

## HOW DOES THE FOOD ENVIRONMENT INFLUENCE HOUSEHOLD FOOD PURCHASE PATTERNS AND NUTRITIONAL STATUS? EMPIRICAL EVIDENCE FROM FOOD VENDOR MAPPING IN PERI-URBAN DAR ES SALAAM, TANZANIA

RAMYA AMBIKAPATHI  
PURDUE UNIVERSITY, JULY 1<sup>ST</sup> 2020, #ANH2020



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## BACKGROUND AND AIM

- In Africa, majority of peri-urban population relies on purchased foods. Food environment contains a high density of informal vendors, creating challenges to characterizing the FE.





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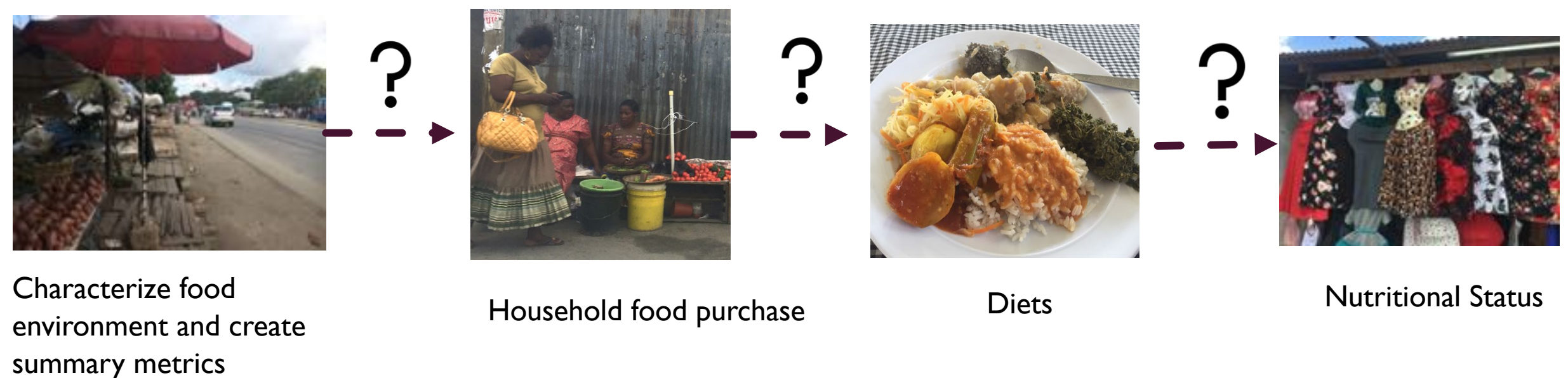
Diets

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# BACKGROUND AND AIM

- In Africa, majority of peri-urban population relies on purchased foods. Food environment contains a high density of informal vendors, creating challenges to characterizing the FE.



- Nested within **Diet, Choice, and Positive living (DECIDE)** study: mixed-methods cohort set in peri-urban Dar es Salaam, Tanzania.

- Aims to characterize food choice and environment among families with persons living with human immunodeficiency virus (PLHIV) using qualitative, geo-spatial and quantitative methods.
- IRB approval from Purdue University and Tanzania's National Institute for Medical Research.





# GEOCODING A DYNAMIC FOOD ENVIRONMENT



Example of formal food vendor



Example of semi-formal food vendor



Example of informal food vendor

Formal	Semi-Formal	Informal food vendors
<ul style="list-style-type: none"><li>- Fixed structures (super-market, wet market, shops)</li><li>- Fixed location</li></ul>	<ul style="list-style-type: none"><li>- Semi-permanent structures (umbrella, pallets)</li><li>- Consistent location daily</li></ul>	<ul style="list-style-type: none"><li>- Baskets/Bicycles</li><li>- Mobile through space and time</li></ul>



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\*Tool and protocol available

