Nairobi eCookBook Focus Group Discussion

Final Report

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Loughborough University

ESMAP Energy Sector Management Assistance Program

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MECS Modern Energy Cooking Services

Executive summary

The Nairobi eCookBook – Beans Edition is the first in a series of eCookBooks designed to support everyday cooks to make more informed choices about the fuels and appliances they use at home. The focus of the eCookBook is on electricity and the time and money you could save by switching from other fuels, in particular by energy-efficient cooking practices (e.g. soaking beans) and energy-efficient cooking appliances (e.g. an electric pressure cooker).

This eCookBook was developed during the cooking diaries study in Nairobi in 2018. It was part of a research study called 'Low cost energy-efficient products for the bottom of the pyramid', which was supported by the UK government. The study involved 20 households recording what they cooked, how they cooked it and how much energy they used for 2 weeks. They then tried out a range of electric cooking appliances for 4 weeks, continuing to record data. For this eCookBook, we focused in on 4 of the cooking diary participants and explored in greater detail exactly how they cooked beans. We measured the energy they consumed throughout the cooking process to pinpoint exactly where energy was wasted and where it was saved. We collated this into a series of recipes, describing what each cook did and what the energy implications of cooking in that way were.

This report describes the findings of a focus group held in Nairobi in March 2019 to review the first draft of the Nairobi eCookBook – Beans Edition. Participants from the cooking diaries study, the cooks from the eCookBook, representatives from a cookstove company and others who had not been involved in the research before were invited to share their opinions. The session featured a participatory challenge, where the FGD attendees had to decide on how to cook dinner for the group using the techniques from the eCookBook. The debate as to whether to prioritise quick and efficient cooking or the most familiar (and possibly tastiest) method fueled a rich discussion.
The key findings of the focus group were:

1. The eCook book should have less words and more visual illustrations because most people are captured by visuals.
2. Many of the pages were too packed with information and should be condensed or split up into multiple pages.
3. Future iterations of the cooking diaries study should capture fuel purchases, as well as fuel usage.
4. Fuel expenditures during cooking diaries should be double checked, as the result was unbelievably high for the baseline fuel calculation.
5. Safety is a key message for electric pressure cookers (EPCs), as there is a widespread perception of stove top pressure cookers as at risk of exploding.

6. A table of cooking times and volumes of water for popular cereals would be very helpful. It would have to cater for soaked/fresh and dried cereals and button- and dial-type EPCs. If rules of thumb could be established instead of tabulated data, this would be preferable. The use of tenderisers to speed up cooking may also be worth investigating
7. Reorganising the content of the book to tell each cooks story all the way through, rather than cutting between them, could make the narrative easier to follow.

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Introduction

Aim

The aim of the FGD was to get user feedback on the first draft of the Nairobi eCookBook.

Venue & participants

The FGD was held at Judy's house in Kasarani on the 11th March 2019 and was attended by 11 people, 8 of whom had been involved in the cooking diaries study, 4 of whom were the cooks featured in the eCookBook, 2 were representatives from Burn Manufacturing (manufacturers of the Jikokoa stove) and 1 person who had not been involved with the research before.

Figure 1: The host, Judy, introduces herself to the group.

1. Facilitators
    a. Jon Leary (Loughborough University/Gamos)
    b. Karen Chepkurui (also eCookBook cook & cooking diaries participant)
    c. Ann Numi (ACTS, also cooking diaries participant)
2. Burn Manufacturing
    a. Jessie
    b. Jenifer
3. Cooking diary participants
    a. Lilian
    b. Wambui
4. eCookBook cooks (also cooking diaries participants)

   a. Damaris
   b. Christine
   c. Judy (host)
5. New participants not previously involved in the research
   a. Shiko

Agenda

1. Reading time: as everyone arrives
2. Introductions & welcome: 15 mins
3. Discussion session: 2 hours
   a. Ask key questions then run through page by page
   b. Decide on how to prepare a dish from the book together
      i. 3 people branch off and cook
4. Eating together

The key questions posed to participants as the group ran through the recipe book page by page were:

- What do you like most?
  - Which graphics were most engaging?
  - Which pages were most useful?
- What's missing?
  - e.g. batch cooking, table of times/quantities/water for specific cereals, stove-top pressure cooking, should other dishes be included?
- What do you like least?
  - Which graphics were most engaging?
  - Which pages were most useful?
  - What is confusing?
  - What is unnecessary?
  - What is misleading?
  - What is wrong?
    - In particular for the 4 cooks

Figure 2: The participants read through the draft eCookBook.

Minutes

The session started by allowing participants to read through the draft of the eCookBook. The participants gave suggestions to improve the eCookBook:

1. General comments
    a. The eCook book should have less words and more visual illustrations because most people are captured by visuals.
        i. Pages with only text mostly glossed over, especially by those with poor English and reading skills.
    b. Pages previously intended as double page spreads should be reworked so that they make sense individually, as they will be broken up on a phone screen.
    c. Page numbers are needed
    d. Disclaimer needed about prices – Nairobi in 2018
        i. Hiked charcoal prices from start of logging ban should be replaced with more representative prices
    e. I was suggested that the eCookBook, as the name suggests, should mostly focus on cooking with electricity and avoid cluttering the book with other fuels. However, further debate concluded that the comparisons with other fuels were still relevant, but that perhaps the sections describing kerosene, charcoal etc. could be condensed.

Figure 3: The discussion begins.

2. Cover
    a. The cover photo should have bean stew instead of beef stew, possibly also with an EPC.
    b. It could be renamed to “The Kenya eCookBook: Beans & Cereals Edition”, as the book is now broader than just beans and these cereals are eaten throughout the whole country and prepared in a similar way.
        i. Would need to state that prices are from Nairobi
3. Inside cover
    a. Acknowledgement of 4 cooks featured in the book did not print out properly.
    b. 20 cooks who recorded data from cooking diaries should also be acknowledged.
    c. Also need a back cover, which should actually be displayed next to the front cover in the PDF, as it should summarise the whole book so new people can decide whether its relevant to them or not
4. Photo pages
    a. More photo pages encouraged
    b. Collages proposed in addition to full page shots
5. Introduction
    a. Recommended adding page saying how we recorded the eRecipes
    b. All text – needs to be broken up by images
    c. Needs a table of contents to allow readers to scheme through to what they perceive more important in the eCook book.

6. The cooks section
    a. Interview format unanimously preferred over third person
    b. There was a lot of debate around the monthly cooking costs featured in Damaris' section
        i. The text of the section (based on interview data from a week ago) reads that "When I could, I would buy a sack of charcoal for 1,700KSh & it would last 6 weeks. But mostly, I'd buy a tin of charcoal for 70 bob (100 bob in the rainy season), plus 60 bob of kerosene (600ml) each day.
            - Damaris clarified that this was the '90kg' sack. Everyone agreed that the 90kg referred to the original contents of the sack (likely maize flour), but nobody knew how much charcoal was usually squeezed into the sack.
        ii. When adding up these daily amounts, this totals 3,900KSh per month, which the group thought sounded too high.
        iii. Damaris clarified that these were maximum amounts, as some days she would have some fuel left over from previous days. She also said that she actually purchased kerosene 3 times a day, paying 20 bob for 200ml in the morning, again at lunch and again for tea.
            - Future iterations of the cooking diaries study should capture fuel purchases, as well as fuel usage.
        iv. Burn Manufacturing state on their web site[1] that the Jikokoa saves 18,000KSh per year, which works out at 1,500KSh per month. Jessica from the marketing team at Burn said this was an average figure calculated from Kitchen Performance Tests carried out by Burn with the Jikokoa against the Kenya Ceramic Jiko for households doing all their cooking on charcoal. The Burn web site also states that the Jikokoa reduces charcoal use by 50%, which implies the average household in these KPTs would have been spending 3,000KSh per month on charcoal.
        v. Looking back at the cooking diaries data, Jon had calculated that Damaris' monthly charcoal consumption was 75 kg and kerosene 28 litres. Multiplying this up by general prices of 45KSh/kg for charcoal and 60KSh/litre of kerosene (both of which are actually lower than the 47KSh/kg and 100KSh/litre Damaris pays), this gave 5,315KSh per

[1] https://burnstoves.com/pika-haraka-okoa-makaa/

month. The group agreed that this was too high and something must have gone wrong in the calculation

vi. The figures of 62 units and 1,453KSh per month for Damaris' electricity consumption during the cooking diaries study were accepted as reasonable by the group.

vii. Damaris was asked whether she cooked in the same way during the baseline and electricity part of the cooking diaries study, as for example, she cooks a lot more when the children are on school holidays. It was confirmed that her children were at school throughout the whole study and she could not remember any other significant changes in the way she cooked at that time.

