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Household dietary patterns and the cost of a healthy diet in Kenya

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Motivation

1) Kenya has made impressive reductions in poverty & malnutrition since 2005
   - Poverty headcount: 46.8% (2005); 36.1% (2015); 33.6% (2019)
   - stunting, children under 5: 40% (1993) to 18% (2022)
2) Yet malnutrition still prevalent among children and women
   - 18% of children aged 6-59 mos. were moderately or severely stunted (2022)
   - 21.8% children aged 6-59 mos. were anemic, as were 16.5% children aged 5-14, & 21.3% women aged 15-49 (2011)
3) Why? While nutrition outcomes are influenced by various factors, diet quality is a key one

Diet quality, nutrition, and health

1) Poor diet quality among young children & women
   - only 36.9% children aged 6-23 mos. living with mother had diet that met Minimum Diet Diversity (MDD) in 2022; 31% Rur, 48% Urb
   - MDD proxy measure of diet quality associated with lower rates of stunting
   - only 48.5% of women aged 20-49 met Women's MDD (2022); 43% R 56% U
2) Poor diet quality recognized as leading cause of non-communicable diseases

Research objectives

1) Estimate minimum cost of a “Recommended Diet” in Kenya by urban-rural, agro-zone, USAID ZOI
   - Cost of Recommended Diet (CoRD) method (Herforth et al)
   - Recommended Diet (RD) is a “balanced diet” designed to meet human nutrition & health requirements
2) Estimate cost of Recommended Diet in Kenya that allows more flexibility of food choices
   - Food Preferences CoRD (CoRD-FP) method (Mahrt, Mather, Herforth & Headey, 2018).
3) Investigate key drivers of costs of a Recommended Diet (RD) across 6 food groups and within them

Research objectives

4) Assess affordability of the CoRD & CoRD-FP by spatial domain & household wealth quintiles
5) Analyze (a) household food consumption patterns relative to those prescribed in RD; (b) role of relative food prices & food group costs in shaping these patterns

Methods

1) **Cost of a Recommended Diet** (CoRD), Herforth et al (2018)
   - Estimates cost of RD by categorizing food times into 6 food groups (defined by nutritional content)
   - Staples (calorie-dense): grains, roots/tubers, cooking bananas; Protein foods (protein-dense): meats, fish, legumes, eggs
   - Dairy; Vegetables; Fruits; Oils/Nuts
   - Find the 2 lowest cost food items in each food group; 3 for Vegetables (include at least one DGLV)
   - Multiply the average cost of those 2-3 food items by a RD quantity of each food group (such as 435 g of staples per AE per day, 175 g/AE/day protein foods, etc).
   - More realistic diets than CoNA, simpler computationally
   - Provides useful lower bound of cost of healthy diet

Methods

2) **Food Preferences CoRD** (Mahrt et al, 2018)
   - Allows more flexibility for number of food items in each food group, based on local food consumption patterns
   - provides estimate of cost of RD that reflects local consumption patterns, arguably more realistic, though CoRD-FP will by definition be more expensive than the CoRD

Data

1) Kenya Integrated Household Budget Survey (KIHBS) 2015/16
   - Nationally-representative household survey n=21,773 hhs (n=13,092 rural; n=8,681 urban)
   - implemented across four consecutive quarters between Sept 2015 and August 2016 – captures seasonality of food prices & consumption
   - Household food consumption & expenditure over past 7 days
   - Household demographics and wealth (total expenditure/AE)
2) Kenya Food Composition Tables (2018); USDA (2023)
   - info on nutritional content of 213 food items observed in KIHBS

Cost of Recommended Diet (CoRD, CoRD-FP), relative to other diets, 2016

Spatial area	Diet cost (Ksh/AE/ day)			Ratios of diet costs		
	CoCA (A)	CoRD (B)	CoRD-FP (C)	CoRD to A	CoRD-FP to A	CoRD-FP to B
National	36	84	108	2.4	3.0	1.28
Rural	36	80	97	2.2	2.7	1.22
Urban	36	91	123	2.5	3.4	1.35

CoCA is the **Cost of Calorie Adequacy** – cost of consuming adequate calories from the lowest-cost, common staple food