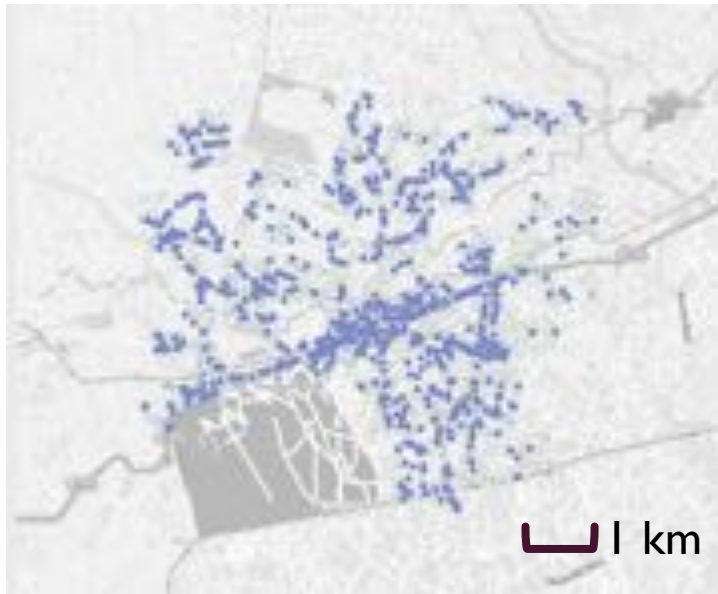




# FOOD ENVIRONMENT: CENSUS OF 6,627 VENDORS



39% Formal vendor



30% sell vegetables  
15% green leafy vegetables

44% Semi-formal vendor



40% sell vegetables  
27% green leafy vegetables

17% Informal vendor



30% sell vegetables  
58% green leafy vegetables

Vegetables include: cabbage, bell peppers, tuber, lemon, onion, tomato, okra, green leafy vegetable, eggplant, carrots

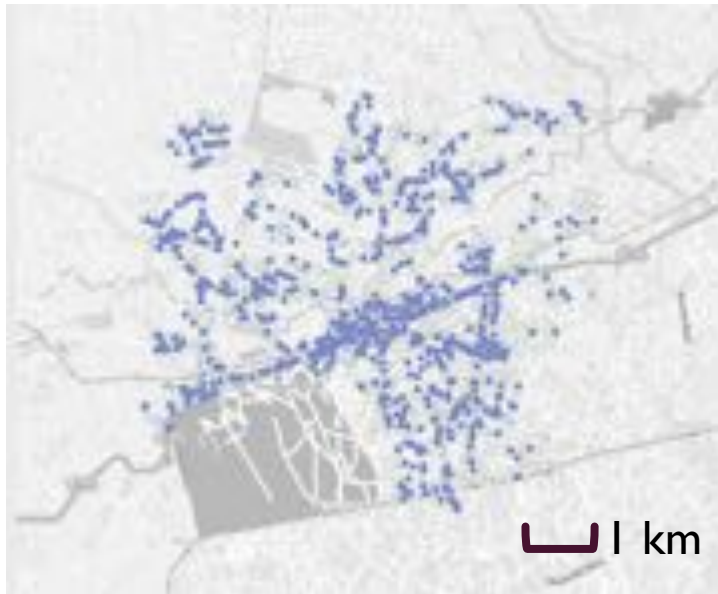
**Data collection: April to June 2019**



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# FOOD ENVIRONMENT: METRICS DEFINITION

Metric	Name	Definition	
<b>Density</b>	Food environment typology	Count	Informal, semi-formal, formal and all vendors
	Vegetable vendors	Count	Vendors who sell any of 10 vegetables
	Green leafy vegetable vendor	Count	Vendors who sell green leafy vegetables
<b>Dispersion</b>	Vegetable vendor hotspots / cold spots	Clusters	Vegetable vendors
	Green leafy vendor hotspots / cold spots	Clusters	Green leafy vegetable vendors
<b>Diversity / Dominance</b>	Shannon diversity of <u>vendor typology</u> (standardized 0 to 1)	Variety and evenness	6 vendor typology: restaurants, mobile vendors, shops, semi-formal food vendors, butchers, umbrella vendors
	Dominance of <u>vendor typology</u> (standardized 0 to 1)	Variety and evenness	Measure of one/few vendor dominating (1- diversity). Lack of variety and evenness.