7. Energy saving tips section
    a. It was suggested that the order should be rearranged, with the Energy Saving Tips page remaining first, then current fuels/appliances (charcoal, kerosene and lindamoto jiko), then electricity & electric appliances
    b. The energy saving tips for EPCs should be clarified that it's just for EPCs
    c. The Electricity page was noted to be too text heavy
    d. The EPC page was voted as the best layout, as it's easy to read and not too cluttered
    e. The Burn team noted that safety was also a key concern of potential EPC adopters, as many had heard or even experienced stove top pressure cookers exploding
        i. It was agreed that an annotated diagram showing the safety features of modern EPCs would be useful (e.g. Figure 4)

Figure 4: Sample annotated diagram showing EPC safety features. [2]

8. Recipes section
    a. Listing English names for ingredients in brackets, e.g. Njahi (Black Beans), was suggested.
    b. A table of measurements listing the cooking times for popular Kenyan cereals plus the ratio of cereals to water was proposed and the group confirmed this would be useful (e.g. Figure 5).

Pressure Cooking Timetable for Dried Beans, Legumes & Lentils

Dried Beans & Legume	Dry, Cooking Time (in Minutes)	Soaked, Cooking Time (in Minutes)
Adzuki	20 – 25	10 – 15
Anasazi	20 – 25	10 – 15
Black beans	20 – 25	10 – 15
Black-eyed peas	20 – 25	10 – 15
Chickpeas (chick peas, garbanzo bean or kabuli)	35 – 40	20 – 25
Cannellini beans	35 – 40	20 – 25
Gandules (pigeon peas)	20 – 25	15 – 20
Great Northern beans	25 – 30	20 – 25
Lentils, French green	15 – 20	N/A
Lentils, green, mini (brown)	15 – 20	N/A
Lentils, red, split	15 – 18	N/A
Lentils, yellow, split (moong dal)	15 – 18	N/A
Lima beans	20 – 25	10 – 15

Figure 5: Sample table showing EPC cooking times for cereals[3]

    i. During the cooking session, it was mentioned that most people don't measure things, but add ingredients by eye. Jon mentioned that instead of measuring 1 cup rice to 2 cups of water, he usually covers the rice with enough water to reach up to the first third of his finger. It was agreed that finding rules of thumb like this would be better than tabulated data wherever possible.
    ii. It was also noted that cooking times would be different for button type and dial type EPCs, as button type only start timing when they get to

[2] https://www.amazon.in/Usha-Electric-Pressure-Mechanisms-Stainless/dp/B01M9A2Y7M/ref=sr_1_5?ie=UTF8&qid=1548325121&sr=8-5&keywords=electric+pressure+cooker
[3] https://www.instantpot.co.uk/beans-legumes-lentils/

pressure, whilst dial type start timing right away. As a result, cooking 1 bean in both would have similar timings, but cooking 1kg beans in the dial type would require the user to add an extra 20 mins to account for the time taken to get from room temperature to 120C. Conversely, setting the timer on the button type for 40 mins for 1kg beans would mean that the EPC wouldn't actually finish cooking until an hour had passed.

iii. Participants noted that the time since the cereals had been harvested also had a big influence on cooking time. After discussion, it was concluded that freshly harvested cereals had similar cooking time to soaked cereals, but cereals that had been harvested a long time ago had to be dried to be preserved, so would need longer cooking times to rehydrate.
    - Some participants also soak their rice. Although this does speed up cooking time, it was more to stop the grains of stickier varieties of rice from clumping together.

iv. It was noted that the timings in Damaris' and Christine's recipes were longer than would be recommended because at the time that the eRecipes were recorded, they had only just started using EPCs.
    - Damaris opened hers 3 times to check on the beans, resulting in a total pressure-cooking time of 110 mins (1hr50). She has cooked yellow beans many times since and now sets the timer for 1hr, which actually equates to 1hr20, as she has a button type EPC that requires 20 mins to go from room temp to 120C.
        a. Times should be standardized to HRShrMINS instead of MINSmins
        b. It should be clear to the reader that it is not recommended to open the EPC many times to check and that if they do, they are likely to slow cooking down by 10-15 mins each time. Table of cooking times & water volumes would help!

v. Some participants reported using tenderisers such as citric acid to reduce the cooking time for longer cooking cereals.

c. It was suggested that the book could be reorganized by cook, i.e. each section would start with the intro to that cook, then their recipe, then the analysis of their recipe.

Figure 6: Participants talk about the fireless cooker featured in the eCookBook.

9. Cross-comparison section
    a. What's the Smartest Way to Cook Beans with Electricity page was seen as much clearer than the How Much Can I Save Just by Changing the Way I Cook page, which was too densely packed.

Cooking session

The participants were presented with a challenge – to cook dinner for the group. Several ingredients had been pre-purchased and participants were given free choice of which ones to cook and how. They were asked to consider whether they wanted to prioritise tastiness or speed and to what extent. The available ingredients included:

- 1kg njai, 1kg yellow beans and 1kg ndengu (green grams) – all soaked for 3hrs.
- Sindano rice, tomatoes, onions, dhania (coriander) and a range of spices/condiments.

At the beginning of the debate, roughly half the group wanted to cook as quickly as possible (voting for ndengu and the fry and boil method featured in Karen's eCookBook recipe – see Figure 7), whilst the other half preferred yellow beans and thought that the boil and fry method would give a tastier results. In particular, one participant stated that tomatoes would be too bitter if boiled together with the beans. However, after the debate had been running for fifteen minutes, several of those who had advocated for the tastier method had got hungry and switched sides.

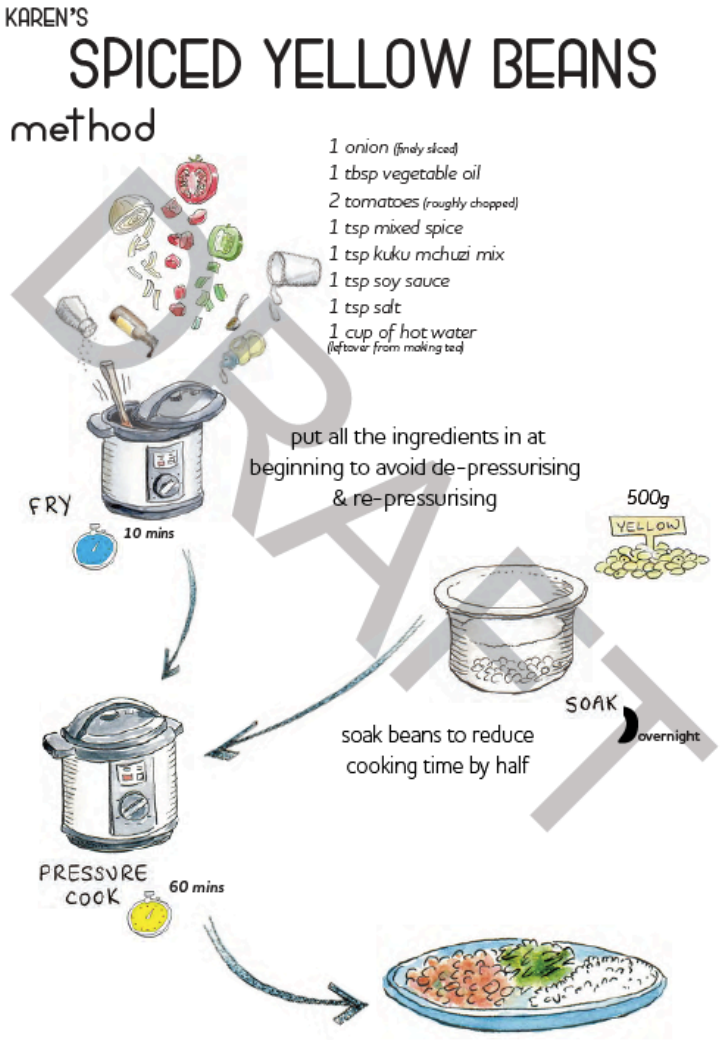

Figure 7: Karen's recipe from the eCookBook.

All participants agreed to cook rice and green grams for dinner and they chose the short and quick way;

1. Soaked 1kg ndengu for about 3 hours.
2. Chopped all the ingredients
3. Fried ingredients for about 6 minutes
4. Add ndengu and water
5. Put to pressure for 30 minutes.
6. Add water to increase soupiness, turning heat back on.

A plug-in energy meter was used to measure the energy consumption of the beans, which totaled approximately 0.5kWh. At 23KSh/kWh, this cost roughly 12KSh. The rice was cooked in the rice cooker and the beans were also served with an even lower energy dish, smashed avocado.

