Research article

Consumer preferences raise hope for increasing effective demand for maize products and maize research in Kenya

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Abstract

The importance of maize in Africa and Kenya is demonstrated by the research attention and the resource flows to research. The need for the extensive and intensive research investment is much justified by findings of various studies ranging from conventional to fortify and genetically modified maize studies where willingness to consume and consumer preferences were demonstrated and documented. This paper evaluates findings from two consumer preference studies for maize products in urban Kenya and takes stock of the near linear consumer preferences alongside the stated prices that consumers are willing to pay for different maize products. The results of the 2014 consumer preference survey further give a growing popularity of maize preparations especially ugali in urban livelihoods where living estates were used as a proxy for socio-economic well-being, The increasing consumer preferences by percentage of ugali for instance from 70.5% to 75% for lunch and from 67.4% to 88.9% for dinner translates to a significant demand for maize especially if it is mapped against the increasing population of the maize consumers in Kenya and Africa in general. Further, the stated prices that consumers are willing to pay which on average are far below or about 0.5 US dollars implies given the fact that maize is the most popular staple food consumed by households that have a daily earning of less than a dollar. The paper recommends that research

towards maize targets growing the production by more than the 3% of the current production levels through technological innovation that will guarantee reducing production costs. **Copyright © FEARJ, all rights reserved.**

Key words: Maize products, consumption, preferences, ugali, urban and Kenya

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Introduction

In Africa, poverty and malnutrition are still on the rise and Sub-Saharan Africa is the only region in the world where both the proportion and number of malnourished children are increasing (Rosegrant, et al 2001). Consumer surveys in Kenya as that done by De Groote and Kimenju (2012) indicate that maize has a range of preparations from *uji* (porridge) through *ugali* or *sima* to *githeri* and *muthokoi* all of which are distinctly differentiable. Consumption preferences based on maize attributes (color and nutritional quality) and preferences for maize products in urban Kenya were conducted and documented by De Groote et al, (2008 and 2012) while urban maize consumption patterns in Kenya were studied by Mukumbu, et al (1994) who documented higher total consumption of maize meal by the lower income earners and higher whole maize meal consumption by high income earners in urban Kenya. Mayanga et al (2004) studied maize consumption patterns with a central focus on factors that are driving changes in the amount and form of urban maize meal consumption to enable better understanding of how food security policy should be designed to respond to the needs of low income consumers. The study revealed how consumption and expenditure patterns differ according to household income. These studies give reasons to justify the importance of understanding trends in consumer preferences as lead information in estimating demand profiles and in particular effective demand for maize products and by extension also estimate thematic research areas for the maize enterprise. The major concern however was that all these studies (by Muyanga et al, (2003), Mukumbu, et al (1994) and De Groote, et al (2012) were done in or around Nairobi's urban estates and the results thereof used for generalization of other regions' maize products' preferences.

The coastal lowland tropics of Kenya is home for diverse communities including the native Mijikenda, the Arab and Swahili and a good percentage of all other communities from the entire Kenya as well as foreigners. The native Mijikenda and Swahili are dominant communities with significantly different socio-cultural and economic capacities that also influence their needs, wants as well as tastes and preferences (Mburugu and Adams, 2004). Past research by Wekesa, et al (2003) demonstrated that maize is an important food crop in Kenya and in the coastal lowland is a primary staple for the majority of the population and grown in all agro-ecological zones of the region, including arid and semi-arid lowland areas suitable for sorghum and millet.

 It is on the basis of the recognition of the socio-cultural and economic perspectives and capacity differences that the need for conducting a similar consumer preference survey (as those done by different institutional experts in Nairobi) in the coastal lowland tropics was born as a basis for getting an cross-sectional picture of the place of maize products in different urban areas of Kenya, the results of which would inform different stakeholders (producers,

enablers, input suppliers, researchers, regulators and consumers) of the demand for the maize products and any related aspects thereof.

