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SUSTAINABLE FOOD FOR GLOBAL HEALTH

Food environments and dietary intake in urban and rural Kenya

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DECLARATION OF CONFLICTS OF INTEREST

I hereby declare that there are no conflicts of interest related to this presentation.

All information provided is accurate and reflects the impartiality of the presenter and the Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT).



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Introduction

- Globally, 11 M deaths annually due to **poor diets**; More than 3.1 billion people in the world (42%) unable to afford a healthy diet (SOFI, 2023)
- **Food safety**: ± 600 million people globally fall ill after consuming food contaminated by bacteria, viruses, parasites, or chemical substances, with 420,000 dying every year (Mutoro, 2021)
- Besides not conducive to healthy diets, current **food systems** contribute to climate change, land degradation, biodiversity loss and are not inclusive of the poor
- **Food environment** (FE) is the interface between consumers & their food system. Despite increasing burdens of malnutrition in all forms, little is known about how FEs shape diets in Africa
- Of the 2.2 billion food insecure people in the world, 1.7 billion live in urban and peri-urban areas (HLPE, 2024) => **leveraging connectivity across the rural–urban continuum** is imperative
- 60% of Nairobi's 4.4 million inhabitants live in **informal settlements**: complex, fragmented and less cohesive communities experiencing adverse poverty and under employment, highly vulnerable to shocks (price, disease or political unrest), leading to high disease, malnutrition and mortality burdens

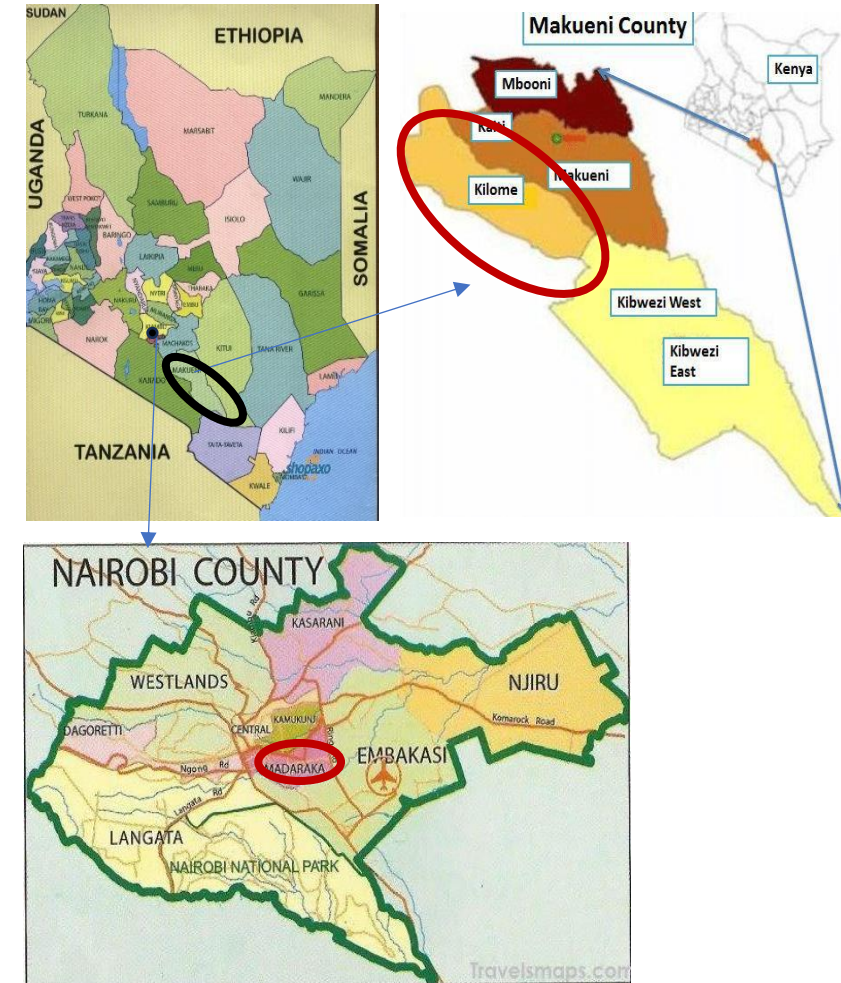


Study context

Baseline: *‘Piloting an organic food system in Kenya, by connecting vulnerable consumers in Nairobi, Viwandani with small scale producers practicing regenerative agriculture in Makueni’* through co-creating, piloting, and providing science-based evidence of the transformational potential of a niche food system as alternative to the current dominant model and pull the main system towards more sustainability.