Figure 8: Participants debate about whether to prioritise traditional cooking methods and familiar flavours versus supposedly quicker techniques that may compromise flavor.

The collaborative cooking activity sparked rich debate among the participants, including:

- As the food was getting ready, Lilian and Damaris thought the size of cereals does not matter when it comes to reducing the cooking time but rather the period between harvesting and cooking. If the beans were cooked immediately after harvesting, they would cook much faster compared to dried cereals. This was seconded by most of the FGD participants.
- Damaris also sparked a discussion about the safety of pressure cooker and their durability. Everyone thought the electric pressure cooker is safer than the old pressure cookers because of its features to avoid explosions; most of them agreed with the idea of having a picture of the pressure cooker and clearly labelling the features that make it safer. Christine Joy commented that she puts a cloth on the pressure valve when depressurizing the EPC just in case children are playing around. Damaris had brought her EPC with her, as it had got fried when she experienced power surge in her house. The same happened for both her and Lilian's rice cooker.

- Damaris also mentioned the problems that come with sharing electricity meters in informal rented accommodation. Damaris' landlady does not allow her to use the electric appliances because she cannot work out exactly how much electricity she uses.

Figure 9: Serving up the final result of the participatory exercise – a very tasty and timely meal!

Conclusion

At the end of the session, the participants were very impressed with the eCook book draft and many asked if they could take the draft copies home. The dinner was good, with most participants were impressed by the end product, especially the speedy technique used to cook it, as most had not tried frying all ingredients at the beginning then boiling, rather boiling the beans first then frying the sauce and adding the beans back in.

It was decided that the best way to keep in touch would be to create a WhatsApp group. This would allow participants to share cooking tips and for the research team to get rapid feedback on future drafts of the eCookBook and discuss future studies that the group members may want to participate in.

Annex 1: About the Modern Energy Cooking Services (MECS) Programme.

Sparking a cooking revolution: catalysing Africa's transition to clean electric/gas cooking.

www.mecs.org.uk | mecs@lboro.ac.uk

Modern Energy Cooking Services (MECS) is a five-year research and innovation programme funded by UK Aid (DFID). MECS hopes to leverage investment in renewable energies (both grid and off-grid) to address the clean cooking challenge by integrating modern energy cooking services into the planning for access to affordable, reliable and sustainable electricity.

Existing strategies are struggling to solve the problem of unsustainable, unhealthy but enduring cooking practices which place a particular burden on women. After decades of investments in improving biomass cooking, focused largely on increasing the efficiency of biomass use in domestic stoves, the technologies developed are said to have had limited impact on development outcomes. The Modern Energy Cooking Services (MECS) programme aims to break out of this "business-as-usual" cycle by investigating how to rapidly accelerate a transition from biomass to genuinely 'clean' cooking (i.e. with electricity or gas).

Worldwide, nearly three billion people rely on traditional solid fuels (such as wood or coal) and technologies for cooking and heating[4]. This has severe implications for health, gender relations, economic livelihoods, environmental quality and global and local climates. According to the World Health Organization (WHO), household air pollution from cooking with traditional solid fuels causes to 3.8 million premature deaths every year – more than HIV, malaria and tuberculosis combined[5]. Women and children are disproportionally affected by health impacts, and bear much of the burden of collecting firewood or other traditional fuels.

Greenhouse gas emissions from non-renewable wood fuels alone total a gigaton of CO_2e per year (1.9-2.3% of global emissions)[6]. The short-lived climate pollutant black carbon, which results from incomplete combustion, is estimated to contribute the equivalent of 25 to 50 percent of carbon dioxide warming globally – residential solid fuel burning accounts for

[4] http://www.who.int/indoorair/health_impacts/he_database/en/

[5] https://www.who.int/en/news-room/fact-sheets/detail/household-air-pollution-and-health https://www.who.int/gho/hiv/epidemic_status/deaths_text/en/, https://www.who.int/en/news-room/fact-sheets/detail/malaria, https://www.who.int/en/news-room/fact-sheets/detail/tuberculosis

[6] Nature Climate Change 5, 266–272 (2015) doi:10.1038/nclimate2491

up to 25 percent of global black carbon emissions[7]. Up to 34% of woodfuel harvested is unsustainable, contributing to climate change and local forest degradation. In addition, approximately 275 million people live in woodfuel depletion 'hotspots' – concentrated in South Asia and East Africa – where most demand is unsustainable[8].

Africa's cities are growing – another Nigeria will be added to the continent's total urban population by 2025[9] which is set to double in size over the next 25 years, reaching 1 billion people by 2040. Within urban and peri-urban locations, much of Sub Saharan Africa continues to use purchased traditional biomass and kerosene for their cooking. Liquid Petroleum Gas (LPG) has achieved some penetration within urban conurbations, however, the supply chain is often weak resulting in strategies of fuel stacking with traditional fuels. Even where electricity is used for lighting and other amenities, it is rarely used for cooking (with the exception of South Africa). The same is true for parts of Asia and Latin America. Global commitments to rapidly increasing access to reliable and quality modern energy need to much more explicitly include cooking services or else household and localized pollution will continue to significantly erode the well-being of communities.

Where traditional biomass fuels are used, either collected in rural areas or purchased in peri urban and urban conurbations, they are a significant economic burden on households either in the form of time or expenditure. The McKinsey Global Institute outlines that much of women's unpaid work hours are spent on fuel collection and cooking[10]. The report shows that if the global gender gap embodied in such activities were to be closed, as much as $28 trillion, or 26 percent, could be added to the global annual GDP in 2025. Access to modern energy services for cooking could redress some of this imbalance by releasing women's time into the labour market.

To address this global issue and increase access to clean cooking services on a large scale, investment needs are estimated to be at least US$4.4 billion annually[11]. Despite some improvements in recent years, this cross-cutting sector continues to struggle to reach scale and remains the least likely SE4All target to be achieved by 2030[12], hindering the

[7] http://cleancookstoves.org/impact-areas/environment/
[8] Nature Climate Change 5, 266–272 (2015) doi:10.1038/nclimate2491
[9] https://openknowledge.worldbank.org/handle/10986/25896
[10] McKinsey Global Institute. *The Power of Parity: How Advancing Women's Equality can add $12 Trillion to Global Growth*; McKinsey Global Institute: New York, NY, USA, 2015.
[11] The SE4ALL Global Tracking Report shows that the investment needed for universal access to modern cooking (not including heating) by 2030 is about $4.4 billion annually. In 2012 investment was in cooking was just $0.1 billion. Progress toward Sustainable Energy: Global Tracking Report 2015, World Bank.
[12] The 2017 SE4All Global Tracking Framework Report laments that, "Relative to electricity, only a small handful of countries are showing encouraging progress on access to clean cooking, most notably Indonesia, as well as Peru and Vietnam."

achievement of the UN's Sustainable Development Goal (SDG) 7 on access to affordable, reliable, sustainable and modern energy for all.
Against this backdrop, MECS draws on the UK's world-leading universities and innovators with the aim of sparking a revolution in this sector. A key driver is the cost trajectories that show that cooking with (clean, renewable) electricity has the potential to reach a price point of affordability with associated reliability and sustainability within a few years, which will open completely new possibilities and markets. Beyond the technologies, by engaging with the World Bank (ESMAP), MECS will also identify and generate evidence on other drivers for transition including understanding and optimisation of multi-fuel use (fuel stacking); cooking demand and behaviour change; and establishing the evidence base to support policy enabling environments that can underpin a pathway to scale and support well understood markets and enterprises.

The five year programme combines creating a stronger evidence base for transitions to modern energy cooking services in DFID priority countries with socio-economic technological innovations that will drive the transition forward. It is managed as an integrated whole, however the programme is contracted via two complementary workstream arrangements as follows:

- An Accountable Grant with Loughborough University (LU) as leader of the UK University Partnership.
- An amendment to the existing Administrative Arrangement underlying DFID's contribution to the ESMAP Trust Fund managed by the World Bank.

The intended outcome of MECS is a market-ready range of innovations (technology and business models) which lead to improved choice of affordable and reliable modern energy cooking services for consumers. Figure 10 shows how the key components of the programme fit together. We will seek to have the MECS principles adopted in the SDG 7.1 global tracking framework and hope that participating countries will incorporate modern energy cooking services in energy policies and planning.