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FE metrics are correlated with each other.



# FOOD ENVIRONMENT: DISTANCE TO HOUSEHOLD



100 meters    200 meters    300 meters    500 meters    700 meters    1000 meters

Density: Median (IQR) number of all green leafy vegetable vendors	100 meters	200 meters	300 meters	500 meters	700 meters	1000 meters
	0 (0, 1)	2 (1, 4)	6 (3, 11)	18 (15, 26)	38 (29, 49)	69 (57, 88)



## BACKGROUND ON THE PARTICIPANTS (PLHIV)

Participant : 70% of women, 40 years old, 4 years since HIV diagnosis, half share toilets with neighbors, and almost all have cellphone.

Selected main outcomes	Median (IQR); N=239
Bought any (10) vegetables in the last 7 days, Frequency, Main purchase location	71%, 8 times Mostly from semi-formal/informal vendors
Energy intake (kcal) from 24-hour recall	2694 kcal (1874, 3659)
Body Mass Index (Kg/m <sup>2</sup> , measure of obesity)	23.1 (20.7, 27.2) 10% underweight 36% overweight/obese
Waist to Hip Ratio (~ measure of central adiposity)	0.85 (0.81, 0.90) 26% above 0.90 cutoff (risk factor for diabetes)

**Round 1 Data collection: February to June 2019**

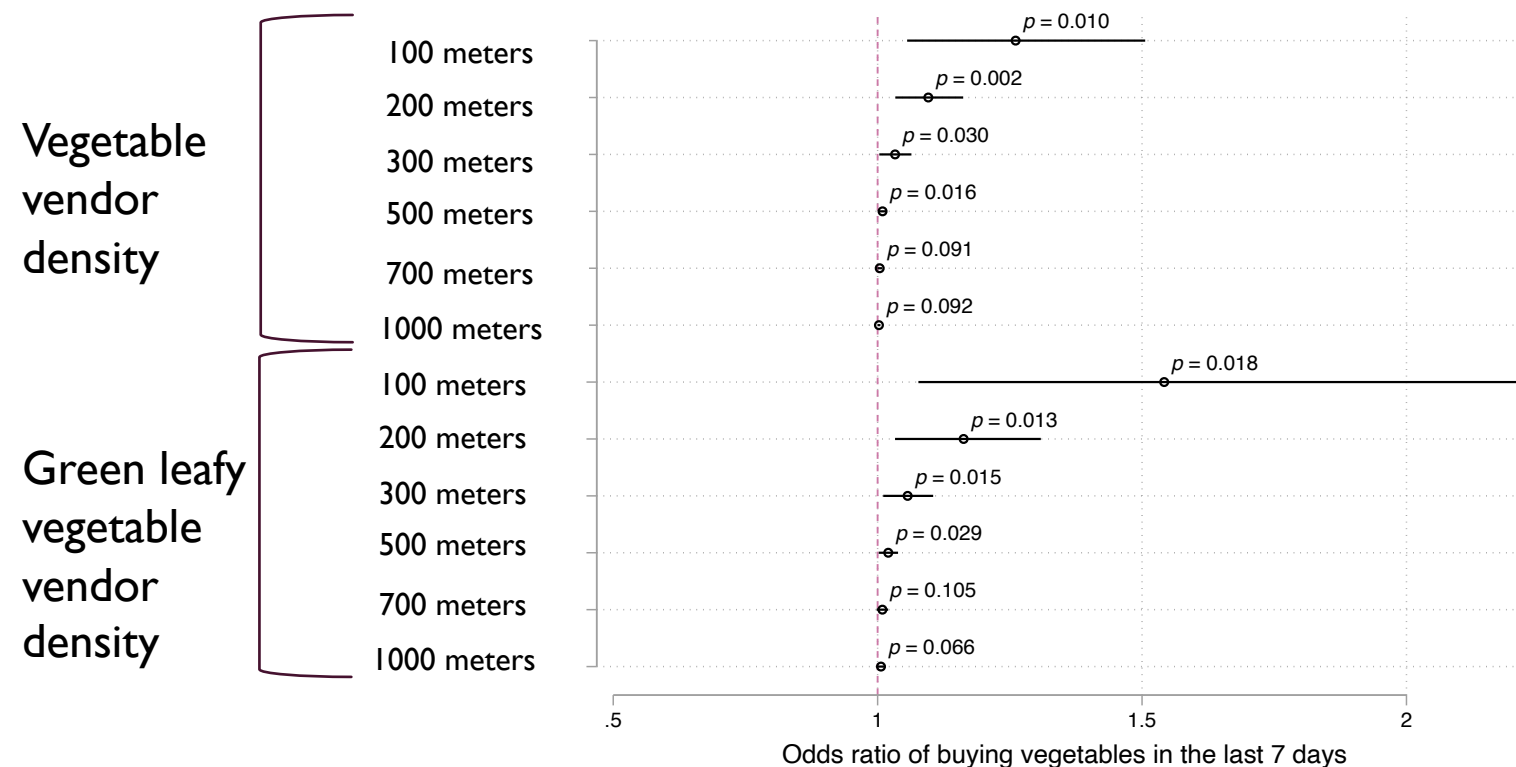
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# REGRESSION RESULTS – HOUSEHOLD FOOD PURCHASE