Expected Outcomes:

1. Increased **awareness & better** food acquisition and preparation **practices** promoting healthy diets for poor **urban consumers**
2. **Improved access** for vulnerable urban consumers to affordable, organic, nutritious foods through co-creation of new business models for sustainable, cost-effective deliveries
3. **Fair incomes and decent livelihoods for small-scale farmers** in Makueni practicing AE/syntropic Agroforestry
4. pilot-tested model of an organic food system



Methods

- Food Environment
 - geocode all food outlet types in the area (Viwandani Nairobi; Kiima Kiu ward in Makeuni), listing of foods and food groups sold
- HH survey with mothers and adolescents
 - 631 HHs in Viwandani from 17 community healthy units
 - 205 HHs in 9 community units in Kiima Kiu Ward, Kilome Sub-county, Makueni
 - HH socio-economics & demographics; Nutrition and food safety knowledge, Adolescent agency, Quant 24h dietary intake recall
- Fruit and vegetable Value Chain actor survey
 - Producers, aggregator/distributors, processors, wholesalers, retailers



Results – Sociodemographic characteristics of respondents

WOMEN			
Characteristics	Makueni ¹ (N=205)	Viwandani ¹ (N=631)	
Age	43.46 ± 7.77	38.29 ± 6.27	
Household size	5.64 ± 1.82	4.74 ± 1.56	
Education level			
No education	1.46	2.69	
Primary school, not completed	24.88	15.06	
Primary school, completed	47.80	39.30	
Secondary school, not completed	10.73	16.64	
Secondary school, completed	12.20	22.50	
Post secondary	2.93	3.80	
Primary Occupation			
Agricultural production	58.54	0.00	
Casual labour	18.05	34.07	
House chores	2.44	3.49	
Retired/old	0.98	0.00	
Salaried employment	5.37	7.77	
School	0.00	0.32	
Self employment	9.76	44.22	
Unemployed	4.88	10.14	
Combined HHD previous month salary ('000)	10.48 ± 11.29	10.95 ± 8.60	
Exposure to healthy advertisements	4.39	30.59	
Belong to a social group (empowerment)	50.24	46.91	

¹ Mean ± SD for continuous and % for categorical variables; HHD = Household

ADOLESCENTS			
Characteristics	Makueni ¹ (N=205)	Viwandani ¹ (N=593)	
Sex			
Female	55.56	61.21	
Male	44.44	38.79	
Age	15.75 ± 1.34	14.80 ± 1.80	
Currently attending school	95.65	94.94	
Education level			
Primary	11.62	27.35	
Junior secondary	6.06	15.45	
Secondary	81.82	56.31	
College	0.51	0.89	
Gets pocket money	55.07	64.08	
Exposure to healthy advertisements	6.28	35.24	
Worked to earn money in past 1 year	37.68	18.21	
Belong to a social group (empowerment)	55.56	62.73	

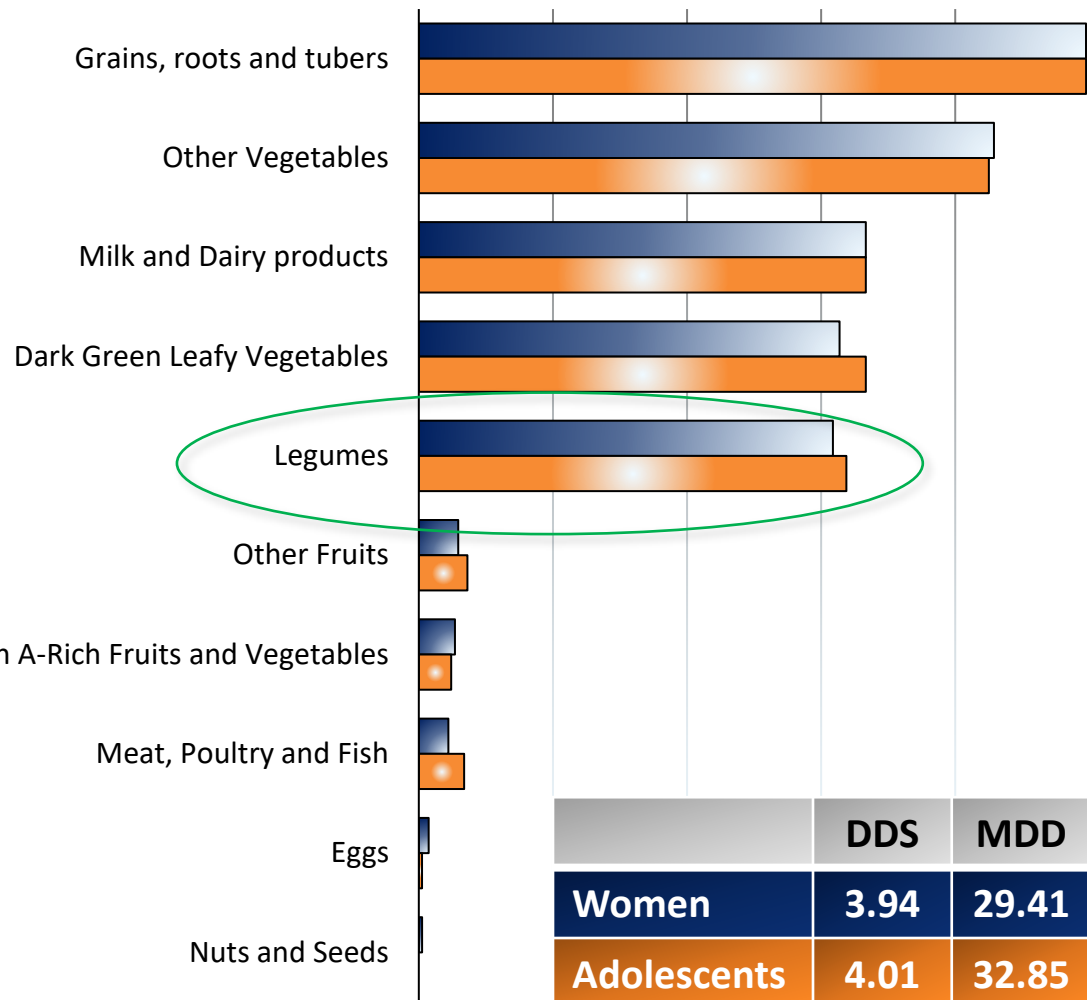
¹ Mean ± SD for continuous and % for categorical variables