Cost of Recommended Diet (CoRD, CoRD-FP) by agro-zone and ZOI, 2016

	Spatial area	Diet cost (Ksh/AE/day)			Ratios of diet costs		
		CoCA (A)	CoRD (B)	CoRD-FP (C)	CoRD to A	CoRD-FP to A	CoRD-FP to B
Rural / urban	National	36	84	108	2.4	3.0	1.28
	Rural	36	80	97	2.2	2.7	1.22
	Urban	36	91	123	2.5	3.4	1.35
Agro-zone	Western	36	83	104	2.3	2.9	1.25
	Rift Valley	33	75	90	2.3	2.8	1.20
	Cent.High	36	77	107	2.1	2.9	1.39
	SA upland	36	85	104	2.4	2.9	1.21
	N.Asals	39	136	156	3.5	4.0	1.14
	C.Asals	34	91	109	2.7	3.2	1.19
	Coast	36	101	132	2.8	3.6	1.31
USAID ZOI	Western	36	83	104	2.3	2.9	1.25
	Southeast	35	85	102	2.4	2.9	1.20
	Northern	37	122	142	3.3	3.8	1.16

Cost of RD food groups in CoRD & CoRD-FP, by rural-urban, 2016

		National		
	Food group	Nation	Rural	Urban
CoRD	Staples	15	14	17
	Protein foods	21	23	20
	Dairy	17	14	21
	Vegetables	18	16	19
	Fruit	7	6	7
	Oils-Nuts	7	7	7
	Total cost	84	80	91
CoRD-FP	Staples	24	22	27
	Protein foods	31	27	35
	Dairy	16	14	19
	Vegetables	22	20	25
	Fruit	8	7	8
	Oils-Nuts	7	8	7
	Total cost	108	97	123

Affordability of CoRD & CoRD-FP, 2016

Spatial area or total HH expend/AE quintile	Diet cost		Median HH food expend. /AE (KSh)	% of population with daily HH food expend./AE below each diet cost (%)			Avg. HH food expenditure shortfall (%)	
	CoRD	CoRD-FP		CoCA	CoRD	CoRD-FP	CoRD	CoRD-FP
National	84	108	107	7	48	63	17	25
Rural	80	97	87	9	55	68	20	27
Urban	91	123	140	3	35	54	12	20
Q1 - low	88	106	49	23	97	100	43	53
Q2	83	103	80	2	57	82	14	25
Q3	83	106	114	1	24	47	5	12
Q4	84	111	156	0	9	25	2	5
Q5 -high	86	116	262	0	1	6	0	1

% of population in HHs with food group consumption/AE up to one serving, RD # servings

Servings	Food group	Nation	HH total expenditure/AE quintile				
			1-low	2	3	4	5-high
			% of population				
One serving	Staples	100	100	100	100	100	100
	Protein	66	56	63	68	81	73
	Dairy	65	64	83	82	75	83
	Vegetable	59	61	69	88	73	87
	Fruit	31	26	24	48	40	45
	Oils-Nuts	52	38	39	73	47	86
RD # servings	Staples	49	54	62	54	58	55
	Protein foods	12	7	12	20	20	13
	Dairy	27	27	41	42	32	37
	Vegetables	3	1	5	6	5	9
	Fruit	19	14	10	33	26	29
	Oils-Nuts	11	6	7	17	6	20
		median HH total expenditure/AE					
HH food exp/ae		107	49	80	114	156	262

Relative prices of staples & protein foods

Food group	Food item	Quantity share (%)	Food exp sh. (%)	Price / gram (Ksh/g)	Price / calorie (Ksh/cal)	Ratio of p/cal to staple p/cal
Staples	Maize flour (loose)	37	35	0.05	0.01	
	Potatoes (Irish)	15	9	0.01	0.03	1.7
	Maize grain (loose)	12	9	0.04	0.01	0.6
	Non-ar. rice (unbroken)	7	11	0.08	0.02	1.3
	Maize flour-sifted	6	5	0.05	0.02	0.9
	Fortified maize flour	6	5	0.05	0.02	0.9
	White bread	5	11	0.13	0.05	2.9
Plant protein	Beans	56	22	0.11	0.03	1.5
	Cowpeas	6	2	0.09	0.02	1.2
	Green grams	5	3	0.18	0.04	2.3
	Peas	5	2	0.14	0.03	1.9
Animal protein	Beef - w/bones	14	34	0.37	0.13	7.4
	Mutton/Goat meat	8	15	0.40	0.18	10.4
	Eggs - exotic/kienyenji	6	6	0.22	0.15	8.3

