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The potential impacts of new policies on milk allocation to infants in Kenya

Transborder, New normal, Food, Health, Well-being" – (TGSW) 2021

Nadhem Mtimet

Sustainable Production, Markets and Institutions (PMI) Division - IFAD

Muunda E., Wanyoike F., Dominguez-Salas P., Schneider F., Alonso S.

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ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

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Background information

Milk Consumption in Kenya

- Kenya is ranked among the highest milk producing & consuming countries
- Annual per capita consumption of milk => 19kg in rural areas and 125kg in urban areas. This falls short of the global (WHO) requirement of 220kg per capita consumption: Highly consumed ASF – for children

Milk Market in Kenya

- KDB estimates: 36% of milk produced in the country is consumed on the farm
- 64% is marketed as both raw (85% informally) and processed milk (15% formal chain)
- Why informally sold raw milk? It is cheaper than processed milk by 20 – 50%; majority prefers its taste and high butterfat content; it is widely accessible; and it is sold in variable quantities suiting every consumer's affordability

The Problem

- Informal sector plays a critical role on food and nutritional security in poor households
- Need to conform to international standards of food safety has triggered regulatory agencies to formulate policies that restrict informal marketing of milk.
- Promoting milk pasteurization is an important public health measure, little is known of its potential effect on household milk consumption and allocation to children.=={food security=quality(safe & nutritious), quantity(sufficient—ss=dd, access(physical & economic)}-→active & healthy life

The New Policy - KDB

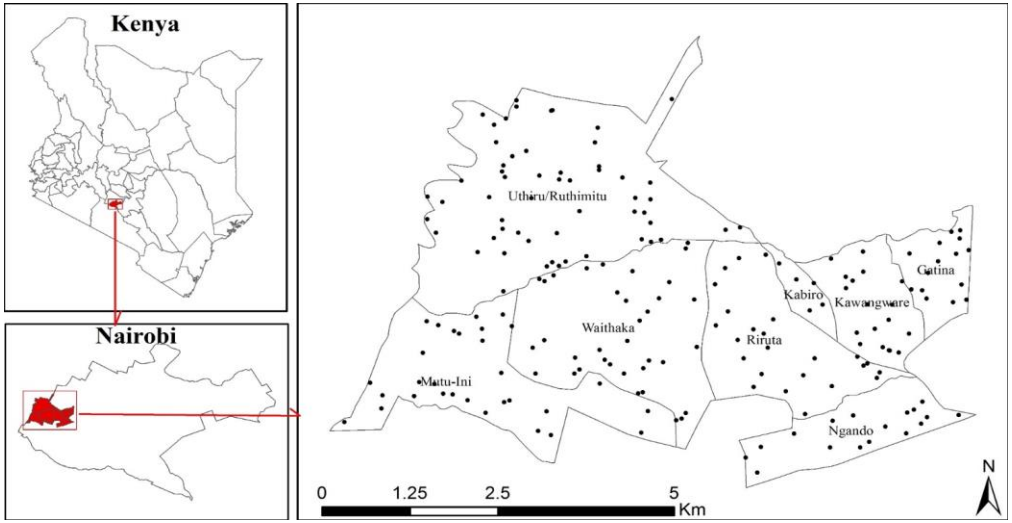
- How policy affects dietary choices depends on its effect on costs and price

  => consumer responsiveness to price variations and choices of milk allocation

- The new policy by KDB stipulates that milk should be processed, chilled & transported using adequate transport means. It should also be traceable and subjected to milk safety and quality testing at different stages. ---- lead to high processing and transaction costs, especially for most informal small-scale traders and will likely result in substantial increase in milk prices.

Methodology

Study area: Peri-urban area; west of Nairobi – Dagoretti



10 wards: Gatina, Kabiro, Kawangware, Mutu-Ini, Ngando, Riruta, Uthiru, Waithaka, Kilimani and Kileleshwa.

The study area is characterized by low income and informal settlements, some in peri-urban settings – with agricultural activities and others in urban areas

Experimental Design – Best-Worst Scaling Approach

- We conducted an experimental study to investigate the effect of milk price increase on intrahousehold milk allocation to children (less than 4-year-old) that would result from elimination of the cheaper informal milk from the market.