Maize in East Africa and Kenya

The role of maize in human livelihoods is known worldwide as a source of food and feed (Thorne, et al, 2002). It is the staple food for perhaps 25 million households in East and Southern African region and is planted annually on more than 15 million hectares of land (Thorne, et al 2002). It contributes at least 25% of the calories to the diets of more than 80 million people in the region. Much of it is grown under mixed systems with other enterprises as well as different production scale dictated by land size and population pressure. As the main staple food in the region, maize availability is synonymously equated for food security both to mankind and livestock (Thorne et al, 2002). However, due to differences in land production potential and with the rising demand/consumption deficits and surpluses of maize translates it to a tradable good to even out the deficits thereby stimulating cross-border trade (CRTES, 2003). As an immigrant crop, maize is today the most widely grown staple food of Sub-Saharan Africa and an important wage good in many countries. Despite past successes, continued investment in maize productivity remains crucial to agricultural growth and food security (Smale, et al, 2011).

In Kenya, the history of maize dates back to the 16th Century (Waaijenberg, 1994) and is today the most widely consumed cereal (AATF, 2010). It is the staple food crop for 96 percent of Kenya's population with 125 kg annual per capita consumption and provides 40% of the calorie requirement (Byerlee and Eicher, 1999). The current trends in maize production show that the country is struggling to achieve self-sufficiency in major staples including maize with a growth rate in production averaging at 2% which is lower than the National population growth rate of 3% (AATF, 2010). Under this perspective, if the country has to be self sufficient in maize then it means the growth in maize production has to surpass the population growth rate or otherwise realize a revolution in maize products' consumption patterns.

Maize products available in Kenya

De Groote et al (2012) documented the major maize products as maize grain from the market or farm households, maize meal from *posho*-mills industrial maize meal (sifted and packaged by industrial millers) and industrial fortified maize mill (also from millers). Using the urban and peri-urban areas as the sampling frame, different types of outlets were noticed to offer different products. For instance *posho*-mills offered mostly artisanal products while kiosks, retail shops and supermarkets offered mainly industrial products (De Groote et al, 2012).

Materials and Methods

The paper examines the results of two maize products' consumer preference surveys by De Groote et al (2012) and the other survey done in 2014 in Kenya. The 2012 consumer survey results were from data collected in late 2003 where a two-stage stratification was used to obtain representative samples of maize products' consumers for the first

one and a three stage stratification beginning with a bimodal classification of residential estates as a proxy to socio-economic status or income levels following the United Nations (UN) - Habitat classification of urban, peri-urban and urban slums (Tibaijuka, 2001). The second stage of the sampling process was to employ a systematic random sampling procedure based on an nth respondent selection from a list of estates' households acquired from vital data gathered from village elders who were key informants to the study. The third stage involved selection of respondents based on their position in the maize products' value chain.

Data collection for the 2014 survey used a similar approach as that employed by De Groote and Kimenju et al, (2012) where enumerators used a simple 30-45 minutes structured questionnaire to engage respondents in a face-to-face interview in socio-economic profiling and further an establishment of the maize products available, their subjective preferences and actual consumption patterns across the three meals namely breakfast, lunch and dinner. A stated preference rating was used due to the ease of evaluation/assessment (as a percentage) and low cost implication (Wardman, 1988). Also, in order to assess the prices consumers were willing to pay for the different maize products, a contingent valuation method (CVM) was used where consumers stated prices that they were willing to pay per unit weight (kg) (Pearce, et al 2002).