Makueni

Percentage of respondents

0 20 40 60 80 100



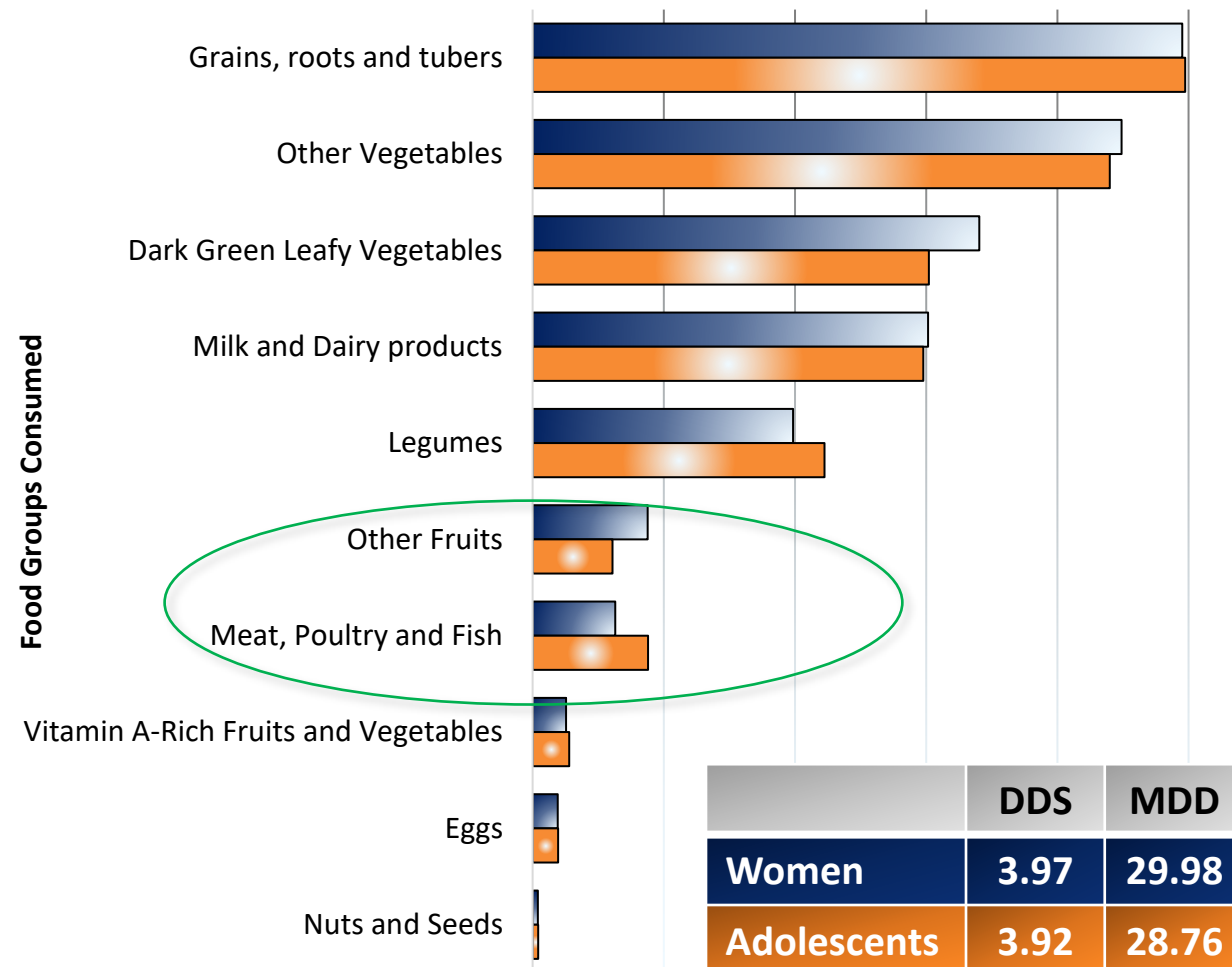
■ Woman (N=205) ■ Adolescent (N=205)

