Tegemeo Institute of Agricultural Policy & Development, Egerton University, Kenya

Working paper 18

CONSUMPTION PATTERNS OF DAIRY PRODUCTS IN KENYA'S URBAN CENTRES:
Report from an Urban Household Survey

Gem Argwings-Kodhek, M'mboyi, F; Muyanga, M. & Gamba, P.

Assisted By D. Kagwe, M. Kwamboka, F. Karin, A Ngoge and J. Olwande

Tegemeo Institute of Agricultural Policy and Development,
Egerton University.
P.O Box 20498 Nairobi, Kenya.
Tel: +254 20 2717818 Fax: +254 20 2717819
Email:egerton@tegemeo.org
URL: www.tegemeo.org

APRIL 2005

Support for this research has been provided by the Tegemeo Agricultural Monitoring and Policy Analysis Project (TAMPA II). The Kenya Mission of the United States Agency for International Development (USAID) provided financial support for this project

Table of Contents

List of Tables

Introduction

Tegemeo has been involved in analysis to support agricultural policy making in Kenya for the last 17 years. Over that time the major focus has been on the analysis of agriculture as a rural sector. However analysis of a number of apparently primarily rural sectors has led to an appreciation of the need for information about marketing patterns, international and regional trade and consumer markets.

Over the last 8 years one of Tegemeo's main products has been a rural household survey. In 1997, 1998, 2000, 2002 and 2004 Tegemeo undertook surveys of the same 1540 households spread in nine agro-regional zones around the country. That rich database has contributed to policy debate on a range of issues in the agricultural economy. However a gap remained in our knowledge and in the types of information we could bring to the policy table. This paper describes an urban survey undertaken in Nairobi and its environs in 2003. Information from that survey is used in this paper to analyze the consumption of dairy products. Separate papers use the survey information to analyze consumption patterns for maize and other staples, fruit and vegetables, and meat.

This paper describes procedures used in doing the Nairobi survey, in particular the statistical procedures used and the collaboration with the Central Bureau of Statistics that allowed the sample to truly be representative of Nairobi. A description of the households encountered, of how they were divide into 5 income quintiles and the demographic, income and expenditure characteristics of the households in those quintile groups follows. Typical households are described to give a better feel for the types of individuals each group represents.

The background information is used as a base for analysis to describe the consumption of dairy products. Information on the consumption of dairy products is presented for Nairobi as a whole, as well as for the 5 different income groups defined within the city. Differences in consumption by type of product – primarily raw milk, pasteurized milk and yogurt- is described by socio-economic characteristics such as income, place of origin, religion, education, gender and age of the household head. The paper goes on to detail the different marketing channels households use to acquire dairy products, and the prices in the different channels. The analytical part of the paper concludes with an analysis of incomes of participants in the marketing channels frequented by the poor and a comparison of the consumption of milk compared to other drinks consumed outside the home.

The paper uses the information gathered to draw policy conclusions. The overall picture is that Nairobians do not drink enough milk and new thinking about how to increase consumption should be brought to the policy table. Compared to more developed

countries Kenyans consume too much of their dairy products in the form of fluid milk. And milk has not penetrated into consumption habits of the Nairobians, particularly the poor and middle classes outside the house where less nutritious and more expensive products like water, soda and even alcohol are winning the battle for market share.

Key policy debate in the dairy sector is whether to ban the hawking of raw milk. The paper concluded by calculating the financial and nutrition related costs in the form of reduced overall consumption of milk that would flow from such a decision.

Primary Data Sources and Methods

Tegemeo has been undertaking rural household surveys over the last 8 years. The Institute last undertook urban household surveys in Nairobi in 1995 and 1993. That survey focused on maize consumption and was able to document the changes in consumption patterns arising from the liberalization of maize marketing.

The institute undertook a survey of 549 urban households in Nairobi in September 2003. The survey covered the consumption of staples, dairy products, fruits and vegetables as well as potential competing products. The idea of the survey was to better understand urban consumption patterns and the policy related factors driving those patterns.

The data used in this study comes from a cross-sectional random survey of 541 households in Nairobi's urban areas and environs. The survey was conducted in October and November 2003 and implemented by Tegemeo Institute in cooperation with the Central Bureau of Statistics. The survey uses the Central Bureau of Statistics National Statistical Sampling Frame - NASSEP IV – that was established using the 1999 nationwide population and housing census database. Census Enumeration Areas were used as the primary sampling units. The first step in developing the frame involved allocating the primary sampling units to the residential areas and income groups considered as the strata. This was followed by selection of the primary sampling units using probability proportional to size.

Nairobi was allocated a total of 108 primary sampling units out of the 1800 units in the national frame. These were then allocated to the five strata using optimal allocation and the primary sampling units selected with probability proportional to size. The allocation of primary sampling units among the five strata is as indicated in Table 1 below.

Table 1: Allocation of sampling units in Nairobi.

Strata #	Income Strata	Primary Sampling Units In Nairobi (Clusters)	Primary Sampling Units Selected
1.	Upper	28	8
2.	Lower Upper	12	3
3.	Middle	16	5
4.	Lower Middle	36	10
5.	Lower	16	4
	Total	**108**	**30**

Source: Tegemeo Urban Consumption Survey 2003, Author Compilation

For purposes of the household consumption survey, 30 clusters were selected using systematic random sampling. Financial and human resources were important factors in determining the overall number of clusters, and ultimately households interviewed. More resources and a larger sample would have been preferable.

For each of the 30 clusters, CBS selected 20 households for interview by Tegemeo enumerators. Each enumerator was introduced to the household by the local CBS supervisor for the area. The overall sample was 600 households. Not all households were available for interview. Others, particularly among higher income groups, were unwilling to be interviewed. CBS assisted in the statistically valid identification of replacement households in a manner that kept the sample representative. Some household interviews suffered from missing information and other data problems and were dropped. The final sample size used in the analysis was 541 households.