- The study entailed a Discrete choice experiment that posed 9 hypothetical scenarios (in pictorial form), each with 4 milk allocation alternatives for the respondent to pick the Best and Worst choices they would take in the event milk prices increased by 40% from the prevailing retail price.

- We analyzed the relative importance of milk allocation alternatives and used latent class model to examine the likely impact of such policy on children milk allocation in different groups.

Experimental Design

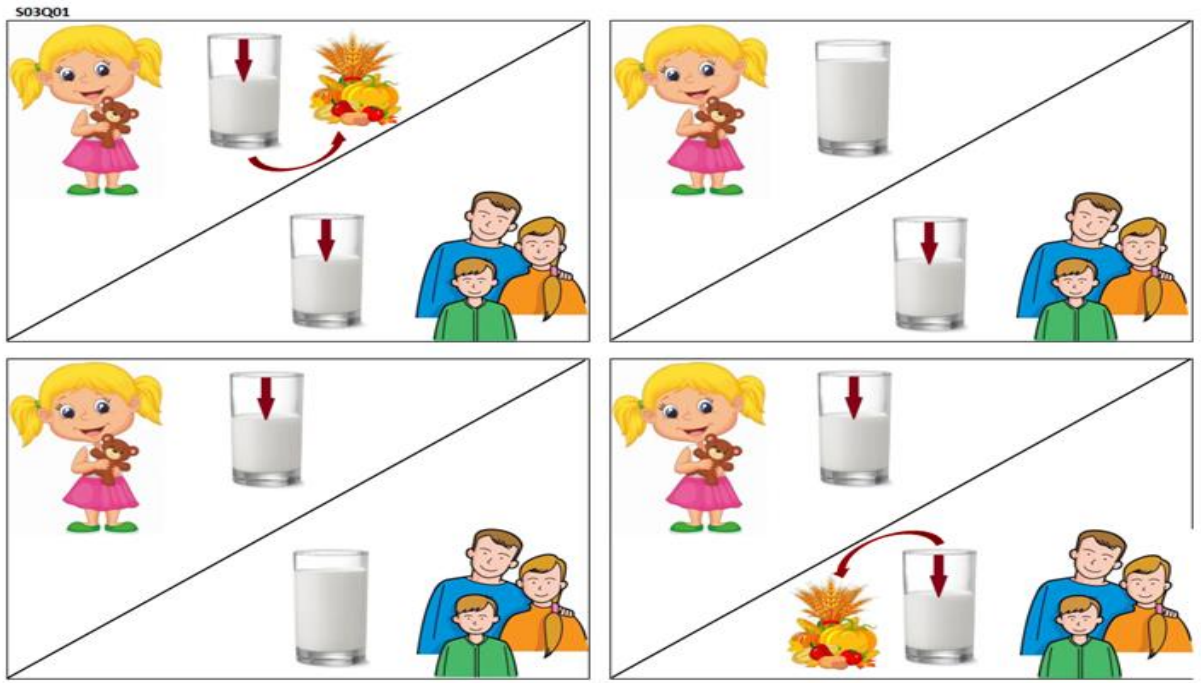
Attributes/Alternatives	
A1	Decrease raw milk quantities for all family members without replacing it by any other food product
A2	Decrease raw milk quantities for all family members, and replace it with another food product only for children <4 years
A3	Decrease raw milk quantities for all family members, and replace it with another food product for all family members except for children <4 years
A4	Decrease raw milk quantities for all family members, and replacing it with another food product for all family members
A5	Keep raw milk quantities the same for children < 4years and decrease it for the rest of family members
A6	Decrease the quantities of raw milk to the children <4 years, without replacing it by other food products. Will keep the same quantities of raw milk for adults
A7	Decrease the amount of raw milk to the children <4 years, while replacing it by other products. Will keep the same amount of raw milk for adults
A8	Keep buying the same quantities of raw milk by increasing milk budget
A9	Stop buying raw milk

The Experiment - example

S03q01. If raw milk price increases by 40% compared to high season prices, which corresponds to a new raw milk price of around KES 100/litre, from the 4 alternatives/actions below please indicate which is the most likely alternative/action you will choose/do and the least likely alternative/action you will not choose/do? (Tick only one case as most important and one case as least important)