Results and Discussion

Respondents' profiles

Respondents' profiles for the two respective (2003 survey reported in 2012 and 2014) surveys are summarized in table 1 below. For the 2014 survey respondents were also profiled by age under five categories in the order of less than 25 years, 25 to30 years, 31to 40 years, 41to 50 and over 50 years. By categorizing the consumers by age bracket we wanted to be sure enough that the respondents were rich enough with maze products' information or had long lasting experience in maize products. The age distributions by percentage to the total number of respondents based on the stated age brackets were summarized in figure 1 below.
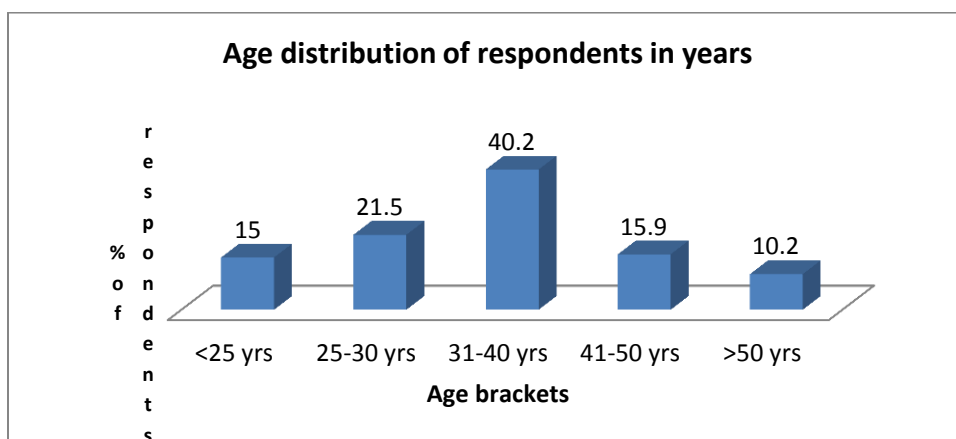

Figure 1: Age distribution of the 2014 survey respondents

Table 1: Socio-economic profiling of respondents by percentage

	2014 respondents' profile (n=220)
Gender:**	
-Females	44.2
-Males	55.8
Education levels:***	
-None	6.0
-Primary level	34.4
-Secondary level	44.2
-Tertiary/college level	15.4
Employment status:***	
-Formally employed	19.3
-Self employed	38.0
-Businessmen/women	16.4
-Not employed	26.3
-Students	-

=significant differences (p<0.05) and *=significantly different at (p<0.01) across category parameters

Consumer preferences for maize preparations across meals

A preference rating for maize preparations gave the results summarized in table 2 below.

Table 2: Stated Consumer preferences for and actual consumption of maize products (n=220)

Meal	Preparation	% of respondents who attested to preference as first choice and actually consuming maize meal/preparation	
		% preferring	% actually consuming
Breakfast**	Porridge (*Uji*)	73.3	70.5
	Ugali	1.9	0.0
	Githeri	-	-
	Other (not maize)	24.8	3.0
Lunch**	*Uji*	10.7	0.0
	Ugali	75.0	64.8
	Githeri	5.1	12.6
	Other (not maize)	-	5.0
Dinner**	*Ugali*	88.9	75.9
	Muthokoi	4.8	10.2
	Githeri	2.6	9.0
	Other (not maize)	3.8	4.8

**=significantly different at p<0.05 (for the within preparations comparison)

Preferences for maize meal preparations in 2012 and 2014 had a high positive correlation (r=0.93) which implied that maize products consumers were either rational or exercised transitivity based on elicited completeness of maize

products (Mandler, 2000) while the correlation of 2014 preferences with actual maize preparation eaten also demonstrated a likely positive and strong relationship (r=0.942) which implies that the consumers preferences were also backed by ability to access their preferred choice either from their own farm harvests or from their ability to pay or purchase (Autor, 2010. Levin J. and Milgrom, P., 2004).

Gender-based maize products consumer preferences

Preference rating disaggregated by gender gave the results summarized in table 3 below.

