D4N 2025
Delivering for Nutrition in South Asia
Towards Impact at Scale
December 1, 2025

Mapping outdoor food advertising and its association with adult dietary intake

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In collaboration with teams from the **GHRU NIHR South Asia Biobank**

Rationale

- Poor diet a key modifiable risk factor for non-communicable diseases (NCDs).[1]
- **Outdoor food advertising** an important component of the environment that can influence purchasing and consumption patterns.[2-4]
- South Asia region:
  - steep increases in sales of ultra-processed foods.[5]
  - forecasted as one of world's fastest-growing advertising markets.[6]
  - nutritional transition.[7]
  - socio-economic inequalities.[8-9]

→ Need to 1) categorize the type of food products advertised outdoors; 2) asses their association with dietary intake and 3) whether the associations differ by groups

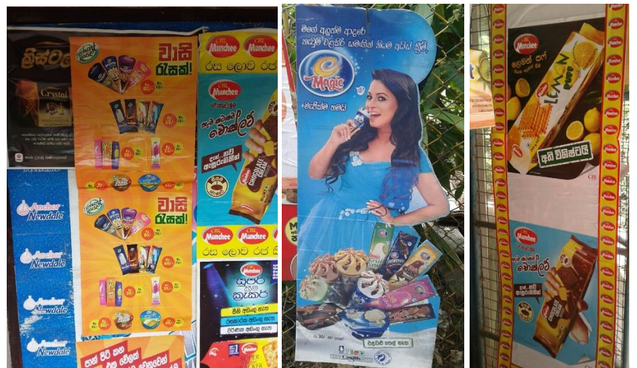
Methods

- **South Asia Biobank datasets:**[10]
- Surveillance data (from BD, IN, PK, SL includes dietary intake, socio-economic, lifestyle, healthcare utilization, geolocation of residence).
- Environmental mapping data (pictures and geolocation of outdoor food advertisements and type of food retailers)

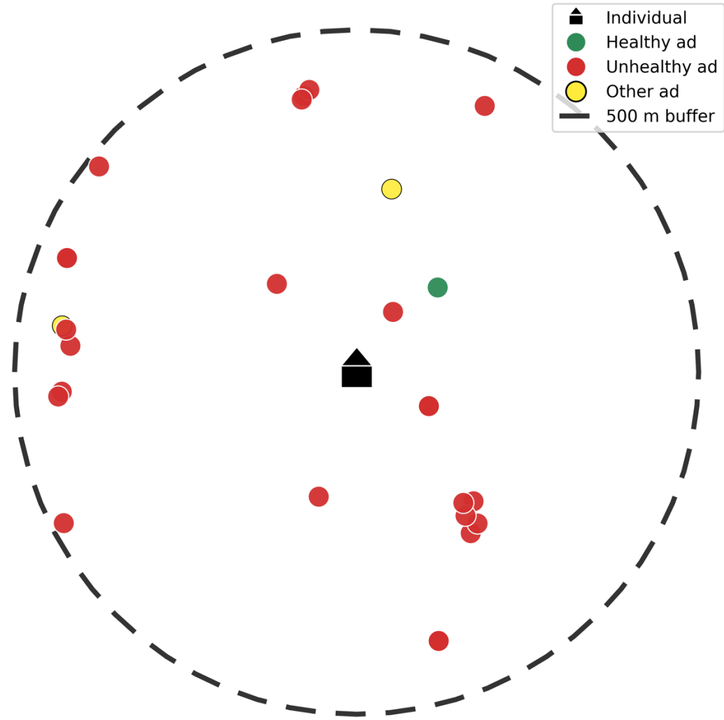
- Manually extracted data from ads images and classified ads into:
  - healthy, unhealthy, high in fat, high in sugar
based on INFORMAS.[11]

- **Techniques:**
- Geospatial analyses
(link individual data to environmental data).
- Multivariate regression analyses
(linear OLS with site-year fixed-effects).
- Stratification by income and sex.