	DDS	MDD
Women	3.94	29.41
Adolescents	4.01	32.85

Viwandani

Percentage of respondents

0 20 40 60 80 100



■ Woman (N=631) ■ Adolescent (N=593)

	DDS	MDD
Women	3.97	29.98
Adolescents	3.92	28.76

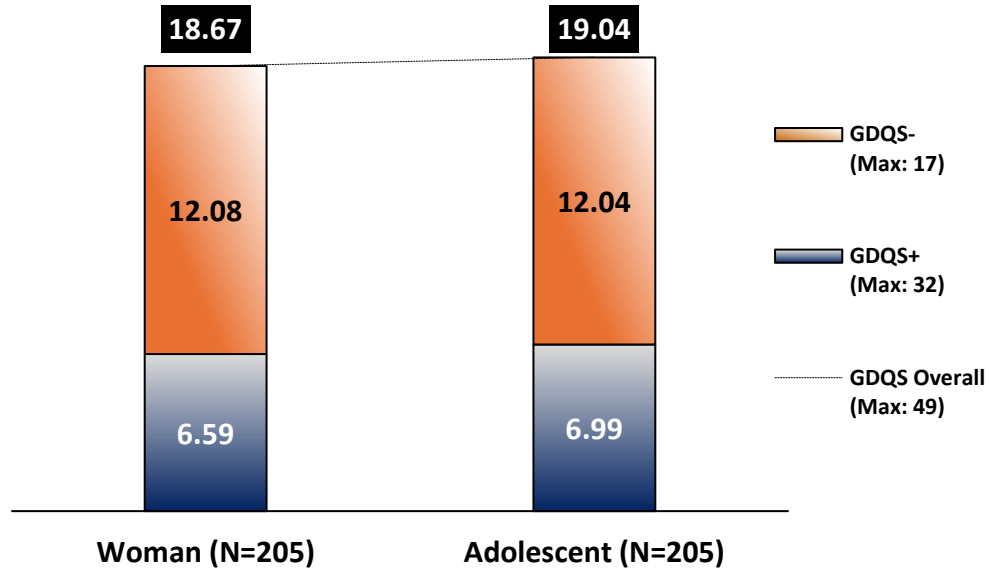


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Global Diet Quality Score

Makueni

>2/3rd at **moderate risk**
for malnutrition and NCDs

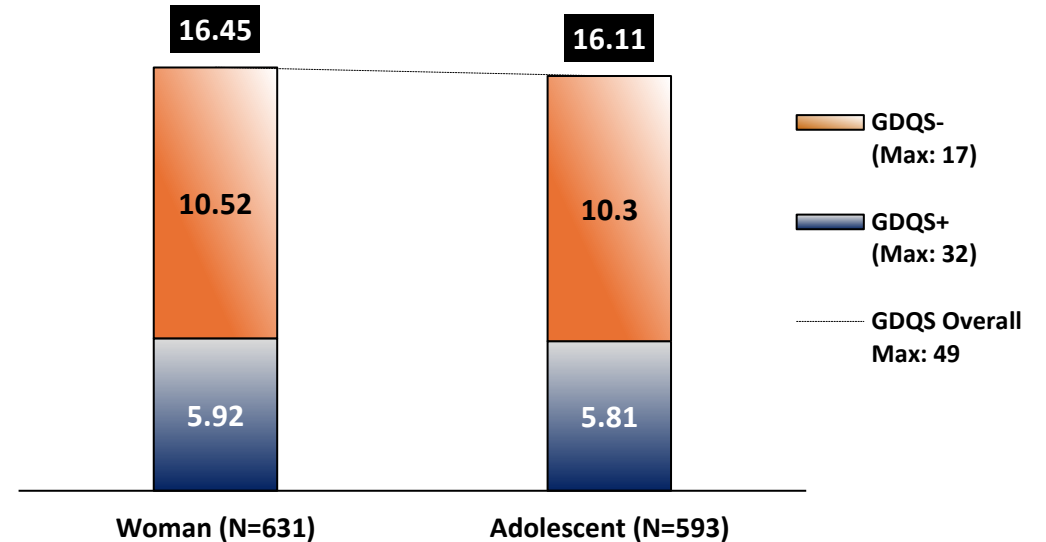


Diets higher in

- whole grains
- legumes

Viwandani

> 1/3rd at **high risk** for
malnutrition and NCDs

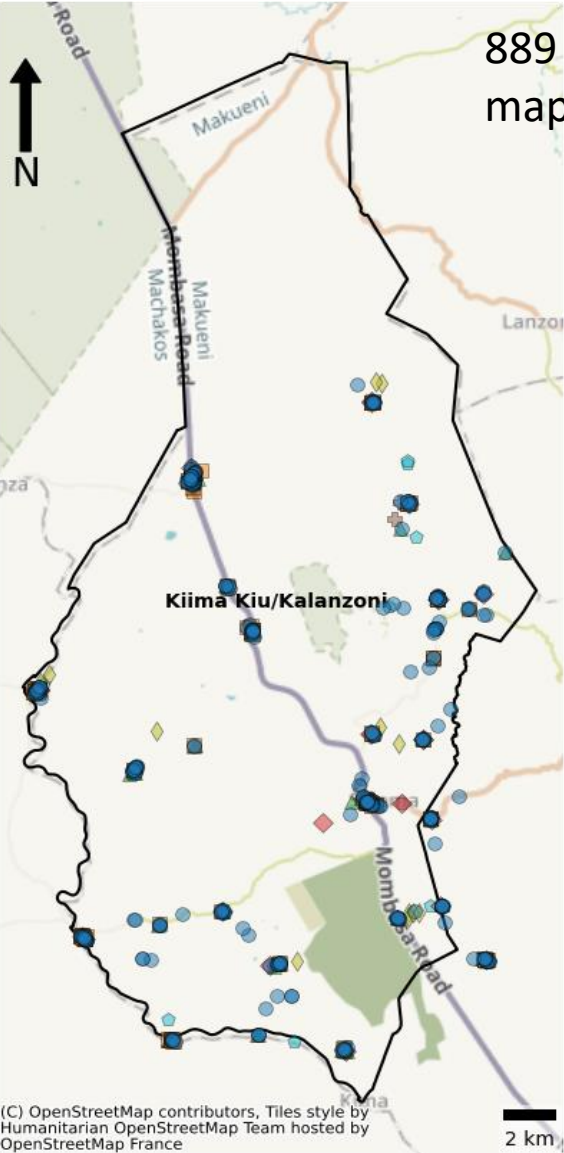


Diets higher in:

- refined grains
- purchased deep fried



Makueni



Viwandani



Fruit and Vegetable diversity - ProColor

Makueni

Vendor type	No. of vendors	Percentage of vendor types selling pro color						Overall color diversity (Mean ± SD)
		White, Brown	Yellow, Orange	Green Other	Dark Green	Red	Purple, Blue	
Tabletop vendor	253	87	57	46	55	75	0	3.19 ± 1.53
Home vendor	8	63	38	38	25	63	0	2.25 ± 1.83
Direct sale from farm	12	25	17	17	92	17	0	1.67 ± 1.5
Modern restaurant	15	73	7	7	53	13	0	1.53 ± 1.19
Kiosk	344	38	14	13	17	34	0	1.17 ± 1.62
Cooked food street	150	51	6	7	54	11	0	1.29 ± 1.21
Wholesalers	16	50	13	13	13	19	0	1.06 ± 1.24
Ambulant vendor	22	50	5	0	5	14	0	0.73 ± 0.7
Cereal shop	22	14	9	5	5	14	0	0.45 ± 1.1
Mom and pop shops	2	50	0	0	0	0	0	0.5 ± 0.71
Butcher	41	2	0	0	0	0	0	0.02 ± 0.16
Mini-supermarket	4	0	0	0	0	0	0	0.00 ± 0.00
Overall	889	53	24	20	34	38	0	1.69 ± 1.75