Relative prices of dairy, veg/fruit, oils-nuts

Food group	Food item	Quantity share (%)	Food exp sh. (%)	Price / gram (Ksh/g)	Price / calorie (Ksh/cal)	Ratio of p/cal to staple p/cal
Dairy	Fresh unpack. cow milk	91	85	0.05	0.07	4.2
	Fr. packeted cow milk	9	15	0.10	0.14	8.1
Vegetables	Sukuma wiki (collard gr	30	23	0.04	0.12	6.9
	Cabbages	25	12	0.02	0.09	4.9
	Tomatoes	22	28	0.07	0.30	16.9
	Indigenous vegetables	15	25	0.05	0.09	5.1
	Onion (bulbs)	7	12	0.10	0.24	13.5
Fruit	Ripe bananas	28	33	0.05	0.03	1.9
	Avocado	23	20	0.04	0.01	0.8
	Oranges	18	15	0.06	0.12	6.9
	Mangoes	15	15	0.05	0.06	3.2
	Paw paws (papaya)	9	8	0.05	0.11	6.0
	Guavas	6	8	0.06	0.13	7.6
Oils-Nuts	Cooking oil (salad)	72	74	0.16	0.02	1.0
	Cooking fat	28	26	0.15	0.02	0.9

Conclusions: Key socio-economic constraints to healthy diets in Kenya

Half of Kenyan households cannot afford a balanced, Recommended Diet. Why?

1) Inadequate household income

   Implication: Adopt policies and make investments to facilitate broad-based increases in rural & urban household incomes

2) Relatively high prices for protein- & micronutrient-dense foods

   - Observed in all countries, yet relative price differences between many of protein/micronutrient dense foods and staples in Kenya/ESA are larger than in higher-income countries, on average

Why are protein- & micronutrient dense foods so expensive?

1) Low productivity at farm-level
   - Significant yield gaps for many food crops in Kenya, larger than EAC neighbors on average, yields stagnant for years
   - Domestic public & private expenditure on local crop varietal improvement programs historically focused on staple cereals, cash, industrial crops; relatively little on legumes, vegetables, fruits

<u>Policy:</u>

- More investment in Ag R&D and extension in general; more on legumes, vegetables, fruits
- How to pay for this? Less spending on subsidies that target cereal crops, particularly untargeted input subsidies; NCPB purchasing grain from large farmers at above-market prices

Why are protein- & micronutrient dense foods so expensive?

2) Inefficiencies in food marketing
   - High post-harvest losses
   - Local supply chains for perishable foods require more expensive storage facilities and equipment than grains/legumes
   - Lack of predictability of policy and enabling environment has historically reduced investment incentives for private sector in storage
   - Lack of storage facilities leads to supply chain inefficiencies; e.g. periods of peak production → oversupply → price crash, food losses

<u>Policy implications:</u>

   - Improve enabling environment for cold storage, including standards for domestic fruit & vegetable marketing
   - Scale-up traditional methods of food preservation, e.g. drying or fermenting vegetables

Conclusions: Key economic constraints to healthy diets in Kenya

Policy Implications (general):

- For many households in rural areas, raising household incomes and improving the productivity of crop and livestock value chains go hand in hand
- Kenya's ASTGS identified 13 crop & livestock value chains with highest potential for facilitating ag transformation & food security
- Different agro-zones have different agroecological potential & market access → need for zone and/or county-specific strategies

Conclusions: Key economic constraints to healthy diets in Kenya

3) Consumer preferences
   - Over-consumption of staples & underconsumption of other foods seen even among households that can afford a balanced, recommended diet
   - lack of consumer awareness of nutritional information & importance of healthy diets for long-term health & productivity

   <u>Policy:</u>

   - Efforts by schools/extension to promote key messages from Kenya's Food-Based Dietary Guidelines (2018) crafted for specific audiences

Asante! Thank you!

Questions/Feedback?