Most likely	Alternatives	Least likely
☐	Decrease raw milk quantities for all family members, and replace it with another food product only for children <4 years	☐
☐	Keep raw milk quantities the same for children < 4years and decrease it for the rest of family members	☐
☐	Decrease the quantities of raw milk I give to the children <4 years, without replacing it by other food products. Will keep the same quantities of raw milk for adults	☐
☐	Decrease raw milk quantities for all family members, and replace it with another food product for all family members EXCEPT for children <4 years	☐

Best-Worst or Most-Least Experiment



Analytical Approach

- **Best-Worst Scores**

Standardized Most – Least Score = (No.Most – No.Least)/ (m . n)

No.Most: # of times the allocation alternative was chosen as most important
No.Least: # of times the allocation alternative was chosen as least important
m: number of respondents = 200*
n: number of times the allocation alternative was presented to each respondent = 4

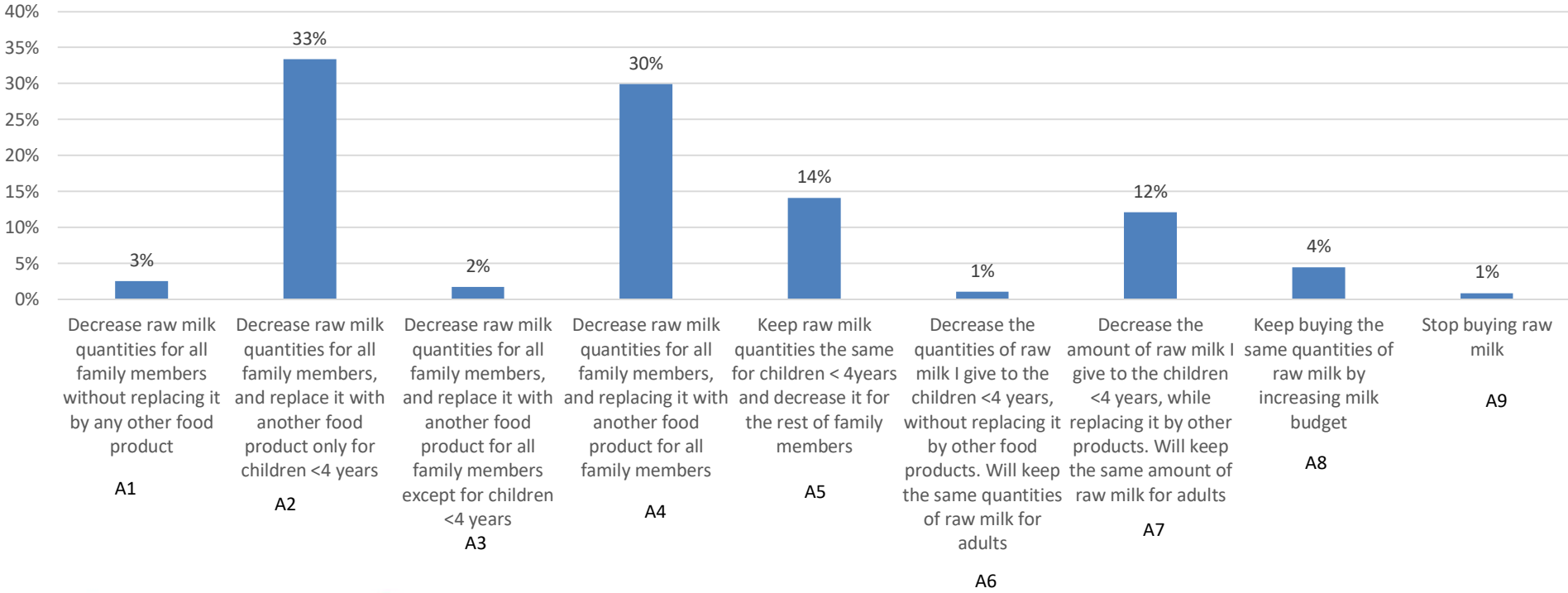
- **Multinomial Logit Model:** To confirm above (max-diff scaling) and identify heterogeneity in choices
- **Mixed Logit Model:** To assess heterogeneity between respondents
- **Latent class model:** Latent class analysis groups cases or scenarios into classes or categories of an unobserved (latent) variable.
- **Share of Preference (SP)** $= S_i = \frac{e^{\widehat{\beta_i}}}{\sum_{m=1}^{j} e^{\widehat{\beta_m}}}$