Table 3: Gender based maize products' preference rating by percentage

Meal	Gender	Preparation	% rating by respondents by gender		
			Most preferred for consumption	Second most preferred	Actual consumed product
Breakfast **	Males	*Uji*	63.9	5.6	95.55
		Ugali	4.2	11.1	0.0
		Githeri	0.0	22.2	0,0
		Other	31.9	66.7	4.45
	Females	*Uji*	80.9	0.0	98.50
		Ugali	0	10.0	0.0
		Other	19.1	10.0	1.50
Lunch **	Males	*Ugali*	65.93	18.84	57.58
		Muthokoi	8.79	28.99	10.61
		Githeri	13.19	31.88	21.21
		Other	12.09	20.29	10.61
	Females	*Ugali*	82.69	3.94	69.57
		Muthokoi	7.69	34.21	14.13
		Githeri	8.65	40.79	13.04
		Other	0,09	21.05	3.26
Dinner (NS)	Males	*Ugali*	87.36	20.83	69.84
		Muthokoi	3.45	20.83	12.70
		Githeri	4.60	22.92	12.70
		Other	4.60	35.42	4.76
	Females	*Ugali*	90.20	6.12	74.41
		Muthokoi	5.88	40.82	8.82
		Githeri	1.0	18.37	6.86
		Other	2.94	34.70	4.90

**Significantly different between males and females ($p<0.005$)

Gender based products' traits/attributes that influence preferences

Male and female respondents identified and rated maize products' attributes that were drivers to their preference for the different meals. On Cross-sectional basis, nutritive value was the highest and significantly rated ($p<0.05$) attribute. Figure two (2) below summarizes this.
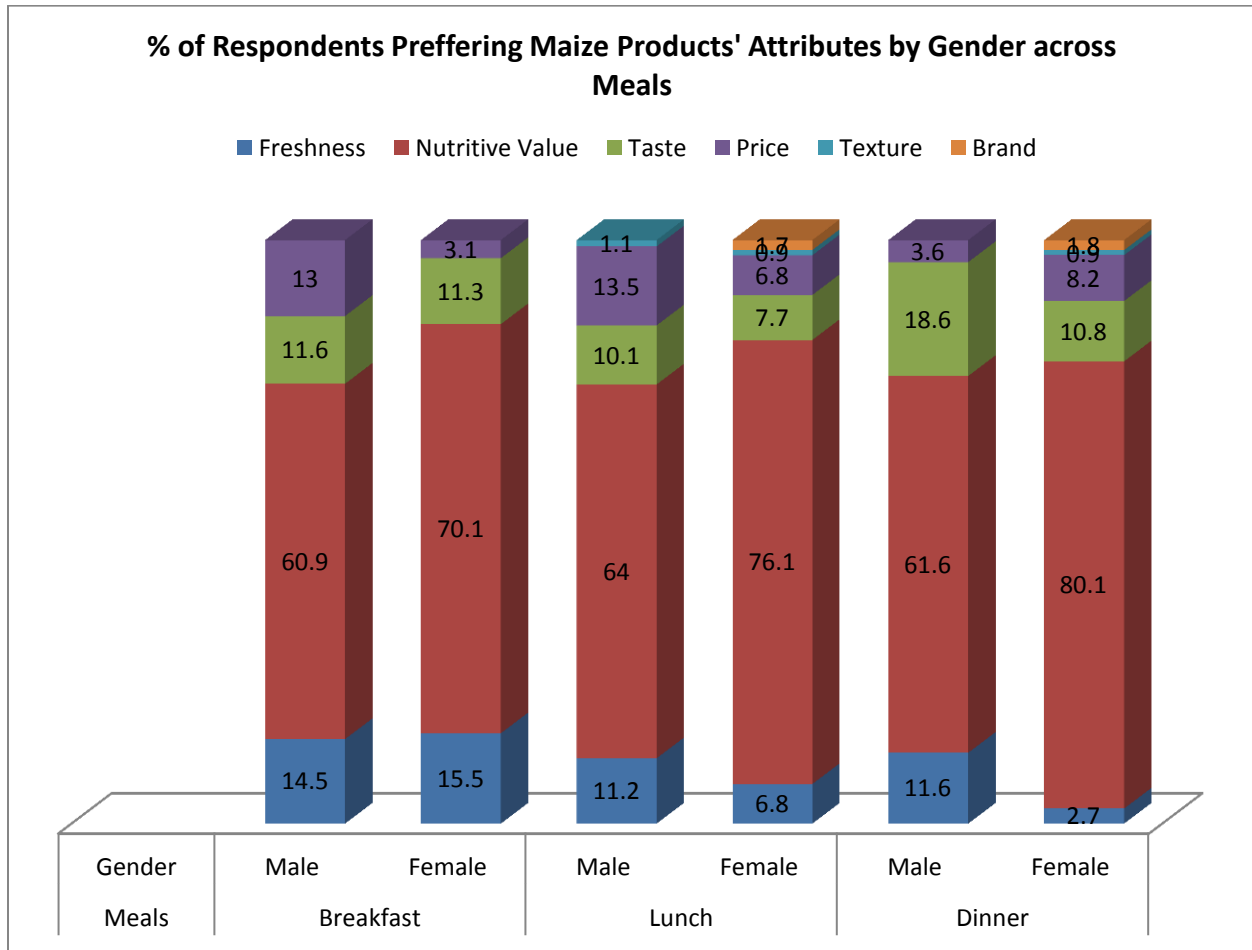