Examples of captured outdoor food ads



Illustrative Example of Geospatial Linkage



Methods

- **Outcome variables**

- Dietary energy density (kcal/g)
- Free sugar intake as % of total energy
- Saturated-fatty acids (SFA) intake as % of total energy

- **Control variables:**

- Relative availability of food retailers within the same geographic area
- Sociodemographic and economic characteristics
- Lifestyle factors
- Dietary advice

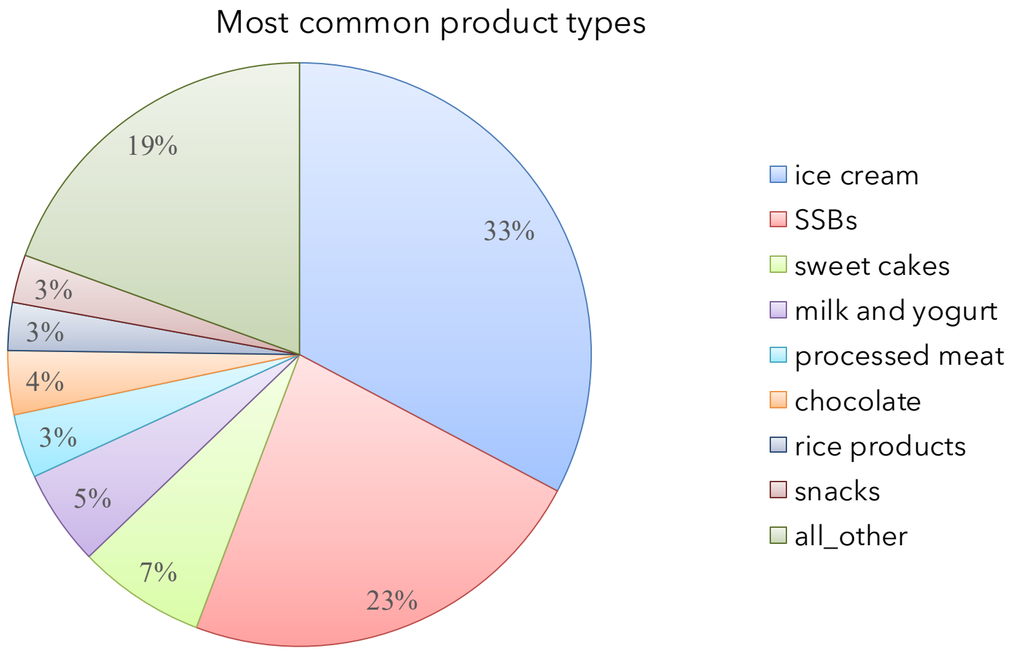
Results - advertisements

- We analyzed a total of ~8,250 outdoor food advertisements, featuring a total of ~19,800 food products.
- 88% of these were for unhealthy products, with 68% being high in sugar

- Food categories dominance:
- Ice creams (33%);
- Sugar-sweetened beverages (23%);