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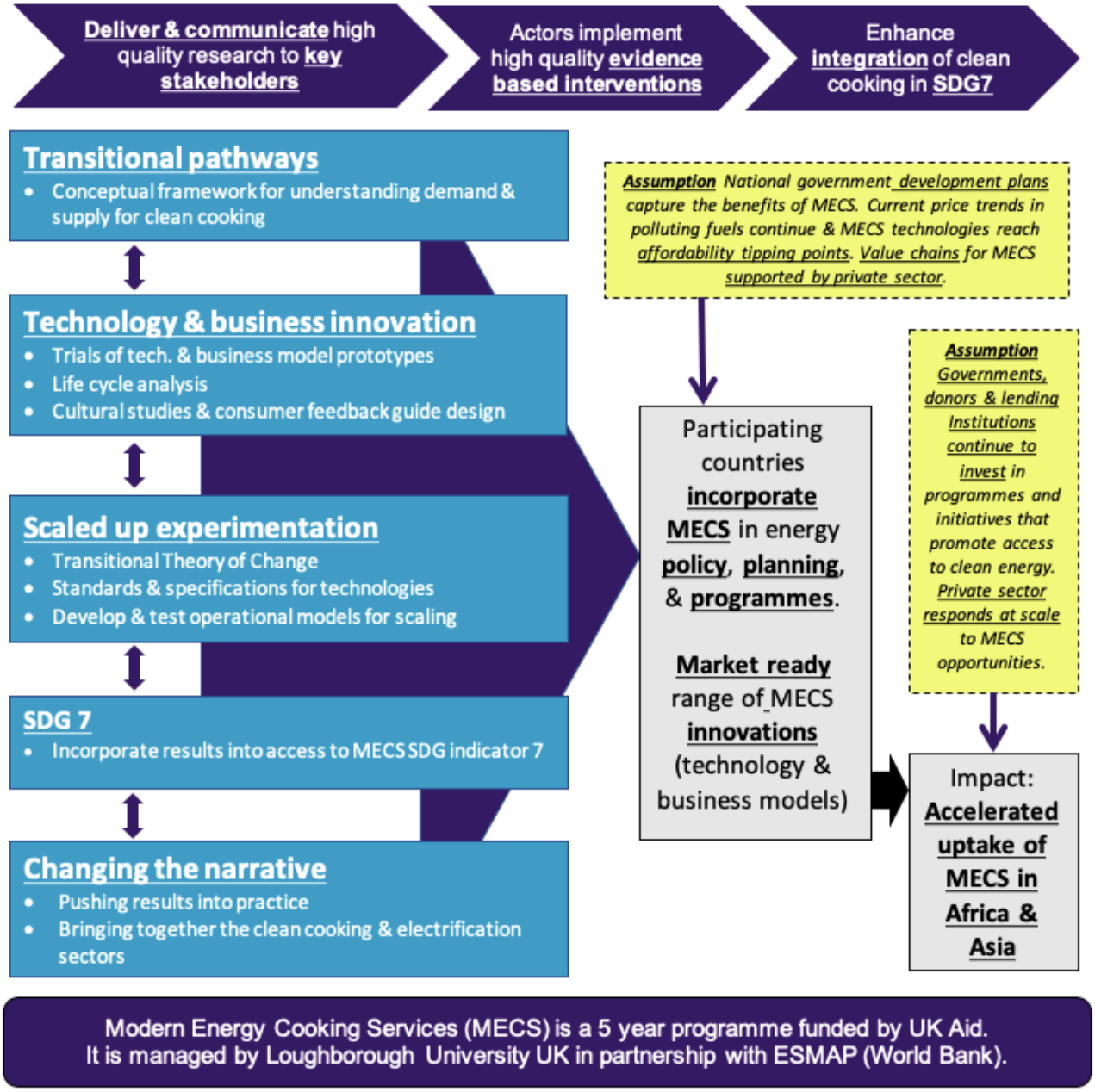

Figure 10: Overview of the MECS programme.

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The concepts, data and key learning points on which the MECS programme is based result from a series of inter-related projects:

- Gamos Ltd.'s early conceptual work on eCook [5].
    - The key **CONCEPT NOTE** can be found here.
- Initial technical, economic and behavioural feasibility studies on eCook commissioned by DfID (UK Aid) through the CEIL-PEAKS Evidence on Demand service and implemented by Gamos Ltd., Loughborough University and University of Surrey.
    - The key **FINAL REPORTS** can be found here.
- Conceptual development, stakeholder engagement & prototyping in Kenya & Bangladesh during the "*Low cost energy-efficient products for the bottom of the pyramid*" project from the USES programme funded by DfID (UK Aid), EPSRC & DECC (now part of BEIS) & implemented by University of Sussex, Gamos Ltd., ACTS (Kenya), ITT & UIU (Bangladesh).
    - The key **PRELIMINARY RESULTS** (Q4 2018) can be found here.
- A series of global & local market assessments in Myanmar, Zambia and Tanzania under the "*eCook - a transformational household solar battery-electric cooker for poverty alleviation*" project funded by DfID (UK Aid) & Gamos Ltd. through Innovate UK's Energy Catalyst Round 4, implemented by Loughborough University, University of Surrey, Gamos Ltd., REAM (Myanmar), CEEEZ (Zambia) & TaTEDO (Tanzania).
    - The key **PRELIMINARY RESULTS** (Q4 2018) can be found here.

Figure 11: Funders of the preliminary research that paved the way for the MECS programme.

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This data and material have been funded by UK AID from the UK government; however, the views expressed do not necessarily reflect the UK government's official policies.

Annex 2: First draft of the Nairobi eCookBook as reviewed by FGD participants

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THE KENYA eCOOKBOOK

Beans & Cereals Edition

HOW TO SAVE TIME & MONEY

Draft Version: *March 2018. Final Version, expected April 2019*

Lead authors: *Jacob Fodio Todd, Jon Leary*

Contributing authors: *Simon Batchelor, Karen Chepkurui, Mourine Chepkemoi, Ann Numi, Rebecca Hanlin, Nigel Scott, Ed Brown*

Featuring: *Judy Mutea, Damaris Wangui, Christine Joy, Karen Chepkurui*

Illustrations*: Michi Mathias*

With thanks to:

Our four cooks - for all the time and effort you dedicated to helping us to understand how you cook and how you want to cook.

The 20 Nairobi cooks who diligently recorded everything they cooked for 6 whole weeks during the cooking diaries study. Their willingness to experiment and share their experiences created an unexpectedly rich learning opportunity that evolved into the eCookBook we see here. In particular, Damaris Wambui, who boilled an immense amount of beans to test the recipes & recommendations in this cookbook.

The many people who kindly reviewed drafts of this cookbook.

The UK government for their generous support of this publication and the research that underpins it via the 'Low cost energy-efficient products for the bottom of the pyramid' project (UK Aid, EPSRC, DECC) and the 'Modern Energy Cooking Services' programme (UK Aid). This data and material have been funded by UK AID from the UK government; however, the views expressed do not necessarily reflect the UK government's official policies.

www.sussex.ac.uk/spru/research/projects/lct

www.mecs.org.uk

INTRODUCTION

This edition of the eCookBook was produced in Nairobi and focusses on one of the most energy intensive popular foods: beans. The ceramic jiko full of red hot charcoal simmering away beside the kitchen door, with a pot of beans ontop is a familiar sight across Nairobi. Even in 2019, many households with a kerosene, gas or electric stove still cook 'heavy foods' like beans on charcoal because most people believe it's cheaper – as you will see in this eCookBook, it is not!

This eCookBook was developed during the cooking diaries study in Nairboi in 2018. It was part of a research study called 'Low cost energy-efficient products for the bottom of the pyramid', which was supported by the UK government. The study involved 20 households recording what they cooked, how they cooked it and how much energy they used for 2 weeks. Then they tried oWut a range of electric cooking appliances for the next 4 weeks, continuing to record data.

For this eCookBook, we focussed in on 4 of the cooking diary participants and explored in greater detail exactly how they cooked beans. We measured the energy they consumed throughout the cooking process to pinpoint exactly where energy was wasted and where it was saved. We collated this into a series of recipes, describing what each cook did and what the energy implications of cooking in that way were.

OVERVIEW

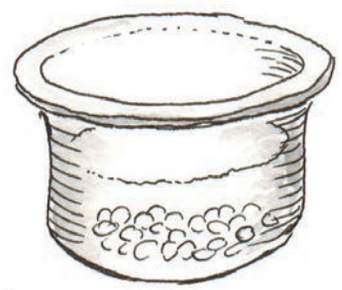
The Kenya eCookBook: Beans & Cereals Edition starts with an explanation of basic energy saving techniques, leading into a discussion of popular fuels and appliances, where electricity as a cooking fuel is highlighted. The next section introduces each of our cooks and presents their recipe for beans. We follow step by step how each cook prepared their beans, seeing exactly where they used time and money and just how much. We also compared this to the fuels/appliances they were using before the cooking diaries study began. The book ends by showing you just how much time and money you can save by employing different techniques and adopting different appliances.