The households interviewed under represented relatively poor households. CBS assisted in the weighting of the data from the household consumption survey to take into account the sampling procedures at each stage of selection and non-responses. Weights for each cluster were calculated based on their selection probabilities. Household weights were also calculated based on their probabilities of selection. In cases where some selected households did not respond, the weights were adjusted by the following factor:

$wi = k_i/n_i$ where

k_i = Number of selected households in the i^{th} cluster
n_i = Number of households that responded in the i^{th} cluster

Overall household weights were formulated as below;

$W_{ci} = D_{ij} * \underline{H_{si}} / H_{ri}$ Where by;
D_{ij} is the sample weight of the j^{th} household in the i^{th} cluster.
H_{si} is the number of selected households in the i^{th} cluster
H_{ri} is the number of households that responded in the i^{th} cluster

The effect of the weighting was to put more weight on interviews among poorer clusters.

Households were interviewed about their demographic details, age, sex, education, salary or business income for each member. Detailed information on household purchase and consumption patterns, sources and prices paid for different food products including but not limited to dairy products including raw milk, pasteurized packed and unpacked milk, yogurt, cheese and ghee, maize and maize products, wheat and wheat products, beef and

other meat products, fruits and vegetables, sugar and rice among other consumption items. Details on overall household expenditure also were gathered.

Consumption was converted to "adult equivalents" to standardize consumption units within households. Adult equivalents are commonly used technique that determines consumption on the basis of the sex and age of each specific household member. Males are given more equivalents than females for each age group, and males between 15 and 25 are the only group over 1 adult equivalent. Adult equivalents are lower then per capita figures by about 30 percent. By aggregating the determined adult equivalents of the respective household members, the household's number of adult equivalents was derived. The conversion factors are shown in Table 1 of the Appendix.

Household income was derived as the sum of proceeds from employment and business earned by household members in the previous month. Remittances from household members not residing in the household and pension accruing to retired household members were also included. Households in the sample were ranked by income per adult equivalent and then stratified into five income quintiles to assess potential differences in consumption patterns by income.

The study uses descriptive statistics to analyze trends in consumption patterns and to calculate various ratios pertaining to consumption comparisons. The study also applies the use of graphical illustrations to explain patterns in milk and dairy product consumption.

Demographic Characteristics of Nairobi Households

Table 2.3 gives the basic demographic characteristics of the sampled households. The average household has 4.7 people and 4.05 adult equivalents. Household size increased with income. i.e. there were more people in wealthier households with an average of 3.6 people in the poorest households and 5.8 people in the wealthiest households. Data indicated teenage children, adult relatives and domestic workers boosting household sizes among the wealthier groups.

Table 2. Basic Demographics

Sample Characteristics						
	Nairobi	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
Adult equivalents	**4.05**	3.01	3.37	4.12	4.63	5.09
# of HH Members	**4.7**	3.6	4	4.9	5.4	5.8
% Male Headed	**82**	79	91	73	78	88
% Female Headed	**18**	21	9	27	21	12
Mean Income	**29,223**	3,613	7,873	13,993	31,770	145,877

Men head 82 percent of sampled Nairobi households. This figure rises to 90 percent among the wealthiest households. Female-headed households are over represented among the poorest income groups - 21 percent against a sample average of 18 percent- and underrepresented among the wealthiest households where they drop to 1 percent.

Table 3. Household Income

Household Monthly Income					
Income Quintiles	**Mean**	**Mode**	**Median**	Min	Max
1	3,613	5,000	4,000	1,200	5,500
2	7,873	6,000	8,000	6,000	10,000
3	13,993	15,000	14,000	10,500	18,745
4	31,770	20,000	30,000	19,000	55,000
5	145,877	70,000	91,000	55,500	2,184,000
Nairobi	**29,223**	**6,000**	**11,500**	**1,200**	**2,184,000**

Income was used to classify households into income quintiles. The sample mean monthly income was Ksh 29,223. There was wide dispersion around this mean with household incomes ranging from Ksh 1,200 to Ksh 2,184,000 per month. The table presents mean, mode and median incomes. The mean is the average of all the households in the group. The mode is the most commonly occurring value and the median is the income within the group that has half of the households above, and half below it. Average monthly income in the first quintile is Ksh 3,613 per month and ranges from Ksh 1,200 to Ksh 5,500. The most commonly occurring figure of income in the quintile is Ksh 5,000. Half of the 108

households in the quintile (54) earn Ksh 4,000 or less and half earn more than Ksh 4000. In Nairobi Ksh 6,000 per month is the most commonly occurring household income and, half of households earn either more or less than Ksh 11,500 per month.

The more educated households tended to have higher income. Among household heads roughly one third of the sample have primary education or less, one third have completed secondary and one third have attended college or university. But around this mean 93 percent of the poorest households have only secondary education or less, while among the wealthiest households 76 percent of household heads have college or university education.

A similar pattern emerges among spouses of the household head. Among the poorest households 46 percent of spouses have primary education or less, a figure that falls to 6 percent among the wealthiest group. Over half (54 percent) of the spouses in the wealthiest group have college or university education as compared to between 1 and 3 percent in the 2 poorest groups. Clearly education levels affect income. These results give a level of comfort about the sample and other inferences that may be drawn from it. Differences in socio-economic characteristics will be used later in the paper to help explain consumption patterns for dairy and other products.