$\widehat{\beta_i}$ is the forecasted probability that milk allocation i is picked as most important

Results
The relative importance of the alternatives

Alternatives	Best	Worst	Best-worst Scores	Sqrt (B/W)	Standardized ratio scale	Rel. Importance**	Std*
A1	45	205	-0.20	0.47	7.60	2.5%	0.3070
A2	494	13	0.60	6.16	100.00	33.4%	0.2870
A3	24	235	-0.26	0.32	5.18	1.7%	0.2713
A4	518	17	0.63	5.52	89.55	29.9%	0.3666
A5	305	45	0.33	2.60	42.23	14.1%	0.3850
A6	12	319	-0.38	0.19	3.15	1.0%	0.2651
A7	239	48	0.24	2.23	36.20	12.1%	0.3556
A8	146	217	-0.09	0.82	13.31	4.4%	0.5074
A9	17	699	-0.85	0.16	2.53	0.9%	0.3392
Weighting factor for standardized ratio scale							16.22
Weighting factor for relative importance							5.41

Results
The relative importance of the alternatives



Results
The relative importance of the alternatives

- In all cases, the increase in milk prices will decrease milk demand and hence consumption at the household level

- Infants below 4 years old will most likely be affected (3 most rated cases over 4) by price increase and their milk intake will decrease. It will be replaced by another food item

=> But is the other food product more nutritious, less nutritious or has almost the equivalent , price? Availability? – we ask the foods they substitute with: NOT ASF! --fruits and/or porridge

Multinomial Logit Model Estimations

Confirms B-W scores (coefficients)

	A8 as reference						A9 as the reference				
Y	Coef.	Std. Err.	P>|z|	[95% Conf.	Interval	Y	Coef.	Std. Err.	P>|z|	[95% Conf.	Interval
A1	-0.0591	0.089	0.507	-0.234	0.115	A1	2.184	0.113	0.000	1.961	2.406
A2	1.7730	0.095	0.000	1.587	1.959	A2	4.016	0.124	0.000	3.772	4.259
A3	-0.2458	0.088	0.005	-0.418	-0.074	A3	1.997	0.113	0.000	1.775	2.218
A4	1.8680	0.094	0.000	1.684	2.052	A4	4.111	0.125	0.000	3.866	4.355
A5	1.1038	0.092	0.000	0.923	1.284	A5	3.346	0.120	0.000	3.111	3.581
A6	-0.4502	0.087	0.000	-0.621	-0.279	A6	1.792	0.112	0.000	1.573	2.012
A7	0.9650	0.089	0.000	0.791	1.139	A7	3.208	0.119	0.000	2.975	3.440
A9	-2.2427	0.111	0.000	-2.460	-2.025	A8	2.243	0.111	0.000	2.025	2.460

Latent Classes Number Choice

- We estimated models ranging from 2 to 9 latent classes. By considering both the BIC, AIC and the CAIC values on the log-Likelihood, 3 clusters were considered optimal number

Classes	LLF	AIC	ΔAIC	CAIC	ΔCAIC	BIC	ΔBIC
2	-2801.49	5636.98		5710.05		5693.05	
3	**-2664.97**	**5381.94**	**4.52%**	**5493.70**	**3.79%**	**5467.7**	**3.96%**
4	-2586.98	5243.95	2.56%	5394.39	1.81%	5359.39	1.98%
5	-2562.83	5213.66	0.58%	5402.79	-0.16%	5358.79	0.01%
6	-2529.5	5164.99	0.93%	5392.80	0.18%	5339.8	0.35%
7	-2506.58	5137.15	0.54%	5403.65	-0.20%	5341.65	-0.03%
8	-2486.44	5114.88	0.43%	5420.06	-0.30%	5349.06	-0.14%
9	-2474.2	5108.40	0.13%	5452.26	-0.59%	5372.26	-0.43%