Figure 2: % of respondents preferring maize products' attributes by gender across meals.

The results showed that there were significant differences (at $p<0.05$) only with traits/attributes for dinner only but not for breakfast nor lunch preferences. These results also give an indication that perceived nutritional value of the products/preparations was a leading attribute/trait that influences preferences more followed by freshness across the three meals and on a gender outlook. For lunch and dinner maize preparations, female respondents had higher perceptions for nutritive value than their male counterparts while for freshness, males had higher rating of the preparations than females. In both cases (cross-sectional and by gender disaggregation) price is not a significant driver may be due to the fact that maize products form an essential diet/s which has/have no perfect substitute/s and therefore its preference is not dictated by the budget constraint (Dean, 2009).

Maize products' preference with socio-economic well-being

Living estates as a proxy for socio-economic well-being was used and results from respondents in the respective estates on preference rating for the different maize products were summarized in table 4 below.

Table 4: Maize meals preference rating on socioeconomic classification

Meal	Respondents s/economic status	Preparation	% respondents attesting to	
			Most preferring	Actually eating
Breakfast * (χ2=19.298)	Urban high income	Uji	69.57	76.2
		Ugali	0	0
		Other	30.43	23.8
	Urban medium income	Uji	75.58	98.2
		Ugali	2.33	0
		Other	22.09	1.8
	Peri-Urban medium income	Uji	100	79.1
		Ugali	0	0
		Other	0	20.9
	Urban-Slum low income	Uji	44	92.3
		Ugali	4	0
		Other	52	7.7
	Peri-Urban low income	Uji	90.9	50
		Ugali	0	50
		Other	9.1	0
Lunch** χ2=39.062, p<0.01 and χ2=30.814, p<0.05	Urban high income	Ugali	75.0	84.2
		Muthokoi	10.7	5.3
		Githeri	7.1	5.3
		Other	7.3	5.3
	Urban medium income	Ugali	72.7	65.1
		Muthokoi	4	8.1
		Githeri	16.2	19.8
		Other	7.1	7.0
	Peri-Urban medium income	Ugali	68.4	68.4
		Muthokoi	31.6	31.6
		Githeri	0	0
		Other	0	0
	Urban-slum low income	Ugali	78.4	58.3
		Muthokoi	8.1	12.5
		Githeri	5.4	20.8
		Other	8.1	8.3
	Peri-Urban low income	Ugali	91.7	33.3
		Muthokoi	0	33.3
		Githeri	8.3	33.3
		Other	0	0
Dinner (NS)	Urban high income	Ugali	80.8	79.2
		Muthokoi	0	4.2
		Githeri	7.7	16.7
		Other	11.5	0
	Urban medium income	Ugali	93.9	78.9
		Muthokoi	3.1	8.9