Total number of ads analyzed by country

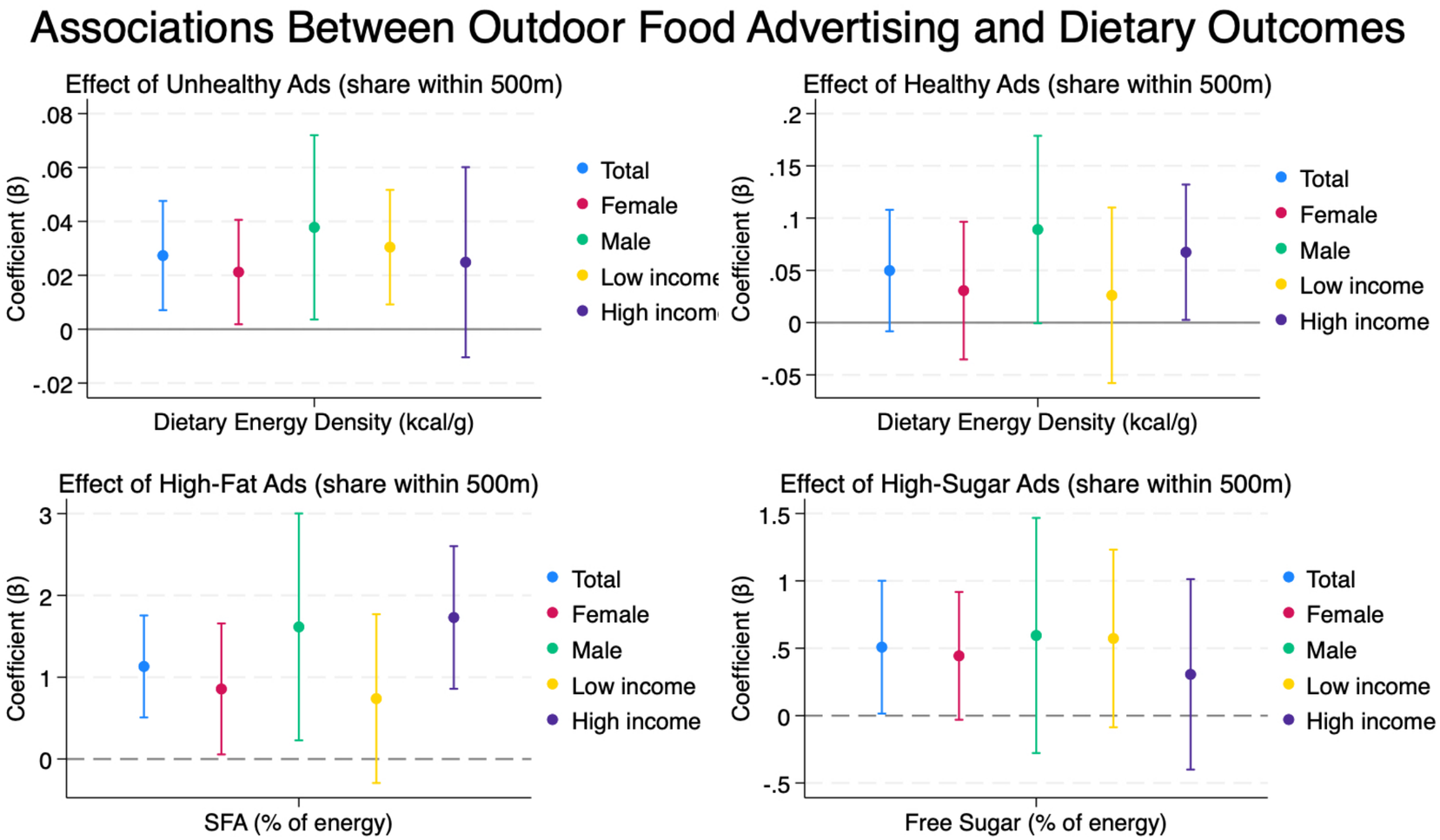
Category	Bangladesh	India	Pakistan	Sri Lanka	Total
Total ads	690	800	681	6085	8256