Bought any vegetables last week? N=239



\*All models adjusted for age, gender, education, asset quartiles, years since HIV diagnosis, renting house, head of household status, morbidity; robust standard error



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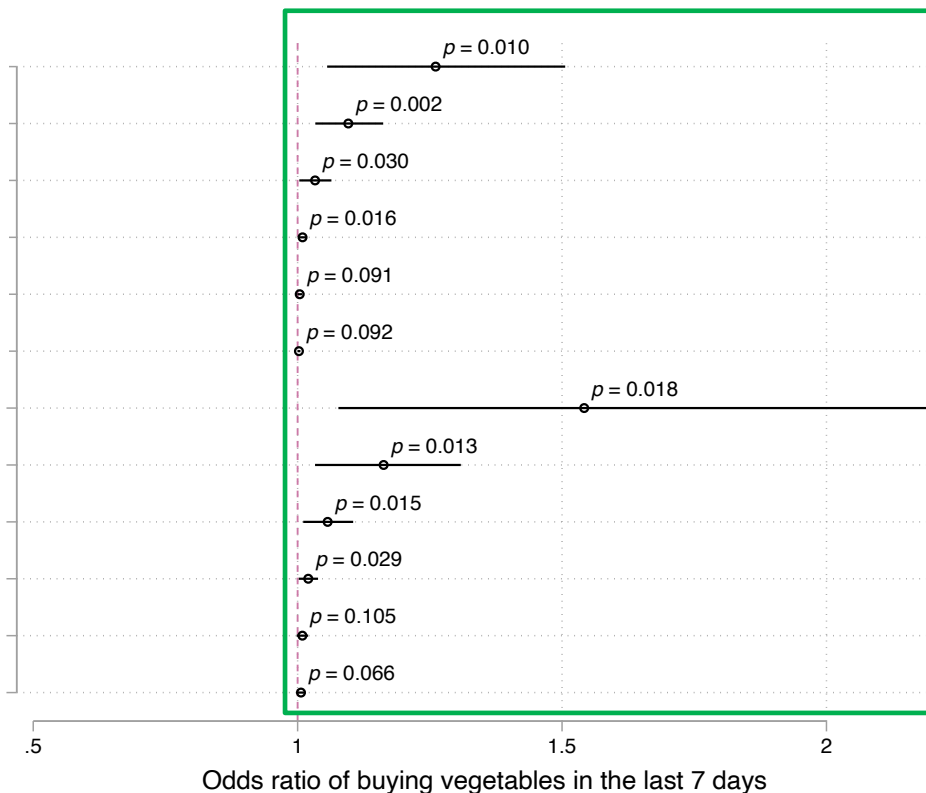
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Vegetable  
vendor  
density