		Githeri	1	7.8
		Other	2	3.1
	Peri-Urban medium income	*Ugali*	89.5	94.7
		Muthokoi	10.5	5.3
		Githeri	17.4	0
		Other	0	0
	Urban-Slum low income	Ugali	87.9	62.5
		Muthokoi	3.0	16.7
		Githeri	6.1	8.3
		Other	3	12.5
	Peri-Urban low income	*Ugali*	72.7	28.6
		Muthokoi	11.3	42.9
		Githeri	13.0	28.6
		Other	3.0	0

**=significant at $p<0.001$ and *=significant at $p<0.05$

The results in the table above show that porridge (*Uji*) is most preferred and actually consumed in the urban medium income estates more than all other estates for breakfast. In the urban slums, *ugali* is most preferred and actually consumed. *Ugali* was least preferred and actually eaten for breakfast in other estates except in the urban slums followed by the peri-urban low income estates.

For lunch and dinner, *ugali* was the most popular maize preparation of all maize products and across the different estate categories stratified by socio-economic well-being. Besides, the urban medium income dwellers take a far lead in preference and actual consumption of *ugali* (89.5 and 94.7% respectively) to other preparations and relative to other living estates' categories. This was attributed to the ease and low cost of preparing *ugali* to other preparations such as *muthokoi* and *githeri* which needed more time and fuel (Sharma, 2012)

Willingness to pay for different maize products

Willingness to pay for the maize products differentiated by traits using the stated (other than the revealed) preference approach gave following results summarized as below.

Table 5: Stated prices (KES) that consumers were willing to pay (per kg) for the maize products

Maize product	N	Mean price (KES)	Standard deviation
Yellow maize	77	33	8.945
White maize (grain)	186	36	11.993
De-hulled white maize	128	38	7.878
Muthokoi	171	51	12.065

Whole-meal flour	97	44	8.753
Hulled maize flour	173	50	7.274
Industrial maize flour	189	42	4.241

Note: The US dollar rate to the Kenya shilling was 1USD to KES. 88.5 at the time of the survey

Willingness to buy and consume yellow maize was stated by 35% of the respondents who priced the same in the range of KES. 28-35 (mean of KES. 33/=) which was lowest to other maize products that included *muthokoi*, whole-meal flour and hulled maize flour in that order. The results implied an ordered value attachment to the products thereby offering willingness for value creation in form of premium pricing as of *muthokoi* (Kirimi et al, 2011). Respondents under-stated (by 16%) the prices of industrial maize flour which at the time of the survey had a retail price of KES. 50/= per kilogram packet. The low stated prices also provided evidence of how maize products were essential tended to be even more essential to household diets and by extension send signals on the need for research to check the cost of maize production to a minimum for enhanced economic production efficiency.

Conclusion

The results of the consumer preference studies demonstrated increasing trends in maize products preferences with particular reference to the survey conducted by De Groote, et al in 2003and documented in 2012. The results further demonstrated the increasing popularity of maize preparations such as *ugali* across socio-economic status which translated to increasing effective demand especially when population growth rates are factored in and mapped against the consumption patterns. The relatively high preference for *ugali* was associated for its ease of preparation as well as the relative energy demand during preparation compared to other preparations such as *githeri* and *muthokoi*. Further, the elicited low prices which maize products' consumers are willing to pay demonstrated the dire need for extensive research to make maize production a cheaper venture than it is now. The study results give a justification to recommend that research towards maize production should target growing the production by more than current Kenya's population growth rate of 3% through technological innovation that will guarantee reducing production costs. The need for enhanced maize productivity is further justified by the fact that there is increasing dual use of maize as food and feed.

References

AATF, (2010). Mitigating the impact of drought in Tanzania: The WEMA intervention. Policy brief, November, 2010

Mburugu, E. and Adama, B. (2004). Families in Kenya

Ahern, A. A and Tapley, N, (2007). The use of stated preference techniques to model modal choices on interurban trips in Ireland

Autor, D. (2010). Axioms of consumer preference and theory of choice. 14.03/14.003 Microeconomic theory and public policy, Fall 2010

Boyd, L. M. (1994). Consumers' constrained choice.