Preliminary results – data from Sri Lanka

Descriptive Statistics	Total	Male	Female	P-value	Low-income	High-income	P-value
	24,234	7,896	16,335		12,252	11,982	
Nutrient and Dietary Intake Outcomes							
Energy (kcal)	1,597 (653)	1,723 (716)	1,537 (611)	<0.001	1,565 (652)	1,631 (651)	<0.001
Food Energy Density (kcal/g)	1.6 (0.4)	1.6 (0.4)	1.6 (0.4)	<0.001	1.6 (0.4)	1.6 (0.4)	<0.001
SFA (% E)	10.7 (7.0)	10.4 (7.0)	10.9 (7.0)	<0.001	10.7 (7.0)	10.8 (7.1)	0.138
Free Sugars (% E)	7.3 (6.8)	7.0 (6.7)	7.5 (6.9)	<0.001	7.7 (7.0)	6.9 (6.6)	<0.001
Density of food products advertised outdoors (500m buffer) (mean, SD)							
Healthy	0.06 (0.13)	0.06 (0.13)	0.06 (0.13)	0.610	0.06 (0.13)	0.06 (0.13)	0.412
Unhealthy	0.47 (0.44)	0.46 (0.44)	0.47 (0.44)	0.005	0.50 (0.44)	0.44 (0.44)	<0.001
High in sugar	0.37 (0.38)	0.36 (0.38)	0.37 (0.38)	0.006	0.39 (0.39)	0.35 (0.38)	<0.001
High in fat	0.07 (0.16)	0.07 (0.16)	0.07 (0.16)	0.631	0.08 (0.16)	0.07 (0.15)	<0.001
All ads (count)	31.07 (64.71)	28.15 (59.50)	32.44 (66.94)	<0.001	31.01 (63.78)	31.13 (65.64)	0.891
Density of food retailers (500m buffer) (mean, SD)							
All food retailers (count)	15.96 (25.22)	15.01 (24.08)	16.41 (25.71)	<0.001	15.74 (25.69)	16.19 (24.72)	0.171
Healthy	0.12 (0.15)	0.12 (0.15)	0.12 (0.15)	0.025	0.12 (0.15)	0.12 (0.14)	0.034
Unhealthy	0.64 (0.32)	0.63 (0.33)	0.64 (0.32)	0.008	0.64 (0.32)	0.63 (0.33)	<0.001
Other	0.08 (0.11)	0.08 (0.11)	0.08 (0.11)	0.067	0.08 (0.12)	0.08 (0.11)	0.454

Preliminary Results – ads and diet



Implications for scaling and policy

- **Scaling:**
- Need to develop monitoring tools for unhealthy advertisements

(current work to design algorithms to automate the process).

- **Policy implications:**
- Most current food regulations in South Asia focus on labelling and safety, not marketing exposure.[12]

- Existing policy recommendations on food advertising focus on children and typically target channels such as TV and around schools. [2,3]

- Adults may also benefit from such recommendations

My participation was made possible through the generous support of the

Delivering for Nutrition 2025 Conference funders

This work was funded by:

- NIHR (16/136/68 and 132960);
- LISS-DTP by the Economic and Social Research Council (ESRC) (ES/P000703/1);
- Imperial College London through an Imperial College Research Fellowship grant awarded to PA

Thank you for your attention!

Questions?

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Additional Results

Association between 1) the density of unhealthy and healthy food products advertised outdoors and dietary energy density; 2) the density of advertised food products high in fat and SFA consumption; 3) the density of advertised food products high in sugar and free sugar consumption. Results are for the total sample as well as stratified by female, male, low-income and high-income.

VARIABLES	Total	Female	Male	Low-income	High-income
1) Dietary Energy Density (kcal/g)					
Healthy food products advertised	0.05	0.03	0.09	0.03	0.07*
	(-0.01 - 0.11)	(-0.04 - 0.10)	(-0.00 - 0.18)	(-0.06 - 0.11)	(0.00 - 0.13)
Unhealthy food products advertised	0.03**	0.02*	0.04*	0.03**	0.02
	(0.01 - 0.05)	(0.00 - 0.04)	(0.00 - 0.07)	(0.01 - 0.05)	(-0.01 - 0.06)
1) 2) SFA (% E)					
High in fat food products advertised	1.13**	0.86*	1.61*	0.73	1.74**
	(0.51 - 1.75)	(0.06 - 1.66)	(0.23 - 3.00)	(-0.30 - 1.76)	(0.87 - 2.61)
1) 3) Free Sugar (% E)					
High in sugar food products advertised	0.51*	0.44	0.59	0.57	0.30
	(0.02 - 1.00)	(-0.03 - 0.92)	(-0.28 - 1.47)	(-0.09 - 1.23)	(-0.41 - 1.01)
Observations	24,229	16,334	7,895	12,250	11,979
Controls	YES	YES	YES	YES	YES
Site-Year FE	YES	YES	YES	YES	YES