Latent Class Model Estimations

Allocation alternative	Class 1 (64%)		Class 2 (22%)		Class 3 (14%)	
	Coefficient	SP	Coefficient	SP	Coefficient	SP
A1	4.098*	0.022	3.264*	0.024	0.354	0.090
A2	6.533*	0.257	5.363*	0.193	1.487*	0.280
A3	3.876*	0.018	3.252*	0.023	-0.164	0.054
A4	7.129*	0.466	5.006*	0.135	1.151*	0.200
A5	5.620*	0.103	5.154*	0.157	0.766*	0.136
A6	3.699*	0.015	2.789*	0.015	-0.341	0.045
A7	5.652*	0.106	4.439*	0.077	0.564*	0.111
A8	3.484*	0.012	6.031*	0.376	-1.226*	0.063
A9	---	0.000	---	0.001	---	0.063

Class 1 – A4, A2 & A7 have the highest coefficients; the quantities of milk allocated to children decreases and is replaced with another food item.

Class 2 – A8, A2 & A5 have the highest coefficients; the most important alternative is A8 which is to keep buying the same quantities of raw milk by increasing milk budget.

Class 3 – A2, A4 & A5 - lower estimation magnitudes. A3 & A6 are not statistically different from the reference level.

Composition of the latent classes

Parameter	Class 1(64%)	Class 2(22%)	Class 3(14%)
Household Income (KES)*			
Below 10,000	16.92	19.05	28.57
10001-20000	39.23	26.19	42.86
20001-30000	43.85	54.76	28.57
Total	100	100	100
Gender of HH Head			
Male	76.92	85.71	89.29
Female	23.08	14.29	10.71
Total	100	100	100
Age of HH head***			
18 - 29yrs	37.69	38.1	25
30 - 39yrs	43.85	40.48	53.58
40 - 49yrs	13.08	16.67	10.71
50yrs and Above	5.38	4.75	10.71
Total	100	100	100
Education level of HH Head*			
Primary / Vocational school	29.46	42.50	28
Secondary school (form 1-4)	44.96	47.5	60
Technical/University	25.58	10	12
Total	100	100	100
Mean Raw Milk Expenditure (KES/week)*	313.84[a]	235.73[b]	205.18[b]
Mean Quantity of raw milk purchased (liter/week)	4.00[a]	3.46[a]	2.70[b]
Number of children (6 – 48months old)**	1.19	1.12	1.04
Household size (Mean)	4.36	4.33	4.17

The Messages

- Given the evidence that overall demand for milk is decreasing with increased price, dairy policies should consider milk affordability in order to safeguard nutrition security of children. This may involve interventions that increase production and strengthening the supply chains

- There is a need to strengthen resilience to milk price variations in poor households. Considering that a bigger proportion of the respondents preferred replacing milk with other food items, often fruits, there is a need to identify and create public awareness on food substitutes that offer similar or better nutritional value as milk at similar or lower price and preparation costs. But do such food substitute with these specifications exist?

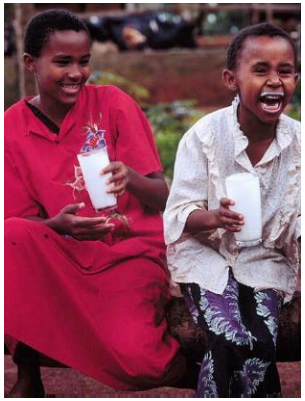
- Low-income consumers represent the largest segment of the Kenya population and thus are the biggest milk consumers (in total vol) of milk. The study showed that these consumers are price sensitive and that the increase in milk prices will reduce their milk purchase and the quantities allocated to their infants (less than 4 years old). This will have negative impacts on low-income household infants' nutrition in Kenya.

Policy recommendations should aim

… fair and competitive dairy markets…

(regulated)

…that sell safe milk… (food safety)



…and that help meet the nutrition needs of poor households, especially children. (inclusive)

Read More

Muunda, E., Mtimet, N., Schneider, F., Wanyoike, F., Dominguez-Salas, P., & Alonso, S. (2021). Could the new dairy policy affect milk allocation to infants in Kenya? A best-worst scaling approach. *Food Policy*, 102043. https://doi.org/10.1016/j.foodpol.2021.102043

Thank you

Contacts:

Nadhem Mtimet: n.mtimet@ifad.org