Byerlee, D and Eicher C. K. (1999). Africa's Emerging Maize Revolution: Food Security and Policy Interventions in Sub-Saharan Africa: Lessons from the past Two Decades; In African Studies Review Vol. 42/Issue o3 Centre for Regional Trade Expansion Support (CRTES) 2003. Regional maize trade issue paper.

Dean, M. (2009). Consumer theory notes for introductory microeconomics, Brown University

De Groote H. and Kimenju S. C. (2008). Comparing consumer preferences for color and nutritional quality in maize: Application of a semi-double-bound logistic model on urban consumers in Kenya

De Groote H. and Kimenju, S. C. (2012). Consumer preferences for maize products in urban Kenya. Food and Nutrition Bulletin, Vol. 33, No. 2 © 2012. The United Nations University

Iaquinta, D. L. and Drescher, W. W. (2000). Defining peri-urban: Understanding rural-urban linkages and their connection to institutional contexts

Kirimi, L., Sitko, N., Jayne, T.S., Karin, F., Muyanga, M., Sheahan, M., Flock, J., Bor, G., (2011). A Farm Gate-to-Consumer Value Chain Analysis of Kenya's Maize Marketing System. International Development Working Paper No. 111. Michigan State University, East Lansing, MI

Levin, J. and Milgrom, P. (2004). Introduction to choice theory.

Mandler, M. (2000). A difficult choice in preference theory: rationality implies completeness or transitivity but not both

Mukumbu, M.and Jayne, T. S. (1994). Urban maize meal Consumption patterns: Strategies for improving food access for vulnerable urban households; Egerton Policy analysis Research Project.

Muyanga, M., Jayne, T.S. Argwings-Kodhek, G.and Ariga, J. (2004). Staple food consumption patterns in Urban Kenya: Trends and policy implications. Tegemeo Institute of Agricultural Policy Development. Working paper No. 16

Muyanga, M. and Jayne, T. S, (2006). Agricultural Extension in Kenya: Practice and policies learnt. Tegemeo Working Paper 26/2006

Pearce, D. and Ozdemiroglu, E. (2002). Economic Valuation with Stated Preference Techniques:Summary Guide. Department for Transport, Local Government and the Regions: London

Rosegrant, M. W., Paisner, M. S, Meije, S. and Witcover J.(2001). 2020 Gobal Food Outlook: Trends, alternatives and choices; International Food Policy Research Institute Washington,D.C.

Smale, M., Byerlee D. and Jayne, T, (2011). Maize Revolution in Sub-Saharan Africa. Policy Research Working Paper N0. 5659;

Smith, D. (2011). Health care consumer's use and trust of health information sources, In the Journal of Communication in Healthcare.

Sharma, A. (2012). Appraisal of cooking stoves in Kenya, with Burn manufacturing. University of Colorado, Boulder Mortenson Center in Engineering for Developing Communities

Tibaijuka, A. K. (2001). Creating a world of sustainable cities. UN-Habitat's quarterly magazine.

Thornton, P.K., Kruska, R.L., Reynolds, L., Waddington, S.R., Rutherford, A.S.and, Odero, A.N. (2002). Maize as food, feed and fertilizer in intensifying crop-livestock systems in East and southern Africa: An ex ante impact assessment of technology interventions to improve smallholder welfare

Waaijenberg, H. (1994). Mijikenda agriculture in Coast Province of Kenya: peasants between tradition, ecology and policy. Wagenenigen, Netherlands: Wagenigen Agricultural University

Wardman, M. (1988). A comparison of stated and revealed preference models of travel behavior

Wekesa, E., W. Mwangi, H. Verkuijl, K. Danda, and H. De Groote. 2003. Adoption of maize production technologies in the coastal lowlands of Kenya. Mexico, D.F.: CIMMYT