Of course, whilst the recipes focus on beans, many of these techniques are equally applicable to other cereals like ndengu or kamande too.

ENERGY SAVING TIPS

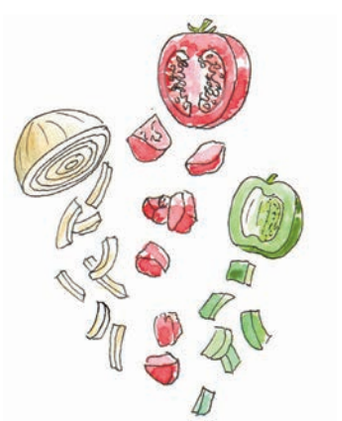
'*Heavy foods*' like beans that need to be boiled for several hours are often the biggest energy users in the kitchen. These tips will help you reduce the time and money you spend cooking '*heavy foods*'.

SOAK DRIED FOODS



Soaking dried foods *until they have absorbed the water they lost when they were dried* ***can reduce boiling times by half****. Usually, several hours is enough, or with beans, until the wrinkles have disappeared.*

THINK SMALL



Smaller pieces cook faster *as they have a larger surface area to absorb heat & water.* ***Smaller cereals****, like kamande,* ***cook in less than half the time of bigger cereals,*** *like njahe. Cutting up other ingredients, like onions, into* ***smaller pieces can also speed up cooking,*** *in particular, the energy-intensive frying stage.*

USE A LID

Steam escaping is energy escaping. Pre*venting steam from escaping* *with* ***a lid makes cooking faster and cheaper****, as you reach boiling point quicker and can then turn down the stove to simmer.*

TIME IS MONEY

*Not all beans were created equal - **some cook much quicker than others**. **The longer you cook for, the more it costs**. We tested a few varieties by boiling ½kg on an electric hotplate (on full power without soaking in a sufaria without a lid) - here's what we found:*

Nyayo: 1hr55 = 2.2units = 50KSh
total cost (½kg+units): **90KSh**

Kamande: 56mins = 1unit = 23KSh
total cost: (½kg+units): **113KSh**

Mbaazi: 1hr57 = 2.2units = 50KSh
total cost (½kg+units): **85KSh**

Wairimu: 1hr34 = 1.6units = 37KSh
total cost (½kg+units): **74KSh**

Ndengu: 1hr1 =: 1.2units =: 28KSh
total cost (½kg+units):
86KSh

Yellow Beans: 1hr50 = 2 units = 46KSh
total cost (½kg+units): : **96KSh**

Njahi: 2hr38 = 2.8units = 64KSh
total cost (½kg+units): :
104KSh

*If you're cooking on an electric hotplate, **warimu is the smart choice** - cheap to buy & relatively cheap to cook. **unless you have an electric pressure cooker** of course!*

CHARCOAL

WHAT IS IT?

- Most charcoal stoves are simple metal and/or clay devices designed to allow air to flow through the charcoal & funnel heat onto the pot.
- Charcoal is produced by **heating wood without oxygen** to remove water & other undesirable components.

WHY DO PEOPLE USE IT?

- **Firewood is bulky** and difficult to transport - **turning it into charcoal makes it accessible to urban people**.
- It also burns **more continuously** & with **less smoke**.
- Charcoal stoves are widely available & cheap (500KSh+).
- **Charcoal used to be cheap** too.
- It gives a unique **smokey flavour** & crispiness - great for nyama choma, but **doesn't do much for foods boiled in a pot**.

WHY CONSIDER OTHER OPTIONS?

- **Lighting charcoal is tedious**, especially when wet.
- Charcoal smoke may hurt your eyes less than wood smoke, but it contains far more **carbon monoxide**, which **can kill** in poorly ventilated spaces.
- **Charcoal prices doubled in 2018** because of the logging ban. **Each kg of charcoal needs 10kg of wood**, so the forests around Nairobi have been stripped & charcoal is now brought from further & further away. At 50KSh per tin, charcoal was on par with other fuels for 'heavy foods', but **switching is now a no brainer.**

KEROSENE

WHAT IS IT?

- Kerosene is a flammable liquid derived from **crude oil.**
- It is widely used across Kenya for **lighting & cooking**.

WHY DO PEOPLE USE IT?

- It **used to sell at 60KSh per litre**.
- It is **easy to divide into small quantities** & sell in everyday containers like drinks bottles.
- It burns with less smoke than other oils.
- Kerosene **stoves are cheap** (500KSh+).
- They are **easy to light & control the heat**.

WHY CONSIDER OTHER OPTIONS?

- It was cheaper than petrol, so people were mixing the two together & selling it to unsuspecting customers. As a result, the government has been **pushing up the price** through taxation to around **100KSh per litre**.
- Just like breathing charcoal or firewood smoke, breathing in kerosene fumes everyday puts your health at risk, specifically to **serious breathing, eye & pregnancy disorders**.
- Knocking over stoves/lights frequently causes **fires & burns**.
- Accidentally swallowing kerosene stored in drinks bottles is one of the **most common causes of child poisoning**.


KEROSENE
MAFUTA TAA

LINDAMOTO JIKO
(FIRELESS COOKER)

WHAT IS IT?

- **Fireless cookers have been around for decades** & most people will have at least one relative who still has one.
- They compliment any other stove by **stopping heat escaping** from the cooking pot.
- Simply **bring your pot to the boil on another stove**, then transfer it into the fireless cooker, bundle it up tight so that as little heat as possible gets out & wait whlilst your food simmers away for free!

WHY USE IT?

- **Cooking times** for the simmering section of a recipe are typically **twice as long** as continuing to boil on another stove, but **fuel costs** for the whole dish are typically **cut in half**.
- Also great for **keeping food warm** once its cooked.
- They typically cost 1,000-2,500KSh & have **no ongoing costs – only savings!**

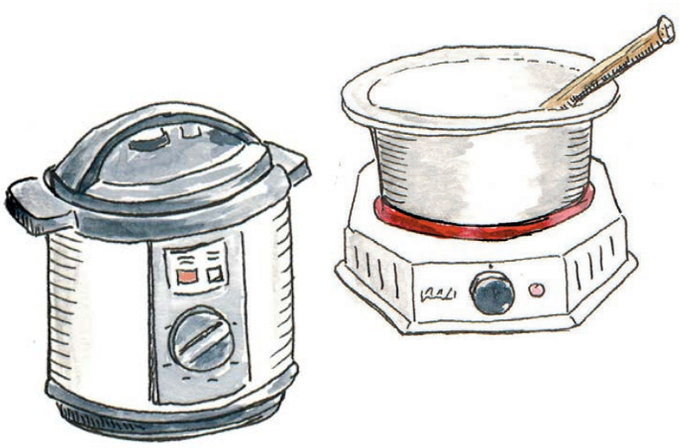
WHAT TO USE IT FOR?

- It works best with dishes that need to be boiled/simmered for half an hour or more.
- The **longer the boiling/simmering stage** of a recipe, **the more you will save** by using the fireless cooker.

ELECTRICITY

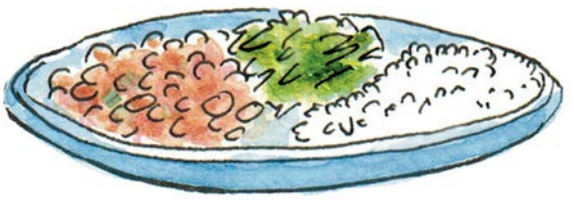
WHY USE IT FOR COOKING?

Electricity opens the door to a range of new cooking appliances that can make cooking much easier, as well as saving you a lot of time and money. Also, unless you burn the food, there won't be any smoke at all in your kitchen when you cook with electricity.



WHY USE IT NOW?

There are new electric cooking appliances entering the market all the time. Some only cook very specific foods (e.g. toaster), some just warm (e.g. microwave), but others can cook almost anything you can think of (e.g. hotplate) and best of all, some can save you a lot of time, money and effort all at once (e.g. electric pressure cooker).



WHAT HAS CHANGED?

The grid is expanding all the time, connecting new households across the country. Historically, electricity has been in short supply, but many new power plants have recently been built and Kenya will soon have electricity to spare.

Meanwhile, the government is trying to push people away from polluting fuels like charcoal and kerosene with various restrictions, bans and levies. They want to protect the nation's forests, the global climate and health. We now know that more people die every year from breathing in smoke from cooking fires than HIV/AIDS, malaria and tuberculosis combined!