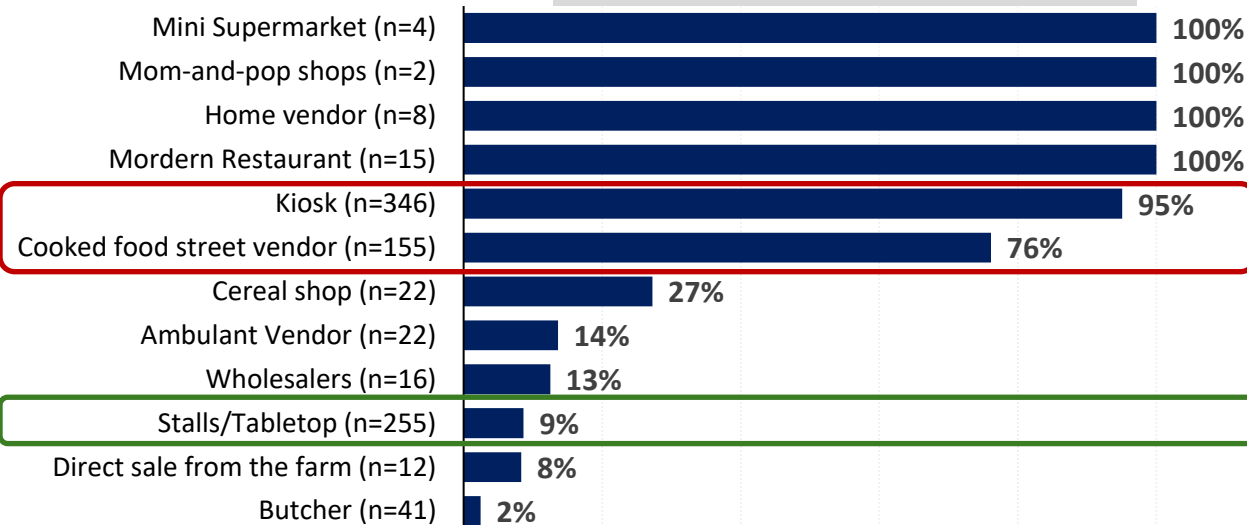
Viwandani

Vendor type	No. of vendors	Percentage of vendor types selling pro color						Overall color diversity (Mean ± SD)
		White, Brown	Yellow, Orange	Green Other	Dark Green	Red	Purple, Blue	
Tabletop vendor	299	76	49	44	55	67	0	2.92 ± 1.72
Home vendor	4	25	0	25	0	0	0	0.50 ± 1.00
Direct sale from farm	1	100	0	0	100	100	0	3.00 ± NA
Modern restaurant	4	50	25	25	50	25	0	1.75 ± 2.06
Kiosk	322	16	8	8	9	15	0	0.55 ± 1.3
Cooked food street	379	24	4	6	25	10	0	0.69 ± 1.11
Wholesalers	14	14	0	7	0	0	0	0.21 ± 0.58
Ambulant vendor	116	34	8	8	3	28	0	0.79 ± 1.02
Cereal shop	14	7	7	0	0	7	0	0.21 ± 0.8
Mom and pop shops	2	50	50	0	50	50	0	2.00 ± 2.83
Butcher	41	0	0	0	5	0	0	0.05 ± 0.22
Mini-supermarket	1	0	0	0	0	0	0	0.00 ± NA
Overall	1197	35	17	16	25	27	0	1.19 ± 1.65

