

KABAROLE RESEARCH AND RESOURCE CENTRE



Gender Perspectives in Lorena cooking energy Technologies

**Rwenzori- Uganda
2014**

**By
KRC – Uganda**

Introduction

This report is a result of the study on the adoption of lorena stoves introduced and promoted by KRC in Kabarole and Bundibigyo districts between 2013 and 2014. The objective of the study was to assess the changes in fuel consumption and household labour structure as a result of the adoption of the lorena stoves. KRC introduced and promoted lorena stoves as a labour saving technology with an environmental imperative. 2,300 households were supported within the 2 years. 639 households were reached during the study representing a 27.8 % of the households . The results show that the technology is beneficial in regard to fuel consumption and time saving but it also reveals Overall, the technology is. The rest of the report is organised in three main sections. Section 1 describes the background to the study and reviews the input of other researchers on the impact of lorena stoves on environment conservation and household labour and relations . Section 2 describes the methodology used and the findings from the primary data. Section 3 contains the discussion and the conclusions. In rural villages of developing countries, the risk endured by women and children collecting firewood constitutes most of the challenging and serious protection concerns. It was noted by USAID (2007) in evaluation of fuel efficient stoves used in Internally Displaced Peoples' (IDP) that are numerous benefits to households in developing countries including fuel and time saving, reduced exposure to smoke and less danger from fire and burns while using fuel efficient stoves like the lorena stoves. The Lorena stoves, a type of the fuel efficient stove was promoted in Fort portal municipality in and Bundibugyo (Kisuba and Nduguto) in 2013/14 by Kabarole Research and Resource Centre (KRC) with an overall goal of reducing on fuel wood fire consumption and work load as an environmental aspect while helping women save on timeThe study was conducted by KRC Farmers' Enterprise Development Unit (FEDU) KRC of KRC to assess outcomes emerging at household level from introduction and adoption of the lorena stoves based on the following objectives.

Objectives

1. Assess the level of utilization of lorena stoves in comparison with the traditional 3 cooking stones in terms of fuel consumption as an environmental aspect.
2. To Assess the household fire wood consumption and expenditure after adoption of lorena stove against the traditional 3 stone stove

3. To assess the utilisation of time saved by women due to adoption of Lorena against the 3 cooking stones
4. To assess utilisation of time saved as means to ascertain implication on workload
5. To assess the implication of lorena stoves on fuel wood consumption and household expenditure against the traditional 3 cooking stones

Methods Used

Quantitative methods of data collection were used to collect primary data on individual households that received support for lorena stoves from KRC in Fort portal municipality, Kisuba sub county and Ndugutu sub county in Bundibugyo District . A total of 2,300 Lorena stoves were constructed by KRC in fort portal municipality, Kisuba and Nduguto Sub- counties in 2013 and 2014

Quantitative method

The household survey was conducted using a formal interview approach. A sample of 600 households with 100 percentage precision was randomly selected from a total of 2,3000 households that were supported with lorena stoves in Fort-portal municipality and Kisuba and Nduguto Sub- counties in Bundibugyo district. House data was collected from 639 households against a 600 planned

Findings

Table 1: Distribution of Households by Parish of Residence

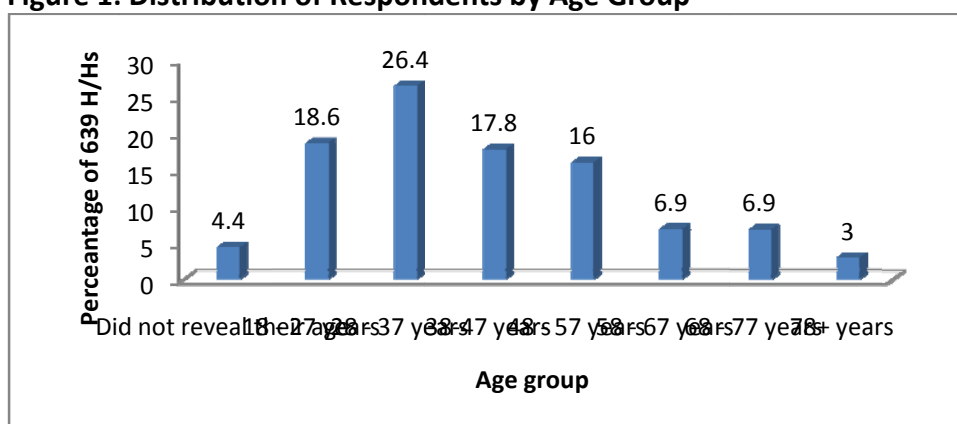
Parish	Fort portal Municipality		Bundibugyo		Total	
	#	%	#	%	#	%
Busoru			51	54.8	51	8.0
Kagote	89	16.3			89	13.9
Kasanzi			36	38.7	36	5.6
kasusu	125	22.9			125	19.6
Kibimba	89	16.3			89	13.9
Kidukuru	5	0.9			5	0.8
Kijanju	29	5.3			29	4.5
Kisuba			6	6.5	6	0.9
Kitumba	103	18.9			103	16.1
Njara	40	7.3			40	6.3
Nyabukara	23	4.2			23	3.6
Rwengoma	43	7.9			43	6.7
Total	546	85.4	93	14.6	639	100

The following can be observed from the table:

A total of 639 households were reached by the monitoring team of which 546 were in Fort portal municipality and 93 from Bundibugyo giving a proportion of 27.8% of the supported households. Altogether the 639 households were sampled from 53 villages with majority from Kagote, Kitebutura, Kaihokwa, Kinsonko, Rwengoma, Kibimba, Kidukuru, Kitumba TC, Mukubo (for details sees Appendix I).