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Related issues for future research

1) Cost of healthy diet for young children
   - already in the 2024 SARA-KEA workplan; using 2021 KHCS
2) Updating CoRD & CoRD-FP analyses using 2021 data
   - 7 years since KIHBS 2015/16; use 2021 KHCS data
   - potential changes in dietary patterns due to income growth, urbanization, AFS transformation → food supply & demand → relative food prices → what foods are eaten, by whom, and where
3) More in-depth & applied analysis of zonal level diets, food options & opportunities to improve diets
4) Analyze trends & seasonality in CoRD & CoRD-FP diets, food group costs over time
5) Assess role of food/diet costs in child nutrition outcomes

Why do Kenyan households over-consume staples & under-consume other foods?

1) Inadequate household income
   - Half of Kenyan households cannot afford a Recommended Diet
2) Protein- & micronutrient-dense foods are relatively expensive compared with staples
   - Observed in all countries, yet relative price differences between many of protein/micronutrient dense foods and staples in Kenya/ESA are larger than in higher-income countries, on average
3) Consumer preferences
   - cultural traditions
   - lack of nutritional knowledge
   - individuals with the knowledge and income to eat balanced diet but choose not to, etc

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3) Consumer preferences
   - cultural traditions
   - lack of nutritional knowledge
   - individuals with the knowledge and income to eat balanced diet but choose not to, etc

Cost of Recommended Diet (CoRD, CoRD-FP) relative to Food Poverty Line, 2016

Spatial area	Diet cost (Ksh / AE / day)				Ratios of diet costs		
	CoCA (A)	Food Pov Line (B)	CoRD (C)	CoRD-FP (D)	CoRD to B	CoRD-FP to B	CoRD-FP to C
National	36	--	84	108			1.28
Rural	36	65	80	97	1.22	1.49	1.22
Urban	36	84	91	123	1.08	1.46	1.35

% of population in HHs with food group consumption/AE up to one serving, RD # servings

	Food group	Nation	Rural	Urban	USAID Zones of Influence West	S.East	North
		---------- % of population ----------					
One serving	Staples	100	100	100	100	100	99
	Protein	66	63	71	58	82	67
	Dairy	65	63	69	52	37	51
	Vegetable	59	55	67	60	47	13
	Fruit	31	28	37	25	30	12
	Oils-Nuts	52	43	73	50	55	67
RD # servings	Staples	49	49	48	53	50	22
	Protein	12	12	12	7	30	12
	Dairy	27	26	28	13	7	19
	Vegetable	3	2	4	1	1	0
	Fruit	19	16	24	14	21	5
	Oils-Nuts	11	7	19	9	8	5
Food poverty %		24	28	18	28	29	47
		-------- *median HH total expenditure/AE* ---------					
HH food exp/ae		107	87	140	88	88	67

% of population in HHs with food group consumption/AE up to one serving, RD # servings

	Food group	Nation	West-ern	Rift Valley	Central High	S.Arid upland	North Asals	Central Asals	Coast
One serving	Staples	100	100	100	100	100	99	100	100
	Protein	66	58	64	77	79	58	61	67
	Dairy	65	65	83	79	49	41	69	41
	Vegetable	59	61	73	80	50	9	35	32
	Fruit	31	26	31	43	30	10	22	37
	Oils-Nuts	52	41	47	68	62	71	41	55
			---------- % of population ----------						
RD # servings	Staples	49	52	60	56	48	20	27	44
	Protein	12	7	14	16	26	11	9	10
	Dairy	27	27	41	35	15	13	29	10
	Vegetable	3	2	5	7	2	0	1	1
	Fruit	19	14	16	28	22	5	13	24
	Oils-Nuts	11	7	9	14	12	23	9	16
Food poverty %		24	28	18	14.6	26	52	35	26
HH food exp/ae			*---------- median HH total expenditure/AE ----------*						
		107	89	119	140	100	61	83	122

HH food expenditure shares by food group compared with CoRD & CoRD-FP, by zone

Food Group	CoRD	CoRD-FP	West-ern	Rift Valley	Cent. High	S.Arid upland	North Asals	Cent. Asals	Coast
	(%)		------- average HH expenditure shares (%) -------						
Staples	18	22	42	43	39	40	47	39	43
Proteins	26	29	20	18	21	24	18	18	25
Dairy	19	15	14	18	14	13	18	25	7
Vegetable	21	21	13	12	13	12	5	9	11
Fruit	8	7	6	5	8	6	2	3	10
Oils/nuts	9	7	5	4	5	6	10	6	5

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