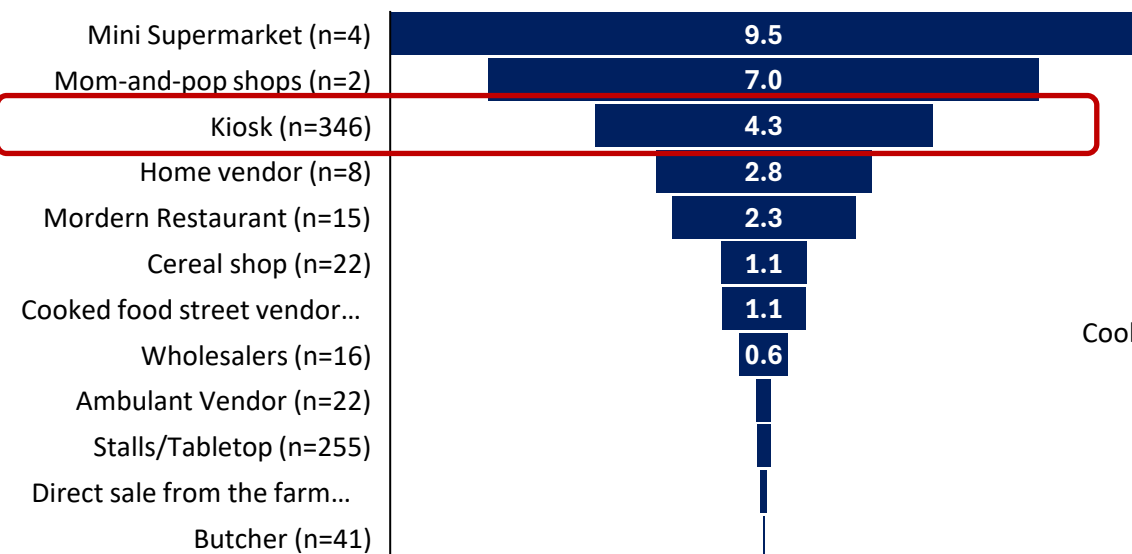


Makueni

% of vendors selling unhealthy foods

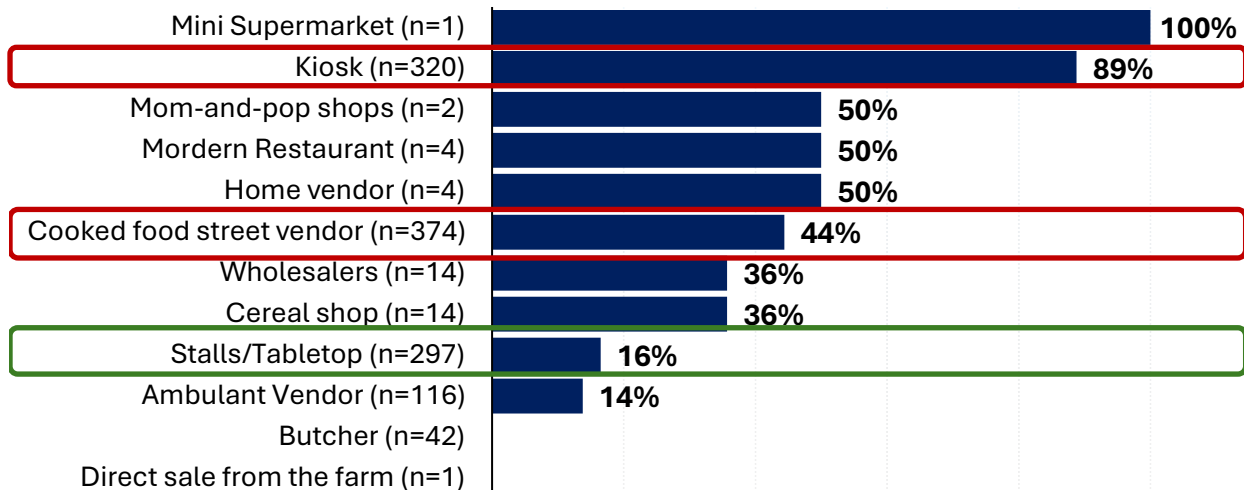


Average number of unhealthy foods sold per vendor type (Max:19)