The study assessed whether age of the household members impacted on the desire to have lorena stoves and figure 1 shows that people of all ages had lorena stoves.

Figure 1: Distribution of Respondents by Age Group



The average age of the household members interviewed was about 52 years much as the youngest was 18 years while the oldest was 81 year of age. This implies that all age categories of the community members were using lorena stoves. Generally, distribution of lorena stoves beneficiaries by age group is as seen in figure 1.

Education level and Sources of Income

Assessing the education level and occupation of the household members interviewed in relation to possession of lorena stoves was in Table 2.

Table 2: Education and Sources of Income of the Households with Lorena stoves

Education level	Farming		Fishing		Business		Employed		House wives		Total	
	#	%	#	%	#	%	#	%	#	%	#	%
Primary	260	65.8	2	.5	112	28.4	21	5.3	-	-	395	61.8
Secondary	59	34.9	5	3.0	80	47.3	21	12.4	4	2.4	169	26.4
Tertiary	7	14.6	1	2.1	6	12.5	34	70.8	-	-	48	7.5
None formal education	18	66.7	-	-	8	29.6	1	3.7	-	-	27	4.2

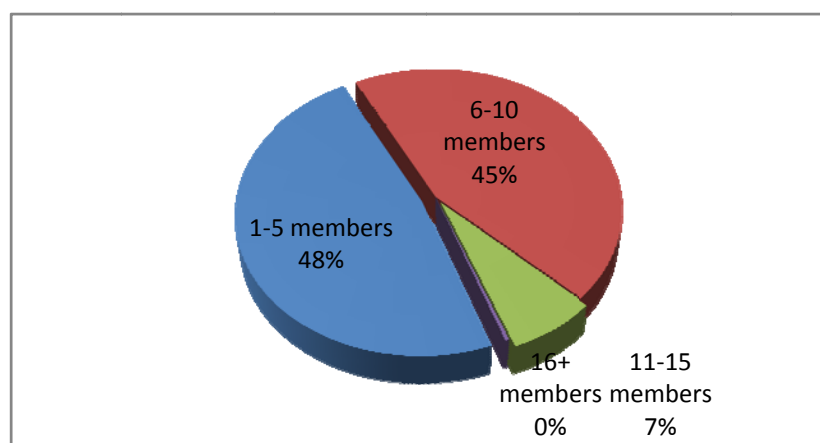
Overall	344	53.8	8	1.3	206	32.2	77	12.1	4	0.6	639	100.0
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The following can be observed from Table 2

Majority (61.8%) of the household members interviewed had stopped at primary level of education. Of the respondents that said to have stopped in primary, majority (65.8%) were engaged in farming as their main source of income. Overall 53.8% of the respondents/households relied on farming, 32% were in business while 12 percent were in other forms of employment.

Household size for monitored households was 5.9 members while the smallest number of members in the household was 1 member and the one with most members had 30 of them and this was in Bundibugyo district. Figure 2 shows proportions of households according to the number of members.

Figure 2: Household Size



Comparing with National household size of 5 members according to the 2009/10 UBOS household survey data, 48% of the households (639) had between 1 to 5 members while 45% of the households had between 6 to 10 members.

Cooking Energy Sources

The study assessed the energy sources and the technologies used to cook food at household level before and after the introduction of the lorena stoves.

Table 3: Energy Sources used at Household level for Cooking Activities

Energy source	Before Lorena stove adoption						After Lorena stove adoption					
	Fort portal Municipality		Bundibugyo		Total		Fort portal Municipality		Bundibugyo		Total	
	#	%	#	%	#	%	#	%	#	%	#	%
Firewood	535	98.2	92	98.9	627	98.3	533	99.4	93	100.0	626	99.5
Gas	4	0.7	0	0	4	0.6	1	0.2	-	-	1	0.2
Paraffin	5	0.9	0	0	5	0.8	7	1.3	-	-	7	1.1

charcoal	35	6.4	19	20.4	54	8.5	24	4.5	18	19.4	42	6.7
Total	545	85.4	93	14.6	638	100.0	536	85.2	93	14.8	629	100.0

The following can be observed from Table 3.

- Firewood is the commonly used energy source for cooking as accounted for by 98.3% and 99.5% of the households who used it before and after the introduction of lorena stoves respectively.
- In both Fort-portal and Bundibugyo the number of households that used firewood increased after the introduction of lorena stoves. In fort portal the number increased by 1.2% and 1.1% for Bundibugyo.
- There was a reduction in the number of households in Fort-portal municipality who used charcoal and gas after adoption of lorena stoves by 1.9% and 0.5% respectively.