ISN'T IT EXPENSIVE?

Many people think it's expensive (as you'll see, it is not!). Electricity is currently sold at around 23KSh per unit (KWh) by Kenya Power. In fact the first 100 units you use each month only cost 17KSh each. Few dishes take more than two units to cook (i.e. at most 46KSh), especially with an efficient appliance like the electric pressure cooker.

ISN'T IT UNRELIABLE?

Blackouts and brownouts (voltage dips) before meal times can render electric stoves useless. However reliability has improved significantly in recent years as the grid has grown stronger and new power plants have come online. As a result, the voltage has stabilised and blackouts are becoming fewer and further between.

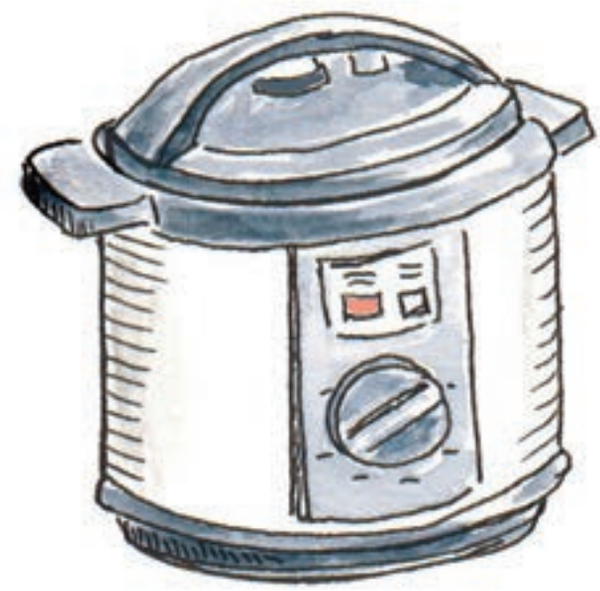
IT'S UNSAFE!

All energy sources have risks associated with them, however an electric heating element is a lot safer than deliberately lighting a fire in your own home! The main risk with electric cooking is burning out thin wiring with dodgy connections that was installed for lower power appliances like lights or phone charging. If you're in any doubt about whether the wiring in your household is safe for cooking, please consult a local electrician.

AREN'T APPLIANCES EXPENSIVE?

The cost of a hotplate (typically 3,000KSh) or an Electric Pressure Cooker (EPC – usually 7,000KSh) may be much more than a ceramic jiko, but long-term you will save a lot of money. Long boiling dishes like beans typically use a whole tin of charcoal – let's assume this goes for 80KSh. Judy showed us we can cook unsoaked yellow beans on the hotplate for 50KSh. This means you could save 30KSh every time you cook long boiling dishes. Therefore after cooking 100 of them, you would have 'paid back' the cost of the appliance and be saving money versus charcoal. Karen showed us we can cook soaked yellow beans on the EPC for 7KSh. This means you could save 73KSh every time you cook long boiling dishes. So again, after cooking around 100 of them, you would be saving money versus charcoal. And saving a lot!

ELECTRIC PRESSURE COOKER
(OR MULTICOOKER)



WHAT IS IT?

The electric pressure cooker (or multicooker) is an appliance that is **a combination of familiar things** (an electric hotplate, a pressure cooker and an insulated hotbox).

WHY USE IT?

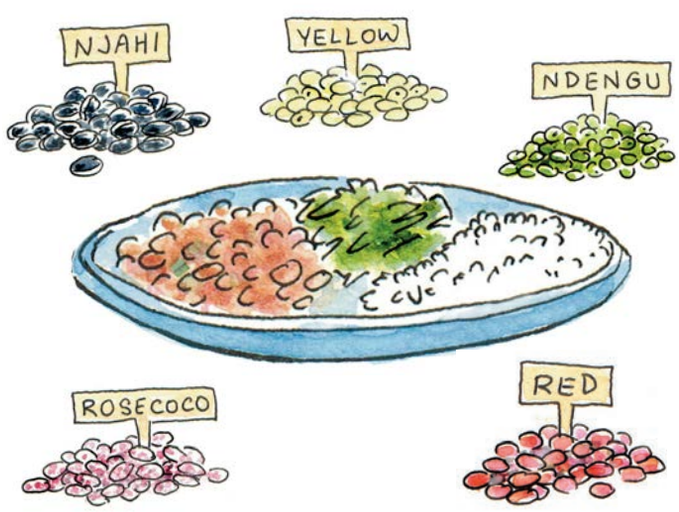
1. It is faster, a pressure cooker **raises the temperature above boiling point** so that it can **cook much faster**.

2. It is cheaper as it is energy efficient. There is insulation around the pot so that **the heat goes directly into the pot and stays in there.**

3. It is convenient, the whole cooking process is **automated**, once you set the time the temperature it is controlled by the appliance, so that you can go off and do other things.

WHAT TO USE IT FOR?

It's best for 'heavy foods' like beans, githeri or matumbo, but can also cook: ugali, matoke, sukuma wiki, rice, eggs, meat/fish/veg stew, fried/boiled meat/fish/veg, mokimo and many more of your favourite dishes.

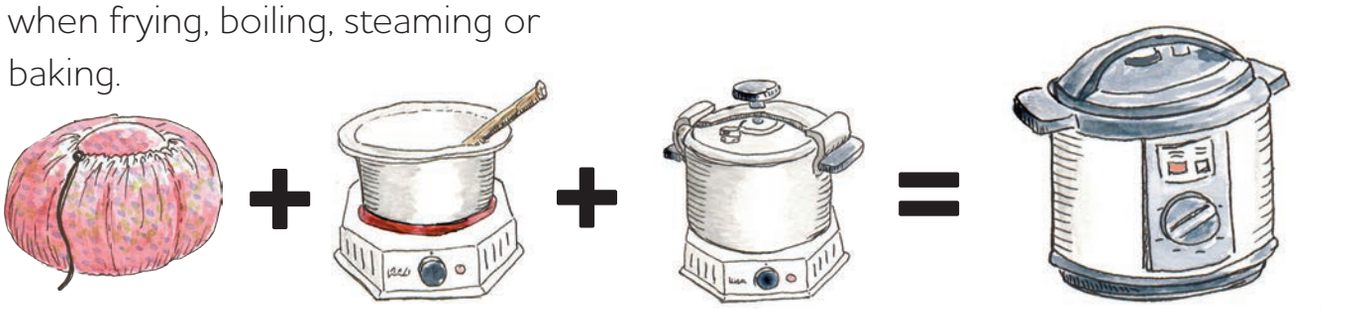


+ PROS

- Can cook 'heavy foods' in half the time and with a fraction of the energy/cost
- Can fry, boil, steam and even bake a cake!
- Safer than ordinary sufarias - locks shut when pressurised
- Totally automated – leave it unattended
- Less stirring and water needed - completely sealed during pressure cooking, so food cannot dry out
- Insulated – keeps food warm after cooking.
- Lid can be taken on and off freely when frying, boiling, steaming or baking.

- CONS

- Not ideal for certain dishes such as cooking chapatis or deep frying, where you need to manually control heat
- Not yet available in most Kenyan stores
- Appliance costs about twice as much as an electric hotplate
- Looks complicated at first, but once you get used to it, cooking becomes much easier
- Inconvenient to check on the food during pressure cooking stage.



fireless cooker + electric hotplate + pressure cooker = electric pressure cooker

TIPS FOR EVEN MORE ENERGY EFFICIENT COOKING

- **Use the right amount of water** to start with (*use less water than usual, as little steam escapes*)
- **Avoid opening during pressure cooking -** heating is automatically controlled and no steam can escape, so stirring is not necessary as food is very unlikely to burn *(each depressurisation adds at least 5mins to cooking time, and can use up to 50% more energy)*
- **Minimise frying time** *(frying uses full power constantly - cut ingredients smaller to fry faster)*
- **Stop leaks** (*listen out for any steam escaping – the pressure valve should be totally sealed*)

ELECTRIC HOTPLATE

What is it?

The electric hotplate is the simplest electric cooking device. When an electric current passes through the heating coil underneath the plate or inside the spiral, it heats up.

Electricity is currently sold at around 23KSh per unit (KWh) by Kenya Power (Nov 2018). Reliability has improved significantly in recent years, with blackouts diminishing and the voltage stabilising. In fact, Kenya will soon have excess electricity on the national grid, so the time is right for electric cooking in Nairobi.

Why use it?

They are fairly cheap. They typically sell for 2,000-5,000KSh for a single or double hotplate, however they will likely need more than twice as many units compared to an electric pressure cooker. However, they are still cheaper to use than charcoal.