Table 4. Education Levels

	Percentage Education levels of head and spouse					
Head	**Nairobi**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
No education %	**3**	3	0	8	4	1
Primary education %	**29**	61	41	30	11	5
Secondary education %	**43**	34	53	40	52	25
College education %	**15**	1	5	17	25	22
University education %	**10**	0	1	5	8	46
Spouse	**Nairobi**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
No education %	**4**	19	0	2	2	3
Primary education %	**39**	61	67	39	17	4
Secondary education %	**38**	18	30	53	53	31
College education %	**10**	1	3	6	23	18
University education %	**8**	0	0	0	5	44

Table 5. Origin and Religion

Origin	**%**
Kikuyu	33.95
Luo	17.71
Luhya	15.13
Kamba	11.99
Others	4.43
Asians	4.06
European	3.69
Kisii	3.14
Meru	2.21
Kalenjin	1.85
Somali	1.85
Total	100

Religion	Count	%
Christian	497	91.7
Muslim	20	3.7
Hindu	17	3.1
Buddhist	5	0.9
Atheist	3	0.6
Total	**542**	**100.0**

Table 5 gives more demographic characteristics of the sampled households. Kikuyu's were the single largest group with 34 percent of households followed by Luo's and Luhya's and Kamba's with 17, 15 and 12 percent respectively. 92 percent of the sample were Christian.

Table 6. The Typical Households

Quintile 1. Income Ksh 4,000 per month.
Watchman. Lives in Kibera, earns Ksh 4,000 per month salary. Primary education only, same for wife. 2 children. Rent Ksh 600 per month. Does not eat outside the home, even during 12 hour shift, and does not use public transport.
Alternatively single mother of 4 doing small business earns Ksh 3,000 per month.

Quintile 2. Income Ksh 8,000.
Factory worker, also lives in Kibera or Mukuru. Rent 600-800. Salary Ksh 6,000. Wife does small business brings in an extra Ksh 2,500 per month. Secondary education, wife primary only. 3 children. Uses public transport Ksh 20 per day (before matatu reforms) and eats Ksh 20 out of home- lunch- per working day.

Quintile 3. **Income Ksh 13,000**.
Mechanic, tailor, carpenter earning Ksh 10,000 per month from his business. Wife earns another 3,000 from her trading activities. He went to post secondary training, she completed secondary. Live in Eastliegh or Huruma. Rent Ksh 2,000. Ksh 40 transport per day and also eat Ksh 40 per day away from home.

Quintile 4. Income Ksh 30-40,000
Accountant or salesman earning Ksh 25-30,000. Went to college. Wife runs family business either shop, café, or hair salon and brings in another Ksh 5-10,000 per month. Over 40 years old, kids at home are teenagers. Rent of Ksh 5,000-8000 in Zimmerman or Eastliegh. Public transport of Ksh 100 per day and eat out Ksh 100 per working day. One relative and one domestic worker. No car.

Quintile 5. Income Ksh 70,000
Professional probably with postgraduate qualifications, doctor, Senior Civil Servant. Salary Ksh 50,000 plus Ksh 20,000 from working wife. If not salaried then in business. Teenage children, domestic staff of 1, 1 or 2 relatives staying with them. 80% chance of owning a car. Lives in Buru Buru or Highridge, Rent Ksh 20,000. Ksh 200 of meals away from home per day for household and Ksh 300 of transport, mainly fuel for the car.

Expenditure Patterns In Nairobi

The aim of the urban survey was to understand food consumption patterns. An analysis of household expenditures is presented to provide context for the discussion that follows. Expenditure was computed from data provided by households during the survey.

Food consumed at home is the largest expenditure category across all income classes. Across the sample for food eaten at home expenditure averages Ksh 4,565 per month and ranges from Ksh 2,389 to Ksh 10,583 from the lowest to highest income quintile. Food eaten away from home adds another Ksh 1,283 to the average and from Ksh 594 to Ksh 4,063 respectively in the lowest and highest quintiles. Food consumed at home is an inferior good whose consumption decreases as a percentage of income as income rises. In the sample the percent of income spent on all food fell from 36 percent of expenditure among the poorest quintile to 20 percent among the wealthiest group.

Monthly household expenditure on food consumed at home in Nairobi is Ksh 5,896 and ranges from a low of Ksh 2,516 per month on average among the poorest 20 percent of households, to Ksh 13,556 among the wealthiest group.

Expenditure on food averages 39 percent of household expenditure across the sample. Relatively poorer households spend a larger proportion of their expenditure on food peaking at 45 percent of expenditure among the poorest quintile and falling off to 34 percent among the 4th quintile and 26 percent among the wealthiest households.

The cost of housing is the next largest item across all income groups. Rent is a normal good in economic jargon – its consumption increases with income. While the absolute amounts spent on house rent increased from Ksh 965 per month in the poorest group to Ksh 9,671 among the wealthiest households housing related expenditure was a fixed 15 to 17 percent of household expenditure across all income groups. Rental expense averaged only 15 percent of expenditure across the sample. Among poorer income groups rent is 36 percent of all expenditure on food. The rent as a proportion of all food expenditure rises to 75 percent among the wealthiest households. Providing access to cheap food is a more pro-poor policy than programs aimed at giving the poor access to more affordable housing.

Table 7. Household Expenditure Per Month

	Nairobi	Q1	Q2	Q3	Q4	Q5
Food consumed at home	**5,896**	2,516	3,199	4,731	5,781	13,556
Housing rent	**3,896**	1,169	1,372	1,955	5,513	9,643
School fees	**3,728**	1,334	824	1,157	4,299	11,092
Transportation	**2,997**	753	1,122	2,113	3,256	7,906
Others	**2,068**	564	701	2,017	1,839	5,278
Food consumed out of home	**1,640**	692	701	1,035	1,615	4,237
Medical	**1,285**	309	478	683	1,364	3,647
Energy	**559**	468	461	634	709	531
Totals	**22,069**	**7,805**	**8,856**	**14,326**	**24,376**	**55,889**

Table 8. Household Expenditure Percentages

Expenditure Item	**Nairobi**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
Food consumed at home	**30**	36	36	32	25	20
Food consumed out of home	**7**	7	8	7	7	7
Total Food	**39**	**45**	**43**	**39**	**34**	**26**
Housing rent	**15**	14	14	14	19	15
Transportation	**11**	10	10	11	12	13
Others	**8**	8	8	10	8	7
School fees	**7**	5	5	6	9	11
Energy	**5**	9	7	5	4	1
Medical	**4**	3	4	4	4	5

Transport related expenses are the next largest category of household expenditure. Transport as a percentage of total expenditure averages 10 percent of household expenditure and ranges from 10 to 13 percent across income quintiles. Transport expenses rise faster than food expenditure. Poor households spend 25 percent of what the wealthiest households spend on food at home. However the wealthiest group spends 10 times as much as do the poorest households on transport. Medical expenses follow a similar pattern.