Table 4: Cooking Technologies used at Household level for Cooking Activities

Energy source	Before Lorena stove adoption						After Lorena stove adoption					
	Fort portal Municipality		Bundibugyo		Total		Fort portal Municipality		Bundibugyo		Total	
	#	%	#	%	#	%	#	%	#	%	#	%
3-cooking stones	510	97.0	90	100.0	600	97.4	101	19.1	77	83.7	178	28.7
Electrical cooker	-	-	-	-	-	-	4	0.8	-	-	4	0.6
Gas cooker	1	0.2	-	-	1	0.2	2	0.4	-	-	2	0.3
Kerosene stove	9	1.7	-	-	9	1.5	6	1.1	-	-	6	1.0
Charcoal stove	38	7.2	16	17.8	54	8.8	31	5.9	15	16.3	46	7.4
Lorena stoves							497	94.1	88	95.7	585	94.4
Others	9	1.7	-	-	9	1.5	-	-	-	-	-	-
Total	526	85.4	90	14.6	616	100	528	85.2	92	14.8	620	100.0

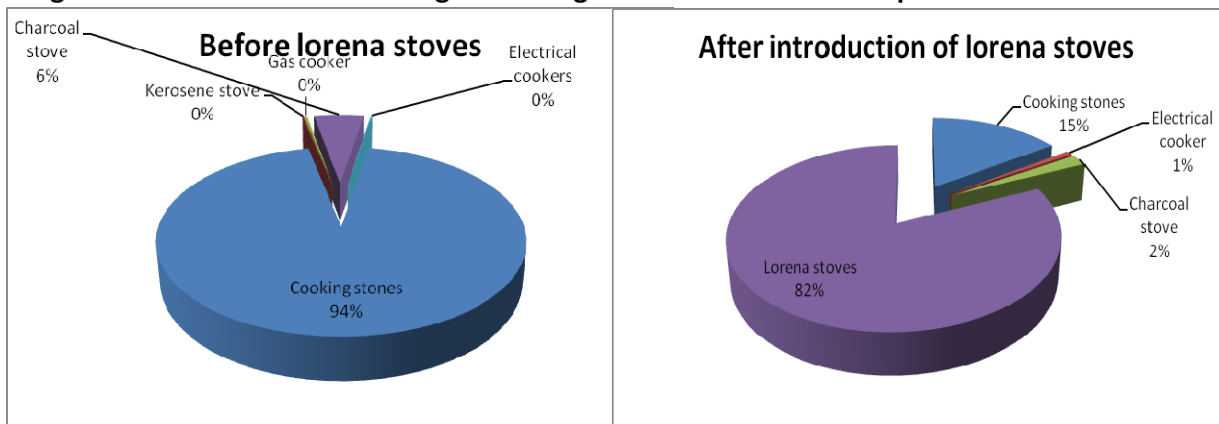
The following can be observed from the above Table 4

- The commonly used cooking technology before adoption of lorena stoves in both Fort portal and Bundibugyo was the traditional 3-cooking stones as accounted for by 97% and 100% of the households monitored respectively.
- After introduction of the lorena stoves 77.9% and 16.3% stopped using the 3-cooking stones in Fort portal municipality and Bundibugyo respectively. 22.1% in Fort portal and 83.7 in Bundibugyo still used the traditional cooking stones. The two figures relate to an urban(Fort portal) and rural(Bundibugyo). This is related to the source and cost of fuel wood, whereas in fortportal, all households buy fire wood at relatively high cost than is Bundibugyo had an implication on the choice of cook stoves. The urban dwellers who feel the pitch of cost had to adopt unlike the rural where the cost pitch is not high due to the

low cost and availability of options of collecting fuel wood from the available natural resources and agricultural waste materials like the maize stalks.

- After introduction of Lorena stoves 94.1% and 95.7% of the households in Fort portal and Bundibugyo respectively adopted the Lorena stove technology for cooking

Figure 2: Most Preferred Cooking Technologies before and after Adoption of Lorena Stoves



However assessing the most preferred cooking technology showed that 94% of the households had preference for the 3 cooking stones before but after introduction of Lorena stoves technology 82% preferred it to other cooking technologies. This analysis reveals that accessibility to cost effective energy technology enhances adoption.

An assessment of the number of meals prepared per day before and after the introduction of the Lorena stoves showed no significant difference since on average, about 3 meals were prepared irrespective of the adopted technology before and after the introduction of Lorena stoves. Table 4 shows the distribution of the households' meals prepared per day irrespective of the adopted cooking technology.

Table 4: Number of Meals Prepared in a Day before and after Introduction of Lorena Stoves

# of meals before Lorena stoves	# of meals after Lorena stoves										Total	
	1		2		3		4		6			
	#	%	#	%	%	#	%	#	%	#	%	#
1	20	83.3	1	4.2	0		0	0	3	12.5	24	3.8
2	2	1.0	164	78.5	43	20.6	0	0	0	0	209	32.7
3	2	0.5	12	3.0	379	95.9	2	0.5	0	0	395	61.8

4	0	0	0	0	2	20.0	8	80.0	0	0	10	1.6
5	0	0	0	0	1	100.0	0	0	0	0	1	0.2
Total	24	3.8	177	27.7	425	66.5	10	1.6	3	0.5	639	100.0

It can be observed from table 4 that there was a small increment in the number of households that prepared 3 meals day by 4.7% after the adoption of Lorena stoves.

Money Spent of Lorena Stoves

An assessment of the financial expenditure made during the construction of the lorena stoves and Table 4 presents the findings