100 meters  
200 meters  
300 meters  
500 meters  
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Green leafy  
vegetable  
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100 meters  
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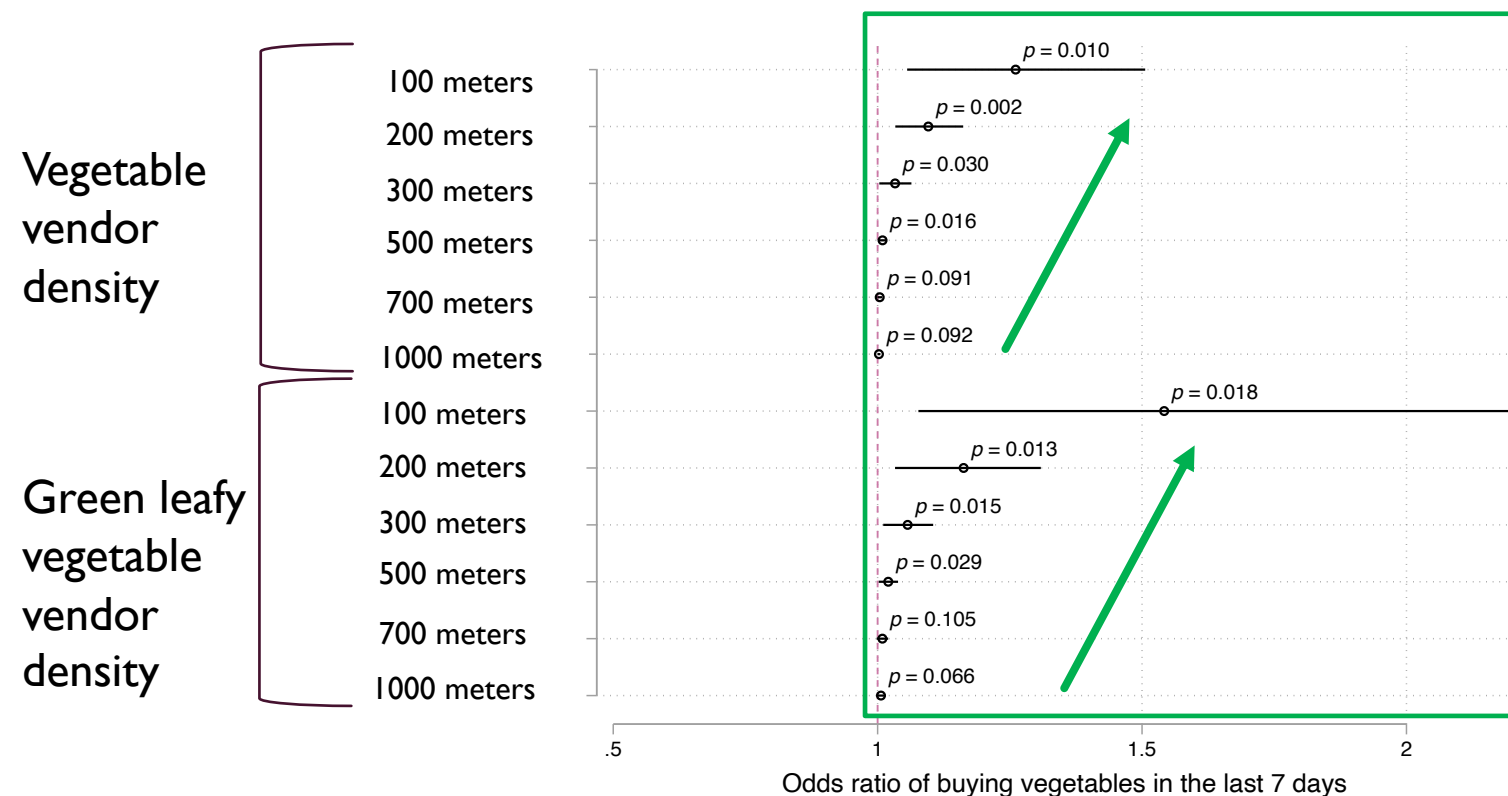


