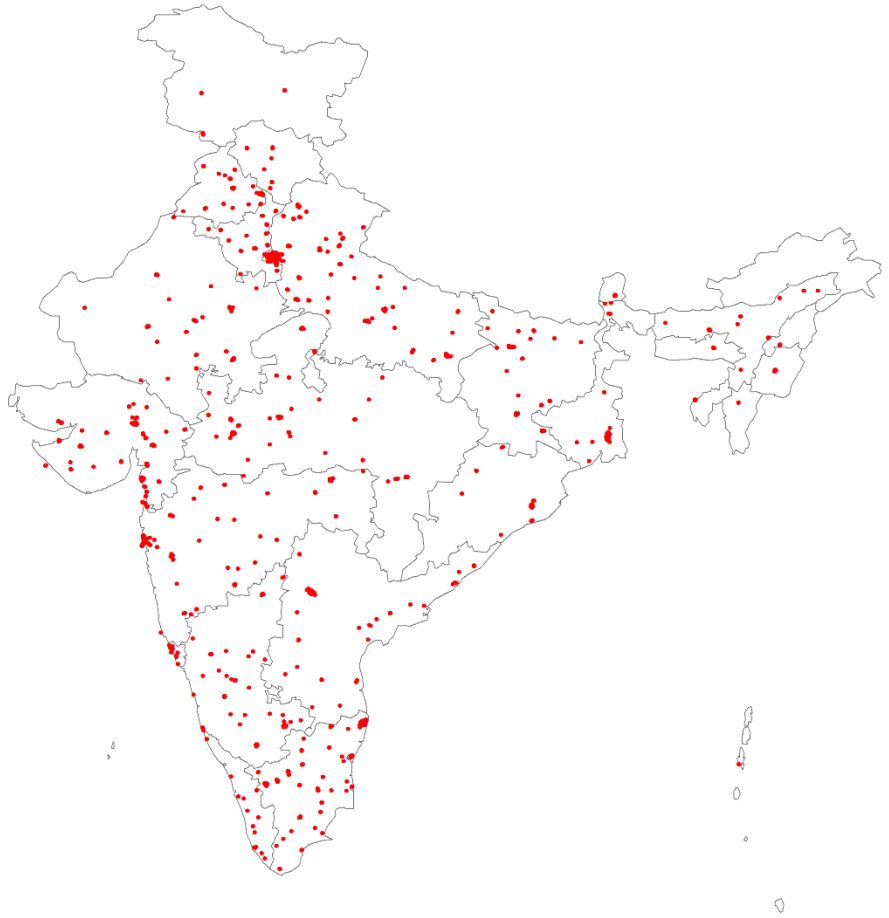
- Base OLS specification:
  - Regress outcome (BMI/BP/blood glucose) on cluster-level restaurant density
  - Controls for HH, individual and other cluster-level characteristics (age FE, education FE, district FE, wealth index, climate, economic activity)
  - Specification compares difference in outcome between individuals with same age/education, within same district but residing in low vs. high restaurant density areas
- Potential problem: restaurant location maybe endogenous
- To address this we use instrumental variable (IV) approach:
  - Currently: Use lagged night light luminosity and population density to instrument for restaurant density
  - Next steps: merging with growth in restaurant density using Economic Census

Spatial overlap between obesity prevalence and restaurant density

Clusters with high obesity (average BMI > 25)



Clusters with high restaurant density (> 60)



Results: Impact of restaurant density on health outcomes

	BMI		Abnormal BP = 1	
	OLS	IV	OLS	IV
Restaurant density	0.00206**	0.00319***	0.0000860	0.000650***
	(0.000838)	(0.00101)	(0.0000680)	(0.0000825)
Observations	228056	228056	238308	238308
Dep var mean	22.85	22.85	0.135	0.135
1st Stage F-stat (IV)		1919.6		1979.5
R square	0.230		0.0766	

Standard errors in parentheses. Standard error clustered at DHS cluster level. All specifications include individual (age & education FE) and household controls (religion, wealth etc.) ; district FE; temperature and precipitation. Ivs are lagged night-light luminosity and population density. * $p < 0.1$, ** $p < .05$, *** $p < 0.01$

Results: Impact of restaurant density on health outcomes are higher for women

	BMI		Abnormal BP = 1	
	Women	Men	Women	Men
Restaurant density	0.00387***	0.000900	0.000174**	-0.000320
	(0.00104)	(0.00238)	(0.0000810)	(0.000197)
Observations	194604	33452	204381	33927
Dep var mean	22.89	22.66	0.129	0.173
1st Stage F-stat (IV)	2145.7	515.2	2176.6	510.4

Standard errors in parentheses. Standard error clustered at DHS cluster level. All specifications include individual (age & education FE) and household controls (religion, wealth etc.) ; district FE; temperature and precipitation. Ivs are lagged night-light luminosity and population density. * $p < 0.1$, ** $p < .05$, *** $p < 0.01$

Mechanisms: Find evidence for increase in unhealthy dietary patterns

	Fried foods		Aerated drinks	
	Women	Men	Women	Men
Restaurant density	0.000235***	0.000186	0.000285***	0.000369
	(0.0000896)	(0.000231)	(0.0000904)	(0.000242)
Observations	204381	35442	204381	35442
Dep var mean	0.129	0.127	0.0597	0.0834
R square	0.389	0.363	0.106	0.167

Standard errors in parentheses. Standard error clustered at DHS cluster level. All specifications include individual (age & education FE; number of children for women) and household controls (religion, wealth etc.) ; district FE; temperature and precipitation. Ivs are lagged night-light luminosity and population density. * $p < 0.1$, ** $p < .05$, *** $p < 0.01$

Policy Implications/Future Work

- Results suggest that proximity to restaurants leads to unhealthy dietary practices and adverse health outcomes
- Study underscores the need for exploring potential policies such as zoning laws, particularly near vulnerable population like schools, hospitals etc.
- Next steps:
  - Additional IV using data from Economic Census (2013 and 2005)
  - Evaluating the impact of 14.5% “sin tax” imposed by the state of Kerala on unhealthy food
- Further research needed to evaluate the effectiveness of various policy options in a developing country context

Thank you