Table 5: Household Expenditure on Construction of Lorena stoves

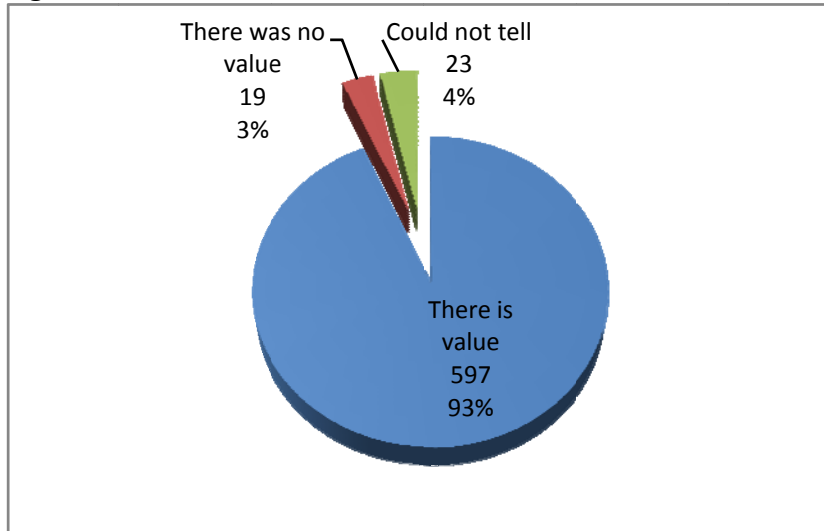
Amount contributed	Freq	Percent
Did not contribute any money	386	60.4
3000/= - 9000/=	53	8.3
10,000/= - 15,000/=	98	15.3
16,000/= - 20,000/=	53	8.3
21,000/= - 30,000/=	28	4.4
31,000/= - 50,000/=	21	3.3
Total	639	100.0

As observed from Table 5, majority (60.4%) Of the households did not spent or contribute any money towards the construction of the Lorena stoves but contributed construction materials in kind since KRC was mainly paying for labour and a few materials that were not readily available in the households like sand for the case of Fort portal Municipality . Even those that said to have contributed towards the construction of Lorena stoves, made small financial contributions with the highest being fifty thousand shillings only. This was mainly for buying materials that were a household contribution.

Value for Efforts Spent on Lorena Stoves

Much as most of the household members did not contribute financially resources towards the construction of the lorena stoves, they contributed in many ways to ensure they acquired the lorena stoves. The study therefore investigated the opinions of the respondents about how they felt about their contribution made. Figure 3 presents the finding.

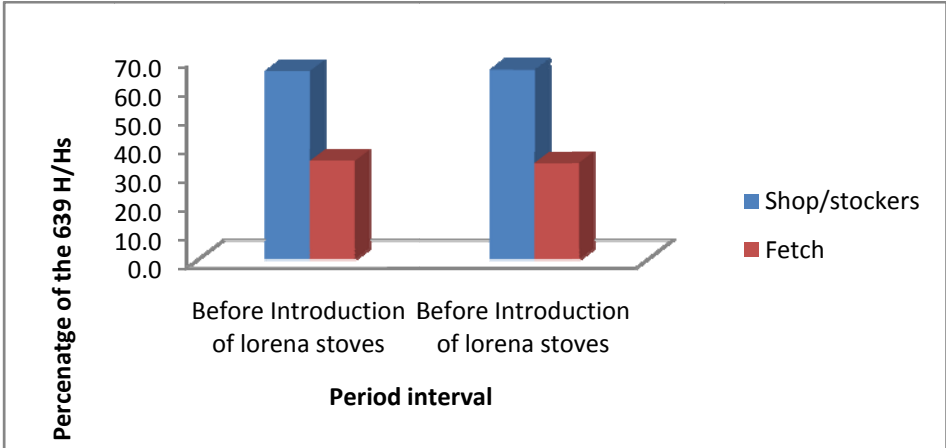
Figure 3: Valuation of the Efforts made towards construction of Lorena stoves



As observed from Figure 3, 93% of the respondents acknowledged that there was value for their participation towards the construction of the Lorena stoves. This is due to the fact that the initiative employed a demand driven approach from the households with mobilisation from the local council leadership.

An assessment of the source of firewood by respondents before and after adoption of Lorena stoves revealed that there was no change in the source of the firewood and major source was through buying since most of the households were from the Fort-portal municipality. This has an implication household expenditure in view of the type of stoves used and their consumption rate and in this case the Lorena stoves against the 3 cooking stones as will be analysed later in this document

Figure 4: Sources of Fired at Household level



Besides the sources of firewood used at household level, the study also investigated the amount and cost of cooking energy resources used for cooking at household level.

Table 5: Pieces of Firewood and Charcoal used before and after Adoption of Lorena Stoves

Aspect of the technology	H/Hs	Mean	Mean difference	Lower	Upper	Sig. level at 95%
Pieces of fire wood used per day in cooking before Lorena stoves	566	12.55	5.55	12.04	13.07	0.000
Pieces of fire wood used per day in cooking after Lorena stoves	570	7.0		6.92	7.56	0.000
Cost of a piece of firewood before Lorena stoves	483	332.65	-46.75	266.96	398.34	0.000
Cost of a piece of firewood after Lorena stoves	415	379.400		329.37	429.43	0.000
Expenditure on charcoal per week before Lorena stoves	63	6700.00	-611.7	5298.15	8101.85	0.000
Expenditure on charcoal per week after Lorena stoves	47	7311.7		3057.96	11565.44	0.001
Expenditure on Kerosene per week before Lorena stoves	5	2800.0	133.33	958.31	4641.69	0.013
Expenditure on Kerosene per week after Lorena stoves	6	2666.67		1232.86	4100.47	0.005
Expenditure on electricity per month before Lorena stoves	2	8500.00	0.0	-35971.72	52971.72	0.249
Expenditure on electricity per month after Lorena stoves	2	8500.00		-35971.72	52971.72	0.249
Expenditure on gas, per week before Lorena stoves	1 ^a	5000.00	0.0			
Expenditure on gas, per week after Lorena stoves	1 ^a	5000.00				

The following can be observed from Table 5.

