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 1ST 2020, #ANH2020

http://www.anh-academy/ANH2020
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**BACKGROUND AND AIM**

- Characterize food environment and create summary metrics
- Household food purchase
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Characterize food environment and create summary metrics
Household food purchase
Diets
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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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

<table>
<thead>
<tr>
<th>Formal</th>
<th>Semi-Formal</th>
<th>Informal food vendors</th>
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<tr>
<td>- Fixed structures (super-market, wet market, shops)</td>
<td>- Semipermanent structures (umbrella, pallets)</td>
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*Tool and protocol available*
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<td></td>
</tr>
<tr>
<td>- Vendor typologies</td>
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<td>- 8 food groups &amp; 58+ food items</td>
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<td>- 31+ food items</td>
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<tr>
<td>- Survey length: 1-2 mins</td>
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<td>- Survey length: &lt;1 min</td>
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*Example of formal food vendor

*Example of semi-formal food vendor

*Example of informal food vendor

*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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<td>Vegetable vendors</td>
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<td><strong>Diversity / Dominance</strong></td>
<td>Shannon diversity of vendor typology (standardized 0 to 1)</td>
<td>Variety and evenness 6 vendor typology: restaurants, mobile vendors, shops, semi-formal food vendors, butchers, umbrella vendors</td>
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### Food Environment: Metrics Definition

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<td><strong>Dominance of vendor typology</strong></td>
<td>Variety and evenness Measure of one/few vendor dominating (1 - diversity). Lack of variety and evenness.</td>
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## Food Environment: Distance to Household

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<th>Distance</th>
<th>100 meters</th>
<th>200 meters</th>
<th>300 meters</th>
<th>500 meters</th>
<th>700 meters</th>
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<tr>
<td>Density: Median (IQR) number of all green leafy vegetable vendors</td>
<td>0 (0, 1)</td>
<td>2 (1, 4)</td>
<td>6 (3, 11)</td>
<td>18 (15, 26)</td>
<td>38 (29, 49)</td>
<td>69 (57, 88)</td>
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**Distance**
- 100 meters
- 200 meters
- 300 meters
- 500 meters
- 700 meters
- 1000 meters
**Participant:** 70% of women, 40 years old, 4 years since HIV diagnosis, half share toilets with neighbors, and almost all have cellphone.

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<th>Selected main outcomes</th>
<th>Median (IQR); N=239</th>
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<td>Bought any (10) vegetables in the last 7 days, Frequency, Main purchase location</td>
<td>71%, 8 times Mostly from semi-formal/informal vendors</td>
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<td>Energy intake (kcal) from 24-hour recall</td>
<td>2694 kcal (1874, 3659)</td>
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<tr>
<td>Body Mass Index (Kg/m², measure of obesity)</td>
<td>23.1 (20.7, 27.2) 10% underweight 36% overweight/obese</td>
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<tr>
<td>Waist to Hip Ratio (~ measure of central adiposity)</td>
<td>0.85 (0.81, 0.90) 26% above 0.90 cutoff (risk factor for diabetes)</td>
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*Round 1 Data collection: February to June 2019*

Vegetables include: cabbage, bell peppers, tuber, lemon, onion, tomato, okra, green leafy vegetable, eggplant, carrots
**REGRESSION RESULTS – HOUSEHOLD FOOD PURCHASE**

Bought any vegetables last week? \( N = 239 \)

- **Vegetable vendor density**
  - 100 meters
  - 200 meters
  - 300 meters
  - 500 meters
  - 700 meters
  - 1000 meters

- **Green leafy vegetable vendor density**
  - 100 meters
  - 200 meters
  - 300 meters
  - 500 meters
  - 700 meters
  - 1000 meters

*All models adjusted for age, gender, education, asset quartiles, years since HIV diagnosis, renting house, head of household status, morbidity; robust standard error*
Bought any vegetables last week? N=239

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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
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

Waist to Hip Ratio  Body mass index

200 meters

Density
- Informal vendors:  p = 0.656
- Semi-formal vendors:  p = 0.887
- Formal vendors:  p = 0.410
- Vegetable vendors:  p = 0.400
- Green.veg vendors:  p = 0.344

Dispersion
- Vegetable hotspots:  p = 0.152
- Green.veg hotspots:  p = 0.057

Diversity
- Vendor diversity:  p = 0.404
- Vendor dominance:  p = 0.287

1000 meters

Density
- Informal vendors:  p = 0.531
- Semi-formal vendors:  p = 0.038
- Formal vendors:  p = 0.089
- Vegetable vendors:  p = 0.064
- Green.veg vendors:  p = 0.102

Dispersion
- Vegetable hotspots:  p = 0.075
- Green.veg hotspots:  p = 0.064

Diversity
- Vendor diversity:  p = 0.042
- Vendor dominance:  p = 0.042

*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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SUMMARY OF FINDINGS

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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.

- **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