What to use it for?

You can put any pot on it, although round-bottomed pots are likely to be wobbly. A control knob allows you to turn the heat up and down, although many people find them more difficult if you need fine control of the heat, like for chapatis.

CHRISTINE

Who do you cook for?
My husband and children

How did you learn to cook?
From my mother

What fuels have you cooked with?
Growing up, my family used kerosene for everyday use, and would buy charcoal for long cooking meals like beans or kienyeji. Charcoal can take a long time to light, and is time consuming. Plus, if it is bad quality then it will irritate eyes. Kerosene can also be messy depending on the quality of the stove, but overall it is much cleaner than charcoal. I started using gas when I moved out of the family household and started to live alone. Gas was the easiest available option, and almost all my peers favour it.

How much did you spend on fuel?
I started using a baby meko (a 6kg cylinder) before graduating to a larger 13kg cylinder, buying about one cylinder a month (about 2000KSh). Until the [2018] ban, charcoal was always the cheapest option.

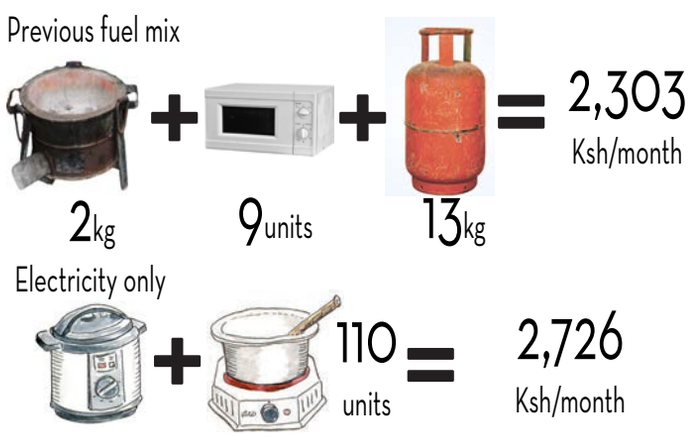
How much did you spend on electricity?
I spend about 2000KSh per month for all my electricity needs which includes some cooking appliances like a microwave and kettle [before using other ecooking appliances].

Were you surprised?
I was so shocked! I couldn't believe how much money I had saved! I always thought charcoal would be cheapest for 'heavy foods' like beans.

Was it difficult to cook with electricity appliances?
The hotplate is easy to use, but it consumes a lot more units & is much slower than the EPC. The electric pressure cooker (EPC) in particular was difficult at first, but my daughter Soni picked it up very quickly & taught me many new tricks.

What are the best things about cooking with electricity?
I didn't need to start cooking early, electric cooking saves time! One can multi-task as the devices are safe to use, especially rice cooker & pressure cooker.

What are the worst things?
The hotplate is not so safe, it emits too much heat and can easily burn your child. When the electricity was off, I had to use LPG to cook our meals.



CHRISTINE'S

NJAHI BEANS

WITH COCONUT MILK

method

500g

850ml warm water
(leftover from tea)

1 onion (sliced)
2 tbsp vegetable oil
1 tsp salt
1/2cm ginger (crushed to a paste)
2 cloves garlic (crushed to a paste)
1 tin coconut cream

PRESSURE COOK
(opened twice to check on beans)

230 mins

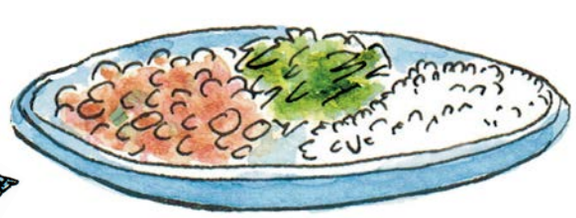
10 mins

FRY

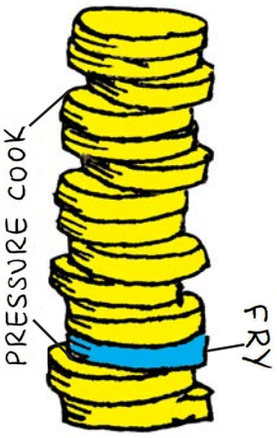
If you have left over hot water (e.g. from making tea), use in place of cold water to give your cooking a head start.

30 mins

PRESSURE COOK



where is the money going?

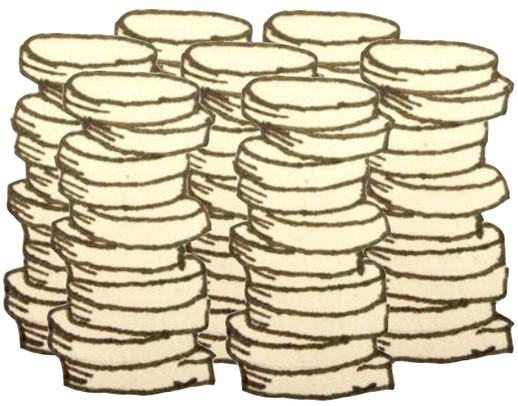


14 KSh
2hrs 10mins
0.6 units

Smaller beans are generally faster and therefore cheaper to cook than bigger ones. Njahi are one of the biggest and therefore slowest and most expensive. Smaller beans (e.g. yellow, wairimu, baazi and nyayo beans) cook 20-40% faster and tiny cereals like kamande or ndengu cook over 60% quicker.

when using charcoal...

70 KSh*
3+ hours
1 tin



*measured during 2018 charcoal ban, actual cost was 150KSh


WAIRIMU
90/=
NJAHI
90/=
YELLOW BEANS
100/=
KAMANDE
180/=
NDENGU NYLON
100/=
KUNDE
100/=
100/=

KAREN

How did you learn to cook?
From my grandmother in Mount Elgon.

Who do you cook for?
Myself and my partner.

What fuels have you cooked with?
In Mount Elgon, we collected firewood, but my grandmother also had a kerosene stove for quick things like boiling water for tea. When I moved to Nairobi with my mum, she was cooking with gas for quick things & charcoal for slow things like beans. When I moved in with my partner, he was cooking with electricity. I was sceptical of it at first, beacause I thought it would be really expensive, but I gave it a try.

How much did you spend on cooking fuel?
When we had just a hotplate and a kettle, we would spend about 1,000KSh a week on electricity for everything - cooking, electric shower, water pump, fridge, etc.

How much of this went on cooking?
According to what we measured during the cooking diaries, with just the hotplate and kettle, we were using 40-50 units per month, which cost us around 1,000KSh. We had already started experimenting with many different appliances and now use an electric pressure cooker and other energy-efficient appliances for most of our cooking. The cooking diaries showed us that we're now using 20-25 units per month, which works out around 500KSh.

Was it difficult to cook with electricity appliances?
The hotplate and kettle were really easy to use. Just press the button & it heats up. The EPC took a bit of getting used to, but I couldn't live without it now!

What are the best things about cooking with electricity?
I love the EPC - its so easy to just throw everything in the pot. I leave it to do its thing whilst I go off and do mine.

What are the worst things?
It's difficult to know how much you're spending. When you load the tokens on the meter, you have no idea whether they're being sucked into the shower, the water pump or the cooking appliances!

KAREN'S

SPICED YELLOW BEANS

method

- *1 onion* *(finely sliced)*
- *1 tbsp vegetable oil*
- *2 tomatoes* *(roughly chopped)*
- *1 tsp mixed spice*
- *1 tsp kuku mchuzi mix*
- *1 tsp soy sauce*
- *1 tsp salt*
- *1 cup of hot water*
  (leftover from making tea)

FRY

10 mins

put all the ingredients in at beginning to avoid de-pressurising & re-pressurising

500g

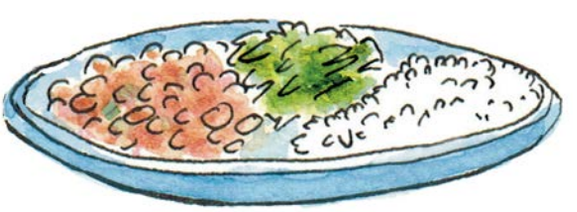
SOAK

overnight

soak beans to reduce cooking time by half

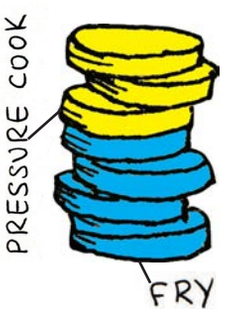
PRESSURE COOK

60 mins



where is the money going?