- There was a significant (P value = 0.000) reduction in the number of pieces of firewood used to cook after the introduction of lorena stoves from about 13 to 7 pieces i.e. a difference of 6 pieces per day.
- Much as there was a general price increase in the cost of most cooking energies, the households that continued to use charcoal after the introduction of lorena stoves incurred a relatively high cost on purchasing charcoal with an increment of over six thousand shillings (over 2 dollars) from 6,77Ushs (2.68 dollars) on a weekly basis.
- A household that used firewood before introduction of lorena stoves spent 4,174 Ushs. (1.7 dollars) per day on firewood and after adoption of lorena stoves they only spent 2,655Ushs. (About 1 dollar).

Table 6: Time spent on Cooking using Firewood before and After Adoption of Lorena Stoves

Time spent on	Sex	N	Mean	Difference	Std Dev	Std. Err mean	Lower	Upper	t	df	Sig (2-tailed)
Collecting fire wood	Men BL	152	54.36	5.829	23.016	1.867	2.140	9.518	3.122	151	0.002
	Men AL	152	48.53								
	Women BL	256	55.14	35.367	53.252	3.328	28.813	41.922	10.626	255	0.000
	Women AL	256	19.77								
	Boy child BL	196	40.51	6.168	13.824	0.987	4.221	8.116	6.247	195	0.000
	Boy child AL	196	34.34								
	Girl child BL	184	16.18	-0.136	8.353	0.616	-1.351	1.079	-0.221	183	0.826
	Girl child AL	184	16.32								
Splitting firewood	Men BL	185	26.33	3.459	11.005	0.809	1.863	5.056	4.276	184	0.000
	Men AL	185	22.87								
	Women BL	266	18.48	-0.034	20.729	1.271	-2.536	2.469	-0.027	265	0.979
	Women AL	266	18.51								
	Boy child BL	209	26.71	5.708	18.474	1.278	3.189	8.227	4.467	208	0.000
	Boy child AL	209	21.00								
	Girl child BL	184	16.18	-.136	8.353	.616	-1.351	1.079	-0.221	183	0.826
	Girl child AL	184	16.32								
Time spent on preparing firewood	Men BL	138	2.48	-0.232	3.057	0.260	-0.747	0.283	-0.891	137	0.375
	Men AL	138	2.71								
	Women BL	263	17.28	7.605	39.170	2.415	2.849	12.361	3.148	262	0.002
	Women AL	263	9.68								
	Boy child BL	125	4.39	.168	8.540	.764	-1.344	1.680	.220	124	0.826
	Boy child AL	125	4.22								
	Girl child BL	205	5.17	0.010	4.663	0.326	-0.632	0.652	0.030	204	0.976
	Girl child AL	205	5.16								
Time spent on cooking food including refueling	Men BL	132	42.39	16.061	30.804	2.681	10.757	21.364	5.990	131	0.000
	Men AL	132	26.33								
	Women BL	420	87.08	27.950	39.991	1.951	24.114	31.786	14.323	419	0.000
	Women AL	420	59.13								
	Boy child BL	116	34.80	9.586	27.732	2.575	4.486	14.687	3.723	115	0.000
	Boy child AL	116	25.22								
	Girl child BL	27	2.48	-11.926	27.919	5.373	-	-882	-2.220	26	0.035
	Girl child AL	27	14.41								

The following can be observed from the above table;

- In collecting firewood the women significantly saved 35 minutes of time on daily basis after the introduction of lorena stoves.
- In preparing firewood, the women saved 7 minutes after the adoption of lorena stoves.
- In cooking food, the women saved about 28 minutes among those that adopted lorena stoves for cooking.

Table 7: Time spent on Cooking using Charcoal before and After Adoption of Lorena Stoves

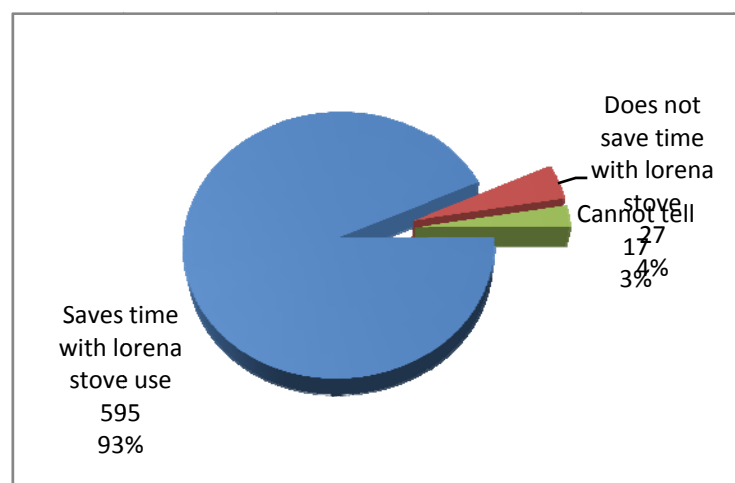
Time spent on	Sex	N	Mean	Difference	Std Dev	Std. Err mean	Lower	Upper	t	df	Sig (2-tailed)	
Collecting of charcoal	Men BL	34	13.74	-1.176	6.860	1.176	-	3.570	-	33	0.325	
	Men AL	34	14.91									
	Women BL	39	12.92	0.256	1.601	0.256	-	0.263	1.000	38	0.324	
	Women AL	39	12.67									
	Boy child BL	There was no data for explanation of the boy child participation in collecting charcoal										
	Boy child AL											
	Girl child BL	32	5.88	0.281	1.782	0.315	-	0.361	0.924	0.893	31	0.379
	Girl child AL	32	5.59									
Time spent on stocking charcoal stove	Men BL	30	0.83	-0.300	1.643	0.300	-	0.914	.314	-	29	0.326
	Men AL	30	1.13									
	Women BL	52	5.10	-0.981	7.061	0.979	-	2.947	.985	-	51	0.321
	Women AL	52	6.08									
	Boy child BL	28	1.96	-2.821	14.155	2.675	-	8.310	2.667	-	27	0.301
	Boy child AL	28	4.79									
	Girl child BL	31	2.10	-1.065	7.882	1.416	-	3.956	1.827	-.752	30	0.458
	Girl child AL	31	3.16									
Time spent on lighting the charcoal stove	Men BL	There was no data for explanation of the men's participation in lighting charcoal stoves										
	Men AL											
	Women BL	57	10.12	1.386	8.594	1.138	-	-894	3.666	1.218	56	0.228
	Women AL	57	8.74									
	Boy child BL	There was no data for explanation of the boy child's participation in lighting charcoal stoves										
	Boy child AL											
	Girl child BL	33	3.61	1.000	4.308	.750	-	-0.53	2.528	1.333	32	0.192
	Girl child AL	33	2.61									
Time spent on cooking food including refueling	Men BL	There was no data for explanation of the men's participation in cooking using charcoal stoves										
	Men AL											
	Women BL	56	62.59	4.286	14.815	1.980	0.318	8.253	2.165	55	0.035	
	Women AL	56	58.30									
	Boy child BL	There was no data for explanation of the men's participation in cooking using charcoal stoves										
	Boy child AL											
	Girl child BL	29	15.00	3.103	11.605	2.155	-	-1.3	7.518	1.440	28	0.161
	Girl child AL	29	11.90									