School fees are the next largest item of expenditure in the entire sample averaging 6 percent of expenditure. However school fees are an area where income group plays a big role in determining expenditure shares. The poorest households spend only 3 percent of income on school fees while the wealthiest clusters spend 14 percent of expenditure on it. Households reported a single annual figure for expenditure on education that was converted to equal monthly equivalents for purposes of this analysis. Around the sample average of Ksh 2,880 per month, monthly equivalents ranged from Ksh 406 in the bottom quintile to Ksh 13,434 per month among the wealthiest group.

The poorest households spend more on energy than on transportation, and more than the second and 5th quintiles. Expenditure on energy averages Ksh 599 across the sample. The wealthiest households spend less than the average for the sample. This may reflect the benefits of electricity connections and gas cookers relative to kerosene, charcoal and firewood. A full explanation of this phenomena is beyond the scope of the current exercise.

The expenditure figures shown, and the relationships between the across income quintiles suggest items that would be part of a pro-poor policy stance. The data suggest that school fees is the item where wealthier households spend 3 times as much as their income would suggest. It is an item where more is spent the more you earn. These are the features of a luxury or an investment. Medical expenses probably are under consumed by the poorer households as suggested by a recent Health Survey. The result is that wealthy households consume 15 times as much as do poor households. Poor households spend half what they should be spending on medical expenses. Adequate medical care cannot be considered a luxury.

Food is not a luxury. It is an inferior good whose consumption decreases as a proportion of income as income rises. The poor spend relatively more of their income on food than the rich suggesting that lowering the cost of the food getting to poor people would be efficient pro-poor policy. It is clear that the same also applies even more strongly to energy. The absolute amounts are small but the poorest households should not be spending as much or more than wealthy households on energy. Kenya taxes food products – maize, wheat and sugar- and the energy sources- kerosene- used by the poor. Policies to make fuel wood and charcoal expensive have a rational basis in trying to protect the environment, but are frustrated by the tax on kerosene.

Table 9. Luxuries and Necessities

"Luxuries"	Rich Spend as Multiple of Poor
School Fees	33.1
Medical	14.9
Transportation	10.4
Rent	10.0
Others	8.4
Food Out Of Home	6.9
Food At Home	4.4
Energy	0.9
Totals	8.4

The expenditure data did not capture all items households spend money on. Investments, remittances, insurance and other costs of living were omitted. However the data give a good picture of relationships among expenditure categories among the different income groups that make up Nairobi. The following section focuses on food expenditure. Later sections focus specifically on dairy.

Food Expenditure In Nairobi

Food is the largest expenditure item among Nairobi households. In this section food expenditure is broke into its components so the relative importance of the different food items can be shown. Information in this section also examines differences in food expenditure by income quintile.

Table 10. Monthly Household Expenditure on Food

Items	Nairobi	Q1	Q2	Q3	Q4	Q5
Dairy Products	**1,211**	596	748	996	1,525	2,127
Wheat + wheat Products	**748**	404	471	673	981	1155
Beef	**637**	243	347	477	839	1278
Maize + Maize Products	**449**	457	410	449	533	397
Fruits and Vegetables	**402**	275	305	364	466	506
Sugar	**314**	277	242	316	373	363
Rice	**201**	161	165	187	237	250
Bananas	**147**	92	92	154	197	166
Total	**4,109**	**2,506**	**2,780**	**3,615**	**5,151**	**6,242**

Dairy products constitute the single largest food expenditure item across all income classes. Average household expenditure on dairy items in Nairobi is Ksh 1,211 with quintile means ranging from a low of Ksh 596 among the poorest households to Ksh 2,127 among the wealthiest group. The poorest households spend an average of Ksh 20 per day on dairy products. The average household spends Ksh 40 and the wealthiest households spend Ksh 71 per day on milk and dairy products. The consumption of dairy products will be examined in more detail in the following sections.

Wheat and wheat products are the next largest expenditure category. The category includes bread, chapatti, mandazi and other wheat based preparations as well as pasta products. Details are presented in Muyanga et al 2005. Wheat consumption is growing in urban Kenya and expenditure surpasses that on maize in all but the poorest income quintile. Muyanga et al. also, presents findings on maize and maize products as well as other staples. Expenditure on staples exceeds that on dairy when the three main staples – maize, wheat and rice- are combined. For the whole sample expenditure on the combined

staples rises to Ksh 1,511 per month. Among the poorest households expenditure on the combined staples at Ksh 1,012 near double expenditure on the next biggest food item in their food budget-dairy.

Beef and other meat is the next largest food expenditure category for Nairobi, largely driven by large figures for the 3 highest income quintiles. Expenditure on maize exceeds expenditure on beef by a wide margin among the 2 poorest quintiles. Consumption of fruits and vegetable and of beef and other meats are covered in separate papers by Ayieko et al and Gamba et al.

Sugar is an important expenditure item constituting 7.5 percent of food expenditure in Nairobi. Sugar constitutes 11 percent of food expenditure among the poorest households, a figure that falls to 6 percent among the wealthiest. Kenya imposes import taxes and other charges that raise the price of sugar well above (distorted) world market prices. That tax falls more heavily on the poorest households. The poorest households spend more per month on sugar than on either meat or the combination of fruits and vegetables.

The Consumption Of Dairy Products

Nairobi consumes an average of 6.28 Kgs of dairy products per adult equivalent per month. The bulk of that consumption is in the form of fluid milk – either raw or pasteurized. 1.7 times as much raw as pasteurized milk is consumed in Nairobi with pasteurized milk having 63 percent of the market for fresh fluid milk. Consumption of raw milk averages 2.24 kg per month. Consumption of pasteurized milk averages 3.84 kg.