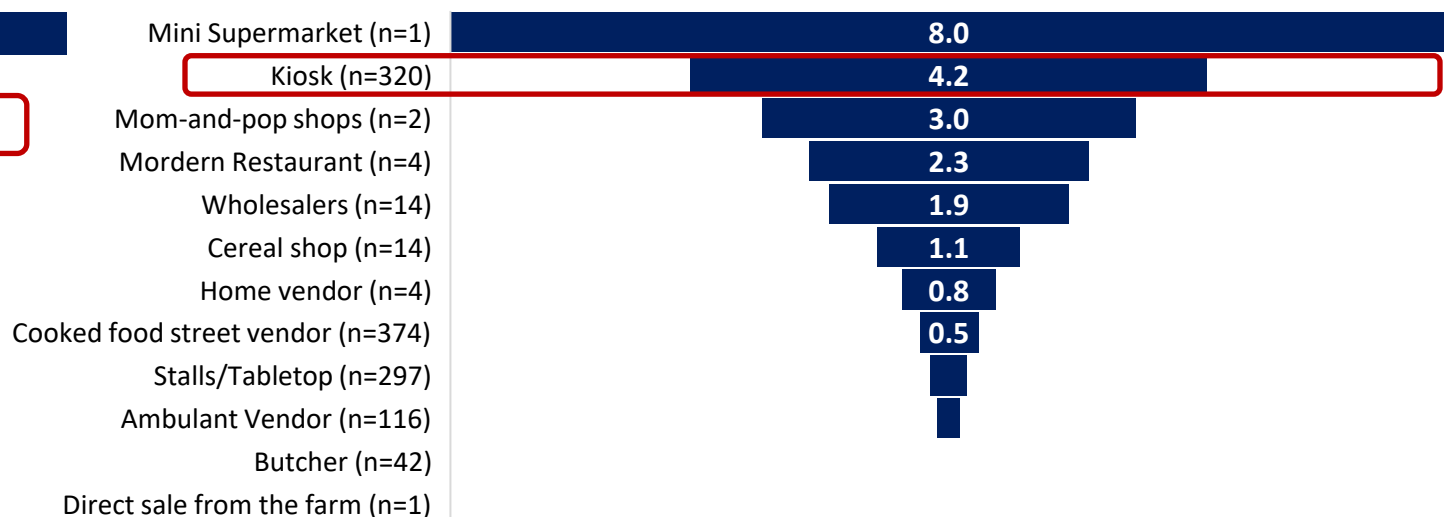


Viwandani

% of vendors selling unhealthy foods



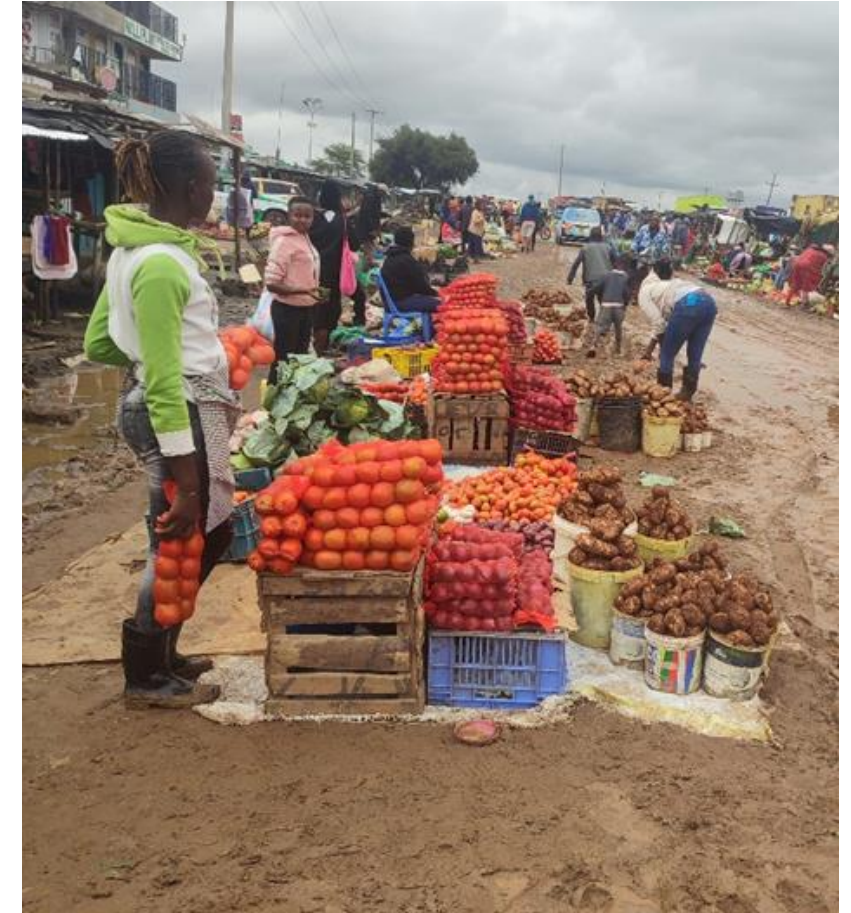
Average number of unhealthy foods sold per vendor type (Max:19)



Multivariate regression of selected socio-demographic variables with Women's DDs, GDQ, GDQ+ and GDQ-

Makueni (rural)

- 'Casual labor' as main *occupation* correlates negatively with women's GDQ+ ($p=0.04$)
- Being part of a **social group correlates positively** with women's overall GDQ ($p<0.001$) and GDQ+ ($p=0.01$)
- Viwandani (urban settlement)
 - *Occupation* (salaried employment ($p<0.01$) or self employed ($p<0.001$), *education* level, being exposed to *healthy food promotion* ($p=0.05$) and being part of a **social group ($p=0.01$) are positively correlated** with women's GDQ+



Multivariate regression of selected socio-demographic, self-esteem & motive variables with adolescents DDS, GDQ, GDQ+ and GDQ-

Makueni (rural)

- Receiving pocket money is positively associated with DDS ($P=0.01$)
- Combined score of group membership and participation is positively associated with GDQS+ and GDQS overall ($p=0.05$)
- No associations were found with the self-esteem variables
- Sustainability motive had a negative association with GDQS+

• Viwandani (urban settlement)

- Receiving pocket money is positively associated with DDS ($P=0.01$)
- Combined score of group membership and participation is negatively associated with GDQS- ($p=0.05$)
- No associations were found with the self-esteem variables
- Product price motive was negatively associated with DDS and positively with GDQS-
- Nutrition self-efficacy was positively associated with DDS, GDQS+ and GDQS overall



Conclusions

- **Most consumers in both sites are at moderate to high risk for malnutrition and NCDs** with diets in rural only slightly better than in the urban settlement
- **Food environments are not conducive to healthy diets,**
- the Makueni wet market (tabletop vendors) is only held once a week, **limiting access to fresh foods in the rural area** (the share of purchased foods, esp. perishables, in rural diets is equally high; SOFI, 2023)
- Improving diets through food environment interventions, will request **increasing availability and affordability of healthy foods** (fruits and vegetables), **AND policy interventions to limit sales of unhealthy foods** (ATNI, 2025 found that 90% of processed foods in Kenya needs front-of-pack warning labels); this through a **‘mainly informal’ food sector** with plenty of food safety challenges
- A food systems approach is needed to simultaneously consider malnutrition, food safety, biodiversity, soil health and climate change challenges; we **urgently need examples and evidence of how to bring food systems transformation in practice** for diverse healthier diets, more inclusion, biodiversity and climate resilience



Thank You

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