From Table 7, it can generally be observed that households that continued to use charcoal stoves used more time on cooking activities even after the introduction of lorena stoves.

Opinion about Saving Time with Lorena stoves

The study investigated the opinion of the households whether usage of lorena stoves actually led to reduced time spent on cooking and therefore saved for other actives. Findings were as seen in Figure 3.

Figure 3: Opinion about Saving Time with Lorena stoves



As observed from Fig. 3, majority (93%) of the respondents revealed that use of lorena stoves helped them save some time initially used for cooking. Respondents revealed that they saved time because; lorena stoves cooked more than one meal item at once and therefore less time used as accounted for by 86% of the respondents. Others said that lorena

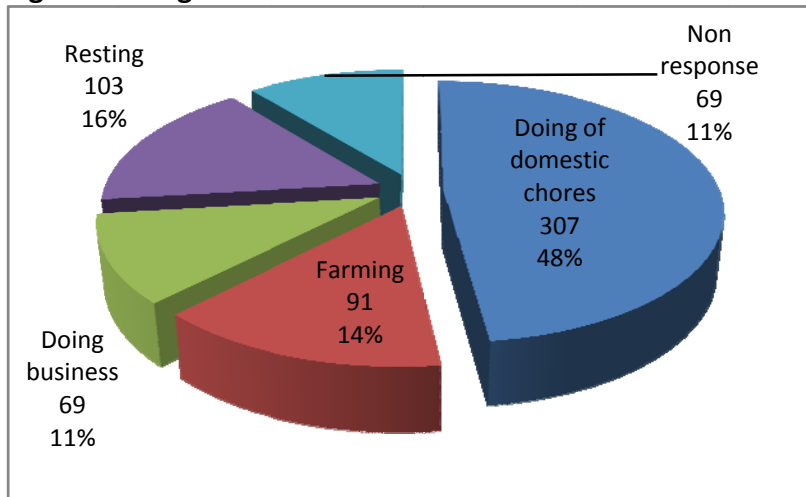
stoves were more efficient cooking technology as it used less firewood and there was no need to keep blowing.

However for those that said it did not save time, revealed that it requires a lot of time to start the fire and it cooks slowly.

How saved time by women was spent

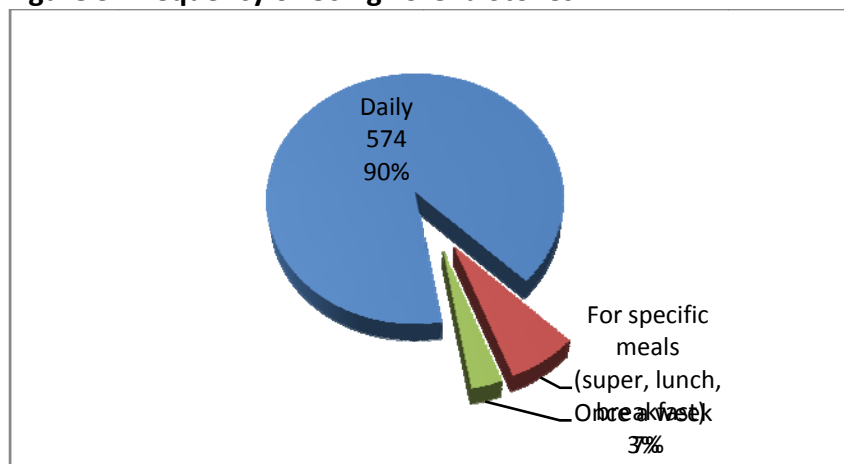
The study assessed how the saved time was spent by the women after adoption of the lorena stoves. Findings were as summarized in Figure 4.