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# REGRESSION RESULTS – HOUSEHOLD FOOD PURCHASE

Bought any vegetables last week? N=239



- A greater density of vegetable vendors within 500 meters of home increases the likelihood of purchasing vegetables in the last week.
- This effect increases as vendors are found closer to home.

\*All models adjusted for age, gender, education, asset quartiles, years since HIV diagnosis, renting house, head of household status, morbidity; robust standard error

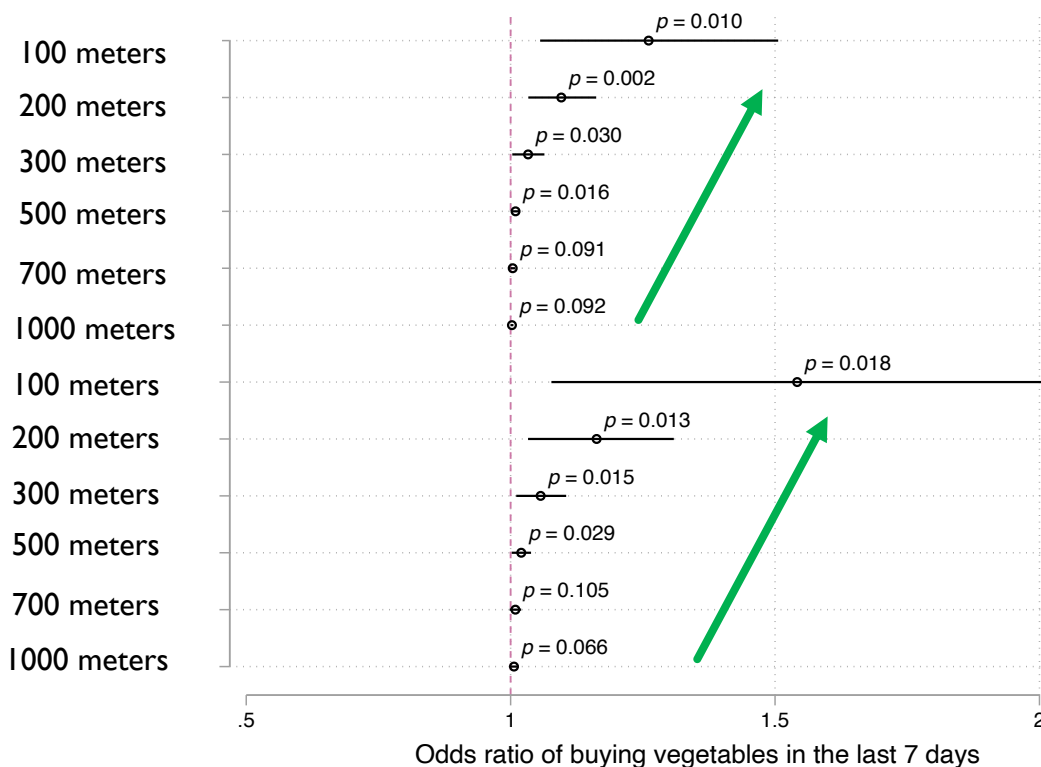


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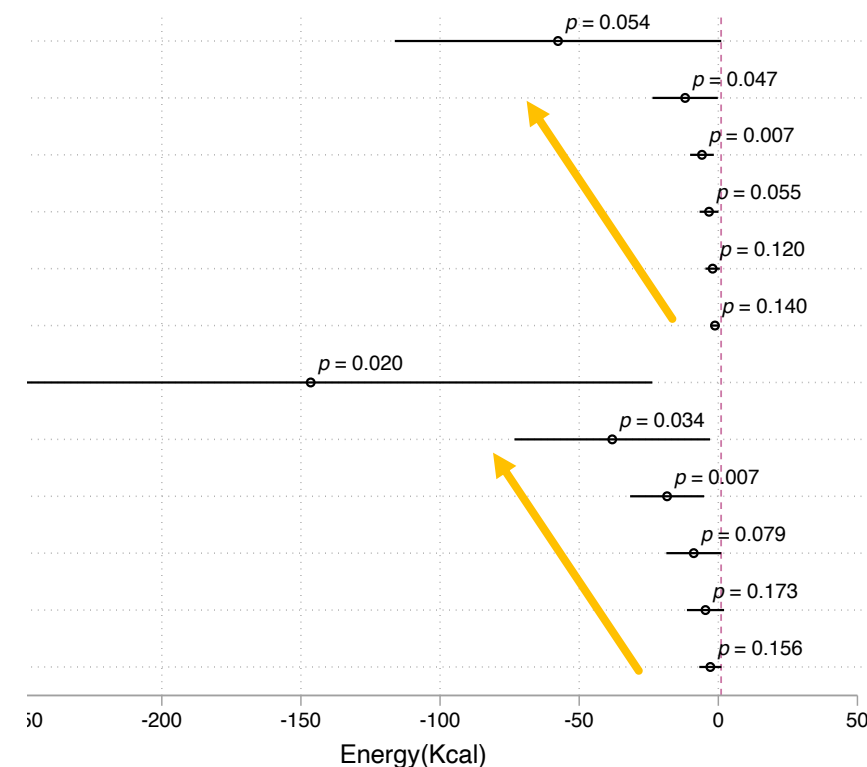
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Vegetable  
vendor  
density

Green leafy  
vegetable  
vendor  
density



Total Energy (Kcal)



- A greater density of vegetable vendors within 500 meters of home increases the likelihood of purchasing vegetables in the last week.
- This effect increases as vendors are found closer to home.