Consumption of raw milk per adult equivalent per month ranges from 2.01 kg among the poorest households, rise to 2.43 kg in the third quintile before falling to 1.68 kg among the wealthiest households. The fall in average consumption among the wealthiest households is driven by a low 23 percent of the wealthiest households consuming raw milk.

Table 11. Milk Consumption In Nairobi

Kgs Consumed per AE Per Month

	Nairobi	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
Raw	**2.24**	2.01	2.43	2.73	2.03	1.68
Pasteurized	**3.84**	2.24	3.34	3.89	4.96	6.26
Yoghurt	**0.21**	0.02	0.07	0.08	0.20	1.11
Total	**6.28**	**4.27**	**5.84**	**6.71**	**7.19**	**9.04**

The figures presented above are averages across the whole population of Nairobi. The table below presents consumption figure for only those households consuming a given product. Figures are higher as the sample is smaller and limited to only those households where a particular product was actually consumed. The table makes a number of interesting points. Households consuming raw milk consume more milk than those consuming pasteurized, across the entire sample, as well as in the individual income groups. This is probably due to the cost differential between raw and pasteurized milk. The 29 percent (23+6) of the wealthiest households who actually consume raw milk consume 300 ml per adult equivalent per day. Consumption among the 90 percent (84+6) of households consuming pasteurized milk is 250 ml per day. At the other end of the scale those households consuming raw milk consume only 140 ml per day. Those consuming pasteurized consume 130 ml per day. Is it that households who consume raw milk drink more than those who drink pasteurized, or that households that drink more milk drink raw milk?.

Averages across the whole population present a less encouraging picture. Poor households overall consume only 67 ml of raw and 128 ml of pasteurized milk per adult equivalent per day. Among the wealthiest households 56 ml of raw milk plus 210 ml of pasteurized milk are consumed per day. Overall Nairobi consumes 75 m of raw milk and 128 ml of pasteurized milk per day giving a total of 203 ml. per adult equivalent per day.

FAO recommends 200 kg of milk equivalent consumption per year. The average for Nairobi is 101 litres per capita among the whole sample and 144 litres among the wealthiest group. The FAO recommendation translates to approximately 550 ml per capita per day or 421 ml per adult equivalent per day. On average households in Nairobi consume only half the recommended amounts, and even the wealthiest groups consume only 75 percent of the global recommended amounts. The overriding policy in dairy in Kenya should be to increase consumption – in all forms.

Table 12. Milk Consumption Among Those Households Consuming

Kgs Consumed per AE Per Month
Among Those HH Consuming

	Total	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
Raw	**6.44**	4.21	6.51	8.69	6.95	8.98
Pasteurized	**5.48**	3.95	4.94	5.36	6.36	7.40
Yogurt	**1.29**	0.35	0.65	0.55	0.84	2.97
Total	**6.53**	**4.51**	**6.06**	**6.91**	**7.45**	**9.23**

More households consume pasteurized than raw milk. Pasteurized milk is consumed by 77 percent of households consisting of 69 percent of households that consume only pasteurized milk, and 8 percent of households that consume both products. 46 percent of households consume raw milk, 38 percent exclusively and 8 percent in conjunction with pasteurized milk.

Pasteurized milk is the dominant form in which milk is consumed in Nairobi with equal numbers of even the poorest households consuming pasteurized as raw milk. As income rises the proportion of households purchasing raw milk declines as the proportion consuming pasteurized milk rises. In the top income quintile 23 percent of households consume exclusively raw milk against 84 percent consuming exclusively pasteurized product. But while relatively more poor households consume raw milk, it is consumed across all income groups. Even among the wealthiest group where 90 percent of households purchase pasteurized milk, 30 percent of households consume raw milk.

Table 13. Percent of HH Consuming A Dairy Product

		% of HH Consuming Product					
	N	**% of Nairobi**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
Raw	207	**38**	54	48	35	31	23
Pasteurized	375	**69**	53	62	71	77	84
Both	45	**8**	10	10	6	8	6
Yoghurt	109	**20**	6	9	17	25	44
Ghee	24	**10**	2	2	0	5	14
Cheese	47	**4**	3	3	5	11	22

*NB % of the total households (541)

The market for dairy products in Nairobi is dominated by fluid milk. In more developed countries the bulk of dairy products are consumed in forms other than fluid milk. In Nairobi yogurt is consumed by only 20 percent of households, particularly among the rich. Ghee is consumed by 10 percent of households and cheese by only 4 percent of households. Processed dairy products are consumed mainly by relatively wealthy households.

Consumption By Household Characteristics

The concentrated consumption of different products among certain groups suggests that dairy product consumption patterns differ by the socio-economic characteristics of households. Presented below are analyses of differences in consumption by place of origin/tribe, religion, and education and by gender of the household head.

Europeans, Indians and Kalenjins and Somali's are the biggest milk consumers per adult equivalent even though they make up a very small percentage of the population. Consumption among Europeans and Indians is near double that in the African population. Kikuyu's and Kamba's consumption is about the sample average, Luhya's and Luo's consume the least milk.

This is closely related to incomes as the big milk consumers are also the biggest earners and the lowest consumers are over represented among the lower income groups. The exception is Somali's whose milk consumption can be attributed to taste or culture as their consumption of milk products is out of proportion to their income. Other than for them, milk consumption is largely driven by differences in incomes. As and if incomes in Nairobi rise, milk consumption will rise disproportionately.