Figure 4: Usage of the Saved Time



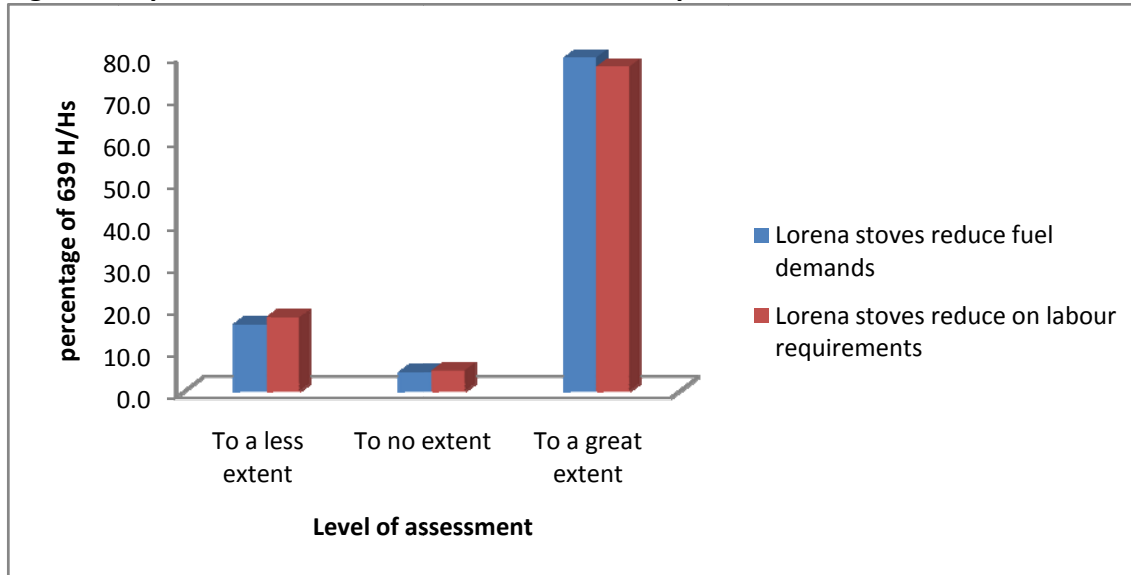
From Figure 4, it can be observed that majority (48%) of the respondents used the saved cooking time to accomplish other domestic chores while 16% of them used this time to rest. Others were as observed in Figure 4.

Figure 5: Frequency of Using Lorena Stoves



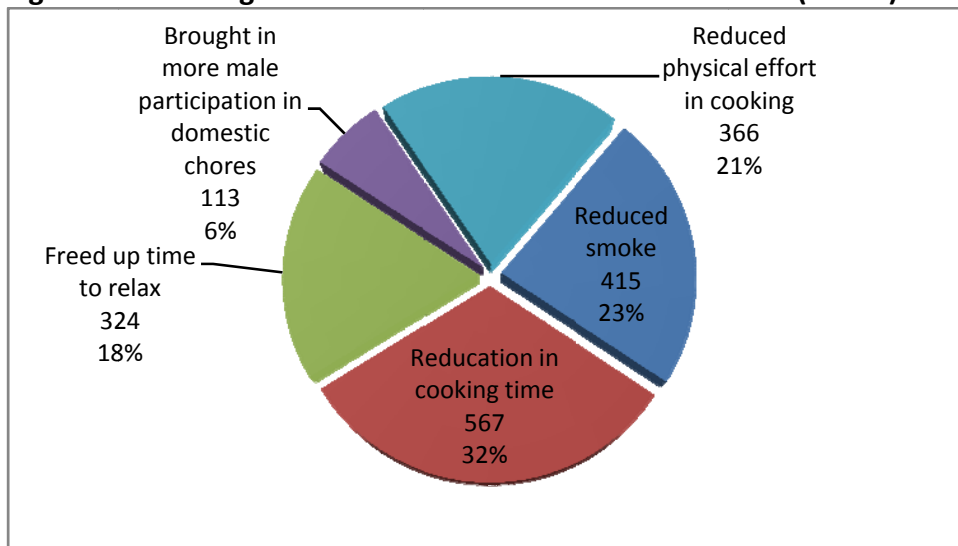
Majority (90%) of the respondents used lorena stoves on daily basis

Figure 6: Opinions on Reduced Fuel and labour Requirements with use of Lorena Stoves



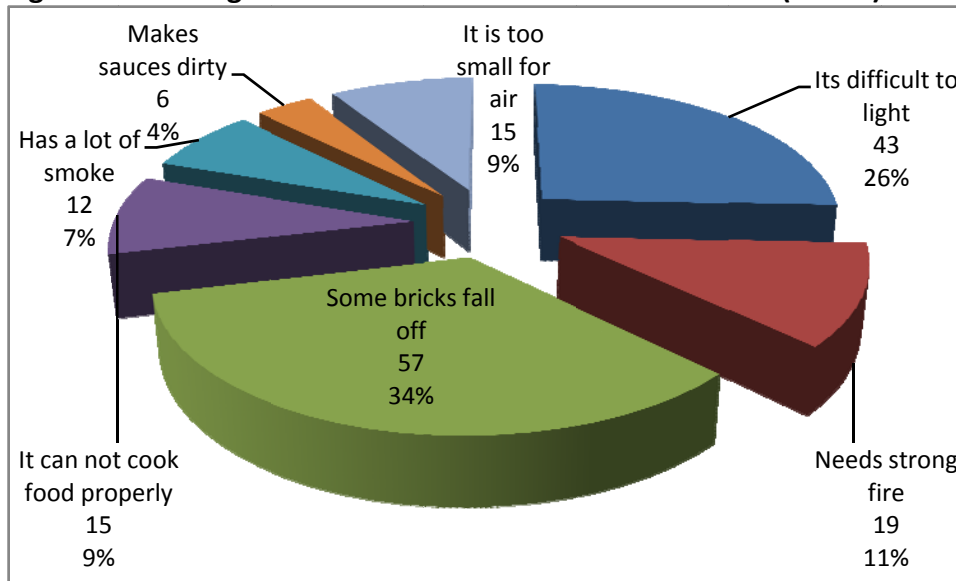
As observed from Figure 6, majority of the respondents revealed that to a great extent lorena stoves reduced fuel demand as while as labour requirements in cooking.