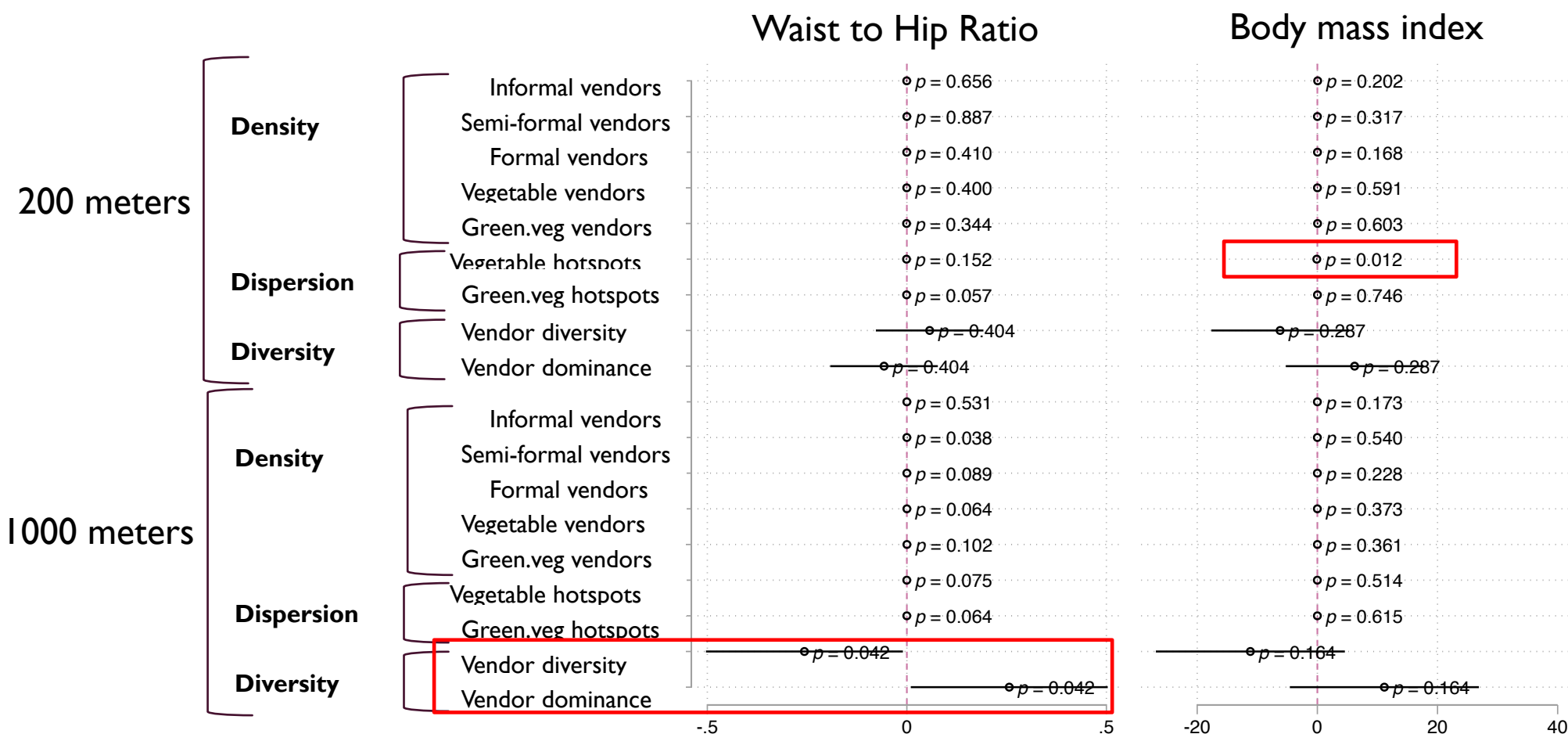
- This effect translated into reduced intake of total energy by 50-100 Kcal.

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# REGRESSION RESULTS–NUTRITIONAL STATUS



Different metrics of food environment at different distances to household have various association with nutritional status

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# SUMMARY OF FINDINGS

**Food environment metrics inspired by ecology are associated with food purchase patterns, diets, and nutritional status.**



Food environment metrics



Household food purchase



Diets



Nutritional Status



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Food environment metrics

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- **Peri-urban setting: Having vendors closer to home is associated with increased purchase of vegetables and reduced total energy intake.**



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**Food environment metrics inspired by ecology are associated with food purchase patterns, diets, and nutritional status.**



Food environment metrics

Household food purchase

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Nutritional Status

- **Peri-urban setting: Having vendors closer to home is associated with increased purchase of vegetables and reduced total energy intake.**
- **Food purchasing behavior and consumption is complex. Need to align specific FE metrics with specific behaviors. Ex. vegetable vendor density is associated with vegetable purchase.**
- **Future work:**
  - Analyze other food purchase behavior (soda, prepared foods, packaged foods, fruits, recommended foods for PLHIV).
  - Examine spatial and temporal variation of food environment using geo-spatial methods.
  - Identify intervention points: Ex. optimize and target semi/informal vendors for healthy eating patterns.





# THANK YOU!

- Grateful for my team and participants for giving me this opportunity to present on their behalf and highlight these findings from this community.
- Funder: Drivers of Food Choice
- Questions/Comments, please contact me at [rambikap@purdue.edu](mailto:rambikap@purdue.edu)