Table 14. Consumption By Origin of Household

		Kgs Consumed Per AE Per Month			
Origin	% Of HH	**Total**	Raw	Pasteurized	Yoghurt
Asians	3.7	**11.72**	4.04	7.38	0.30
European	4.1	**10.15**	2.73	5.51	1.91
Somali	1.8	**7.90**	0.60	7.26	0.04
Kikuyu	1.8	**7.35**	3.40	3.66	0.29
Meru	2.2	**6.95**	2.53	4.15	0.27
Kalenjin	33.9	**6.88**	1.71	4.89	0.28
Kamba	12	**6.83**	1.93	4.76	0.13
Others	4.4	**6.21**	1.11	4.94	0.17
Luhya	3.1	**5.20**	2.77	2.28	0.14
Kisii	15.1	**4.92**	0.95	3.96	0.01
Luo	17.7	**4.90**	0.97	3.81	0.11
Total	**100**	**6.28**	**2.24**	**3.84**	**0.21**

Table 15. Income Ranking By Origin of Household

	Percent of Households In Income Quintile				
	Q1	**Q2**	**Q3**	**Q4**	**Q5**
Europeans	5.0	5.0	5.0	10.0	75.0
Asians	9.1	9.1	9.1	13.6	59.1
Kalenjin	0.0	0.0	20.0	40.0	40.0
Meru	0.0	16.7	16.7	41.7	25.0
Kikuyu	16.3	16.3	21.2	23.4	22.3
Others	16.7	16.7	20.8	29.2	16.7
Kamba	21.5	20.0	20.0	24.6	13.8
Kisii	11.8	47.1	17.6	11.8	11.8
Somali	30.0	20.0	10.0	30.0	10.0
Luo	29.2	26.0	20.8	14.6	9.4
Luhya	29.3	25.6	25.6	11.0	8.5
Total	20	20	20	20	20

Christians constitute 90 percent of the sample and their consumption is just below the Nairobi average at 6.7 kg per adult equivalent per month. Buddhists, Hindu's, and atheists consume significantly more milk. Muslims consume slightly more than the Christian dominated average. The atheists within the sample consume more dairy products in the form of yogurt than milk. Their consumption patterns also extend to cheese and cream and is more like consumption patterns in the developed countries they come from where the bulk of dairy products are consumed in forms other than fresh fluid milk.

Table 16. Impact Of Religion On Kgs Consumed Per AE Per Month

Religion	**Total**	Raw	Pasteurized	Yoghurt
Atheist	**30.71**	9.30	9.01	12.40
Buddhist	**17.31**	0.00	16.43	0.88
Hindu	**11.29**	3.97	7.18	0.14
Muslim	**6.69**	0.93	5.72	0.04
Christian	**6.14**	2.26	3.69	0.19
Total	**6.28**	**2.24**	**3.84**	**0.21**

Consumption of dairy products increases with education. Households where the head never went to school or only completed primary consume 5.5 kg per adult equivalent per month. This rises to 5.9 kg among those who completed secondary, 8.2 kg among those who attended college and rises to 8.9 kg among households where the head attended university.

Raw milk consumption is lowest among households where the head never went to school and increases from 0.4 kg per adult equivalent per month to peak at 3.75kg among college leavers before falling among those who went to university. Graduates are not keen on raw milk. Consumption of pasteurized milk among those who never attended school is high at 5.1 kg. Consumption falls to 2.98 kg among those who completed primary and rises from there as income rises. Yogurt is the preserve of the most educated groups with consumption increasing with education to peak at 1.35 kg per adult equivalent per month among households headed by a university graduate.

Table 17. Impact of Education Kgs Consumed per AE Per Month

	Total	No School	Primary	Secondary	College	University
Raw	2.24	0.40	2.36	1.90	3.75	1.54
Pasteurized	3.84	5.09	2.98	3.84	4.23	6.04
Yoghurt	0.21	0.02	0.01	0.12	0.23	1.35
Total	**6.28**	**5.51**	**5.35**	**5.86**	**8.21**	**8.93**

The data also was able to give a gender dimension. Female-headed households consume an additional 0.55kg of milk per adult equivalent per month. This extra milk is primarily in the form of pasteurized milk. Female-headed households show a slightly greater affinity for pasteurized milk than do male-headed households.

Table 18. Impact of Gender on Kgs Consumed per AE Per Month

	Total	Male	Female
Raw	2.24	2.25	2.22
Pasteurized	3.84	3.73	4.32
Yoghurt	0.21	0.21	0.19
Total	6.28	6.19	6.74

The influence of the age of the head of the household was examined to give some idea of tastes among the relatively young who will have a greater bearing on consumption patterns in the future. Younger households consume more milk than older ones. Compared to a sample average of 6.28 kg per adult equivalent, households where the head is 25 years or less consume 6.55 kg. Households over 45 consume a full 1 kg less per adult equivalent than the 25 year old group. The pattern of higher consumption among the young holds for both raw and pasteurized milk. It is only in yogurt that the households with the oldest heads consume the most i.e. double the population average.

Table 19. Impact Of Age on Kgs Consumed per AE Per Month

	Total	> 25	25 to 35	35 to 45	45 +
Raw	2.24	2.39	1.88	2.46	1.68
Pasteurized	3.84	4.04	4.40	3.36	3.42
Yoghurt	0.21	0.12	0.15	0.10	0.44
Total	6.28	6.55	6.42	5.91	5.55

There is relatively little policy makers, development partners or the dairy sector stakeholders can do to influence religions, origins or age of household heads. But education levels, and the incomes that result from education are factors over which policy makers have an influence. Increases in incomes will be the biggest factor influencing per capita milk consumption in Nairobi. The increase in per capita consumption among the relatively young also suggests increases in demand as those households come to dominate the population, and pass on the milk drinking habit to their children. Perhaps the Nyayo Free school milk program actually transferred permanent benefits to the dairy industry through increasing demand for milk. But for a significant and sustained increase in

demand for milk to come about Nairobi people need to be inculcated with a taste for processed dairy products such as cheese that use many liters of milk to make a single kilogram. But countries where this has been successful have done it on the back of milk pricing systems that recognize that milk going into processed products needs to be cheaper than the prices that can be sustained when the market is only for fluid milk.