Figure 7: Advantages Associated with use of Lorena Stoves (n=639)



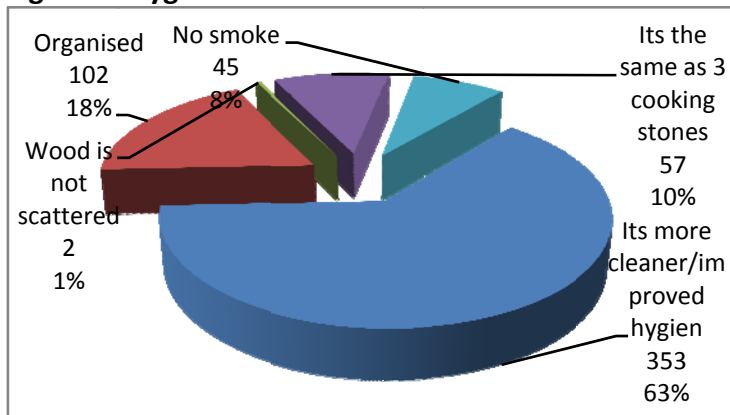
As observed in Figure 7, a number of advantages were associated with lorena stoves with majority saying; it reduced the time needed for cooking just as evidenced from the time analysis. However a 23% also associated it with reduced smoke in comparison to the 3 stone cooking stones. Other advantages were as seen in figure 7.

Figure 8: Challenges Associated with Use of Lorena Stoves (n=223)



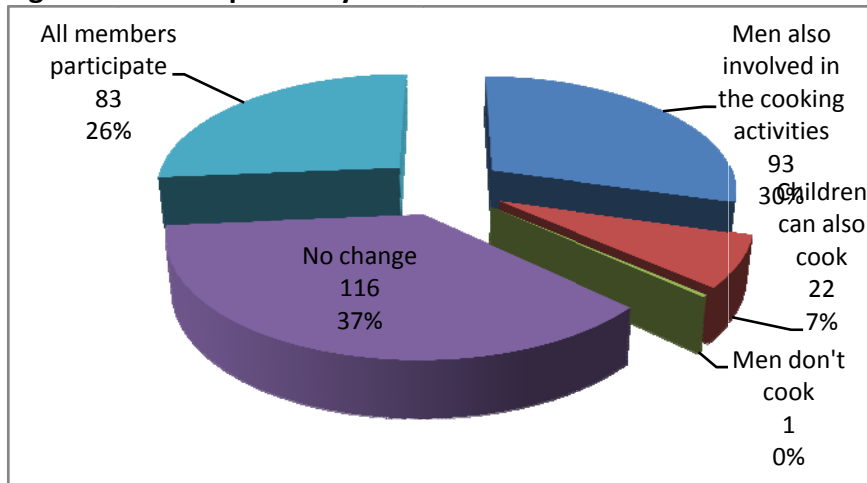
While the advantages of lorena stoves out weighted the challenges, some respondents said that bricks used to construct lorena stoves fell off, it was difficult to light lorena stoves which often took a long period. However, once light the loreana stoves maintains heat for a long time and doesnot require a lot of blowing in air

Figure 9: Hygiene Issues with Lorena stoves



Hygiene wise, 63% of the households said that lorena stoves were clean and improved hygienic conditions in the kitchen.

Figure 10: Participation by Gender



Assessing participation of the household members gender wise in cooking activities, 37% of the respondents said that there was no change males taking part in the cooking activities while 30% said that they male counterparts were involved in the cooking activities after adoption of the lorena stoves.

Appendix I: Names of village for the respondents

Village	# H/Hs	Village	# H/Hs
Kagote	48	Kijanju	7
Kitebutura	42	Kagote A	6
Kaihokwa	32	Kiteere	5
Kinsonko	32	Nsokko	4
Rwengoma	26	Nsokko A	4
kibimba	24	Nsorro A	4
Kidukuru	23	Kasojo	3
Kitumba Tc	23	Kisonko Galiraya	3
Mukubo	23	NSORRO A	3
Katumba	22	Busoku	2
Kitumba	21	Galiraya	2
Isekahungu	20	Karojote Kibimba	2
Kibimba B	20	Kisubu	2
Busoro III	19	Kitumba C	2
Busoro	18	Kitumba Kaihohwa	2
NSORRO	18	Muhooti Kiteere	2
Kibimba A	17	Nzorko A	2
Kasojo Muhooti	16	Katojo	1
Kyabukokoni	16	Kisenyi	1
Nsorro B	16	Ndugutu	1
Busoru III	14	Nsoro B	1
kasusu	13	NSORRO B	1
Binanata	12	NSORRO B	1
Kihembo	12	Nyabukara	1
Kagote C	11		
Kabomba A	10		
Muhooti	10		
Nsokko B	10		
Kagote D	9		