Marketing Channels

Dairy industry stakeholders can play a role in affecting dairy consumption through the marketing channels where the products are bought and the prices in those outlets. Much of the policy debate in the sector has been based on controlling the milk products consumed, and since raw milk is the preserve mainly of hawkers, debate has focused on the control of hawking. Until now figures did not exist showing how hawking of raw milk compared with alternative marketing channels.

Marketing channels for diary products are clearly defined. Table below shows the percent of households purchasing particular products from particular outlets. Pasteurized milk is the dominant product with 63 percent market share within the city. Shops are the dominant source for pasteurized milk selling it to 70 percent of households buying and to 3 times as many households as do supermarkets that supply 14 percent of the households consuming pasteurized milk. Kiosks follow close behind supplying 13 percent of households. Marketing channels for pasteurized milk are concentrated in 1 major and two important secondary channels. However there are thousands of shops and kiosks around Nairobi.

Table 20. Dairy Product Marketing Channels

Where Buy	Supermarket	Shop	Hawker	Kiosk	Milk Bar	Other
Raw milk	0.0	18.5	50.5	11.4	11.4	8.2
Pasteurized	13.9	69.6	1.1	13.1	1.1	1.3
Yogurt	78.1	13.3		1.9	4.8	1.9
Cheese	95.7	2.2				2.2
Ghee	90.0	10.0				

Hawkers are the single most important source for supplies of raw milk and supply 50 percent of the households purchasing raw milk. Only half of the households consuming raw milk get it from a hawker. Shops are an important second channel for raw milk and supply 18.5 percent of households. Kiosks and milk bars each supply 11.4 percent of households. Other outlets such as neighbors and institutions supply eight percent of households. Marketing channels for raw milk are not concentrated in one dominant channel.

Supermarkets dominate the marketing of yogurt, cheese and ghee. 96 percent of households buying cheese get it from a supermarket, as do 90 percent of households buying ghee. Supermarkets are the source for 78 percent of households buying yogurt. Supermarkets are the second most important outlet for pasteurized milk, just ahead of kiosks. They sell no raw milk. Supermarkets are important marketing channels for

accessing wealthy households and are the preeminent source of the products consumed primarily by the highest income group.

Within marketing channels, purchasing patterns vary by income group. Table xx below shows hawkers supplying raw milk to all income groups. Hawkers are the preferred source of raw milk among the wealthiest households who consume the product. The convenience of delivery to the doorstep (or more likely gate) explains this. Compared to the poorer income quintiles, the wealthiest households do not purchase raw milk from shops or kiosks. This direct delivery service is also preferred among the 2 poorest quintiles. Hawkers bring a number of benefits to their customers of raw milk - convenience, and quality control. Hawkers deliver very early in the morning or in the evening- the 2 times when Kenyans need milk. Poorer households benefit from roadside hawkers conveniently situated on their way home, or very near their home. Hawkers with known clients also are able to extend credit and be paid weekly or monthly. And the quality control system with a regular hawker is immediate. If the product is spoilt it is returned at no risk to the buyer. Hawkers who do not accept returns of poor quality milk cannot remain in business long.

Shops and kiosks have become important channels for the distribution of raw milk. Milk bars, the channel preferred by the official regulations have an 11.4 percent share of the market, and are more concentrated in the areas where the quintiles 2-4 live. Milk bars have not penetrated the areas where the poorest households live, where hawkers sell to 7 times as many homes. In all income groups milk bars are the third most popular channel.

Table 21. Source for Raw Milk

	%	Q1	Q2	Q3	Q4	Q5
Duka / shop	18.5	23	15	20	21	6
Hawker	50.5	52	59	43	38	61
Kiosk / kibanda	11.4	14	7	17	10	6
Milk bars	11.4	7	13	14	14	11
Other	8.2	4	7	6	17	17
		100	100	100	100	100

Table 22. Where Pasteurized Milk Is Purchased

	%	Q1	Q2	Q3	Q4	Q5
Duka / shop	69.6	74	70	84	73	51
Supermarket	13.9	7	6	4	12	34
Hawker	1.1	2	3	1	0	0
Kiosk / kibanda	13.1	14	18	6	12	15
Milk bars	1.1	0	0	4	1	0
Other	1.3	4	3	0	1	0
	100.0	100	100	100	100	100

70 percent of households buying pasteurized milk buy it from a duka/shop. Among the poorest households the market share of dukas rises to 74 percent and peaks at 84 percent among the 3rd quintile.

14 percent of households across the sample purchase pasteurized milk through supermarkets with the proportion rising from a low 4 to 7 percent among poorer income classes to 34 percent of the wealthiest group. Supermarkets are relatively more important among the wealthiest households, but supply almost 20 percent fewer of those households than do shops. Kiosks supply 15 percent of the wealthiest households with their pasteurized milk.

Prices

Prices of fluid milk products vary by whether the milk is pasteurized or raw, and by outlet and the income group purchasing through that outlet. Raw milk prices are lower then pasteurized milk across all types of outlet and average from Ksh 27 to 29 per litre. Prices rise to Ksh 30-33 among outlets selling to the highest income group. Across Nairobi during November 2003 a liter of raw milk cost an average of Ksh 28.

Prices for pasteurized milk range from Ksh 29 for unpacked products in a milk bar to between Ksh 31 and 53 across the marketing channels. Prices are highest in supermarkets serving the wealthiest households. Across Nairobi the average price of pasteurized milk, in a packet was Ksh 49 in November 2003, 75 percent more than raw milk.

Table 23. Prices Paid By Channel, Product and Income Group

	Ksh/Kg	Nairobi	Q1	Q2	Q3	Q4	Q5
Raw milk	Duka / shop	29	29	26	29	31	30
	Hawker	28	27	27	29	27	31
	Kiosk / kibanda	27	27	21	28	28	27
	Milk bars	29	29	26	33	28	30
	Other	27	26	29	27	24	33
Pasteurized	Supermarket	51	44	50	50	51	53
	Duka / shop	49	50	48	49	49	50
	Hawker	39	40	33	50	-	-
	Kiosk / kibanda	49	47	50	50	48	49
	Milk bars	29	-	-	27	36	-
	Other	31	30	33	-	30	-

The 75 percent price differential between raw and packed pasteurized milk helps explain purchasing patterns among households and across income groups. If all households consuming raw milk were to transfer their consumption to pasteurized without reducing quantity would transfer an additional Ksh 13.5 million per day from the pockets of relatively poor consumers to the processors, distributors, retailers and regulators promoting pasteurized milk. If those households were to reduce consumption to the pasteurized milk average demand for milk in Nairobi would fall by 15,000 liters per day.

However the price table above shows that in some channels prices for pasteurized milk can match prices of raw milk. In some parts of Nairobi milk processors have made pasteurized milk available in bulk to selected outlets, primarily milk bars. Often this is done by processors using distribution vehicles bearing a different name than their core brand. In some cases the milk is packed in cheaper packaging material. The milk marketing system is innovating as players jostle for market share and increased volume.

Consumption Of Beverages Outside the Home

Milk faces a number of competing commodities. The Tegemeo Urban Household survey gathered date on consumption of a number of potential competitors for space in the consumers throat and budget. The information focused on consumption of beverages outside the home.

Alcohol is the most consumed beverage outside the home, and is primarily consumed by household heads. On average Nairobi households consume 3.6 liters of alcohol per month. Poorer households consume relatively large quantities as the bulk of consumption was in the form of busaa and changaa, as compared to spirits, like whisky, among the wealthiest households. Those difficulties of comparison are removed when consumption is looked at in monetary terms. The second panel of the table below shows Nairobi households spending an average of Ksh 629.60 per month on alcohol. Expenditure rises with income from Ksh 369 among the poorest households to Ksh 1,183 among the wealthiest.

Table 24. Household Consumption (Liters/month) Out of Home

Quintile	Total	Juice	Milk	Soda	Alcoholic beverage
1	**0.74**	0.00	0.58	0.88	3.71
2	**0.53**	0.30	0.49	1.91	2.64
3	**0.63**	0.33	0.90	1.69	3.16
4	**0.32**	0.42	0.80	3.15	1.61
5	**1.44**	0.31	0.44	3.85	7.21
Total	**3.67**	**0.29**	**0.69**	**2.36**	**3.67**

Table 25. Household Expenditure On Beverages (Ksh/Month)

Quintile	Total	Juice	Milk	Soda	Alcoholic beverage
1	**73.77**	0.00	57.93	270.46	368.84
2	**93.06**	17.78	126.38	286.81	465.32
3	**104.73**	19.78	111.34	329.26	523.64
4	**111.44**	25.33	207.78	267.83	557.20
5	**236.64**	18.44	254.22	879.56	1183.20
Total	**629.60**	**17.33**	**155.98**	**408.12**	**629.60**

Soda is the second most popular beverage outside the home among those accounted for. The survey did not cover water and other products. On average Nairobi households consume 2.36 liters of soda (8 sodas) per month. Expenditure averages Ks 408 and ranges from Ksh 270 among the poorest households to Ksh 880 among the 5th quintile.

Consumption and expenditure on juice lags behind milk. But milk consumption outside the home is a fraction of that on soda and alcohol. The milk industry needs to learn from the other more consumer focused sector – soda and alcohol- about marketing channels, and making the product conveniently available at the temperature, price, place and form the consumer wants.

Milk consumption in Kenya is only 60 – 80 litres per capita per year compared to an FAO standard recommendation of 200 litres milk equivalent of milk and dairy products. Reasons for low consumption include low incomes, and the limited forms in which dairy products are consumed. Competing beverages benefit from large, persistent and costly marketing efforts and ensure that the product is always available at the point where the consumer feels the need. Dairy products are often out of stock where they may have been available in the morning and , compared to competitors, relatively hard to come by in non retail outlets like hotels, and restaurants. Increasing consumption outside the home is a policy that can increase incomes to all in the dairy sector.

Conclusions And Policy Implications

Kenyans do not consume enough milk and dairy products. To reach global recommended levels, consumption of milk and milk products needs to double.

Households in Nairobi spend a large proportion of total expenditure on dairy products already making dairy the biggest consumption item in all but the poorest income groups. Consumption varies by origins, religion, age and other demographic factors policy makers can do relatively little about. However policy makers do have a number of leverage points that can be used to increase consumption of dairy products.

Policy initiatives aimed at raising incomes will benefit milk consumption. Many of the type of policies government feels an raise incomes are laid out in the Economic Recovery Strategy for Wealth and Employment Creation. Unfinished business of reducing corruption, reducing the role of government in business and enabling the private sector, and finding the political will to speed implementation have limited income growth over the period since the ERS was published.

There remain a number of dairy sector specific policy levers. Keeping prices competitive through policies to improve on farm productivity is one. Another is to design pricing systems that allow greater penetration of processed products into consumption at competitive prices. A third relates to the facilitation of all retailers in the different supply chains in the sector. Because of a 75 percent price differential households consuming raw milk consume relatively more milk than those consuming pasteurized milk. Hawkers should not be targeted for elimination, but should be seen as an ally in the overarching policy goal of improving nutrition in Nairobi by getting households to consume more milk. The elimination of raw milk from Nairobi would transfer an estimated Ksh 4.9 Bn from current market participants in favor of the processors, distributors, retailers and regulators of pasteurized milk. Increasing overall demand, rather than for only pasteurized milk should be the goal of the Dairy Board, or whatever stakeholder owned institution outside of government takes on the responsibility of increasing demand.

Consumption of milk outside the home is an untapped area. Specific efforts to increase the availability of all dairy products to consumers where they want it, in the form, temperature, packaging and prices they want and at prices they can afford should be the consumer market focus of the dairy industry. Dairy can learn much from the marketing tactics employed by the beverages that out compete it despite being more expensive and less nutritious.