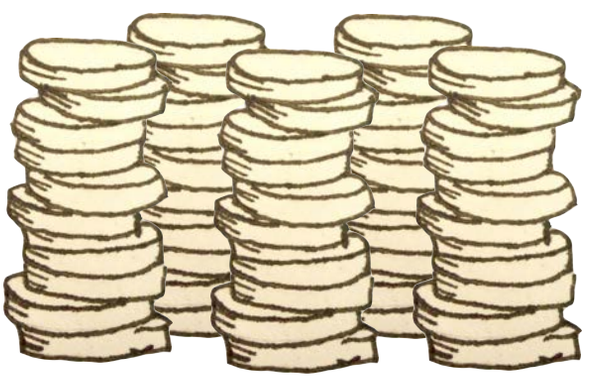
7 KSh
1hrs 10mins
0.3 units



Frying makes food tastier, but pressure cooking is the wiser choice for softening beans. It cost Karen the same to fry for 10 mins as pressure cook for 60. To save even more, she could fry less, or even not at all!

when using electric hotplate...

50 KSh
2 hrs
2.2 units



"I ate beans and githeri so much at school that I never wanted to cook them myself plus they take so long on the electric hotplate, but with the electric pressure cooker its way quicker, cheaper and easier. If I put all the ingredients in at the beginning, I can cook beans from scratch in just over an hour!"

- Karen

DAMARIS

How did you learn to cook?
From my mother in rural Kiambu county.

Who do you cook for?
My two daughters, niece & grandson.

What fuels have you cooked with?
In Kiambu we used firewood, or charcoal if it was raining. When I moved to Eastleigh. I started cooking with kerosene because my landlord wouldn't allow cooking inside with firewood. In Buruburu, I began to use more charcoal, as it used to be very cheap, I could buy in bulk & it's good for cereals. Now in Jericho, I've been using charcoal for lunch & dinner, plus kerosene when I'm short of time, usually for breakfast.

How much did you spend on cooking fuel?
When I could, I would buy a sack of charcoal for 1,700KSh & it would last 6 weeks. But mostly, I'd buy a tin of charcoal for 70 bob (100 bob in the rainy season), plus 60 bob of kerosene (600ml) each day.

How much did you spend on electricity?
I share a meter with my landlady & her other tenants, so I pay a fixed rate of 500 bob a month.

We measured Damaris' monthly cooking fuel use in the cooking diaries study:

Previous fuel mix

Electricity only

Were you surprised?
I was so shocked! I couldn't believe how much money I had saved! I always thought charcoal would be cheapest for 'heavy foods' like beans.

Was it difficult to cook with electricity appliances?
The hotplate is easy to use, but it consumes a lot more units & is much slower than the EPC. The electric pressure cooker (EPC) in particular was difficult at first, but my daughter Soni picked it up very quickly & taught me many new tricks.

What are the best things about cooking with electricity?
Cooking faster, saving money & keeping my kitchen & clothes clean. I love the freedom the EPC gives us - we can multi-task, cook indoors & don't have to plan so far in advance for dishes like beans.

What are the worst things?
My landlady often asks me to stop because we share a meter. Like most people, she assumes that cooking with electricity is very expensive & I can't prove to her how much I'm using.

DAMARIS'

YELLOW BEANS

WITH GREEN PEPPERS, ONIONS AND TOMATOES

method

500g

1 litre

PRESSURE COOK

(opened three times to check on beans)

110 mins

1 onion (finely chopped)
3 tomatoes (sliced)
1/2 green pepper (roughly chopped)
1 tsp salt
1 tsp mchuzi mix
5 tbsp vegetable oil

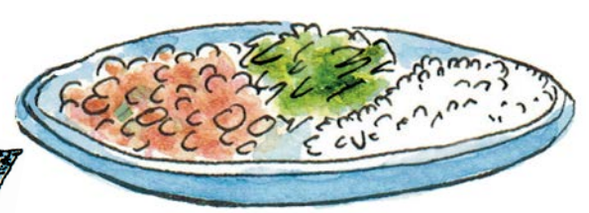
FRY

10 mins

pressure cook for as long as possible without opening, as cooking time & cost increases with every depressurisation.

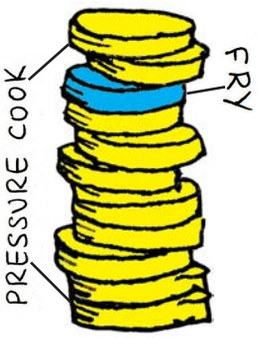
PRESSURE COOK

5 mins



where is the money going?

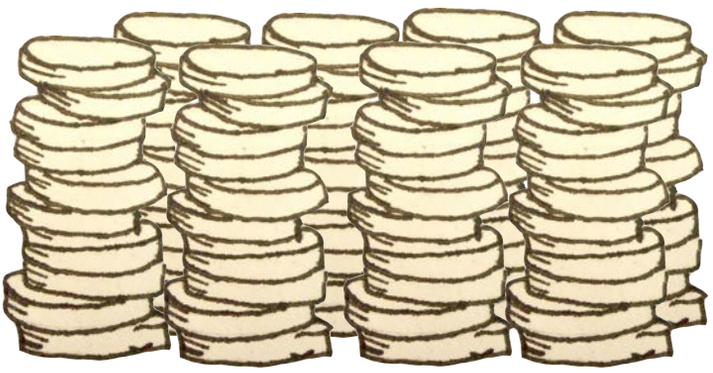
11.5 KSh
2hrs 5mins
0.51 units



Damaris used roughly the same amount of energy pressure cooking for 10 mins, for 30, and for 100 mins. Each time the lid is opened on a pressure cooker a lot of energy and money is consumed.

when using charcoal...

80 KSh
3+ hrs
1 tin of charcoal



"I used to cook beans on charcoal because I thought it was the cheapest option. I was so surprised to find out that cooking beans on the electric pressure cooker was faster and cheaper!"

- Damaris


Bowls
HUSBAND TOOK UP BOWLING
THE PHONE
CALLED KITTY
LEAVE ALONE
WITH KITTY
UP WITHOUT A HITCH

JUDY

Where did you grow up?
I grew up in Meru, where my mother taught me to cook.

How did you learn to cook?
From my mother

What fuels have you cooked with?
We used to collect firewood with my sisters, until I moved to Nairobi to study in the 70s. I continued to cook with firewood, but had to buy it, as it was difficult to collect it in the city. In the 90s, I moved to Kasarani, which at the time was quite rural, so there was a lot of firewood available. I bought a kerosene stove that I would use for quick things and when it was raining, as my firewood stove was outside. I would often use a fireless cooker to simmer 'heavy foods' and save fuel. As Kasarani began to urbanise, firewood became more scarce and I started using more charcoal.

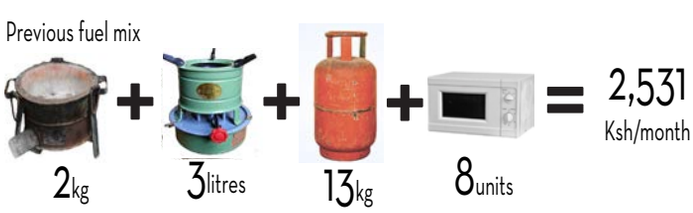
How much did you spend on electricity?
I spend about 1500KSh per month on electricity

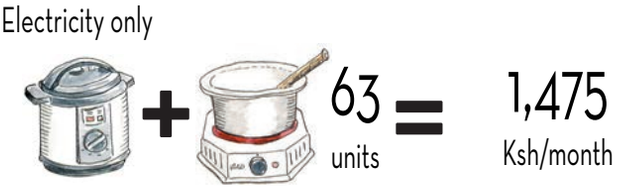
How much did you spend on fuel?
In 2005, I got a big four plate cooker with an oven and a grill, powered by a 13kg LPG cylinder. Over years, I have acquired a variety of electrical appliances, including a microwave, a slow cooker, a kettle and a sandwich toaster. However, as gas just kept getting cheaper and cheaper, it remained my main cooking fuel, until the cooking diary study began in 2018, where I started to use more electrical appliances again.

Was it difficult to cook with electricity appliances?
No, I don't think so. It was much more affordable than I expected it to be. It seems even cheaper than the other fuels.

What are the best things about cooking with electricity?
It is cheap and fast. I like the fact that it is digital and functions automatically. The timer function is very useful, I don't have to keep an eye on things the whole time.

What are the worst things?
I thought it would be a lot of work but it is actually very easy. And it was very safe.





JUDY'S

YELLOW BEANS

WITH GREEN PEPPERS, ONIONS AND TOMATOES

method

500g

1.5 litres water

electric hotplate

BOIL

35 mins

A fireless cooker can simmer for free simply by keeping the heat inside the pot

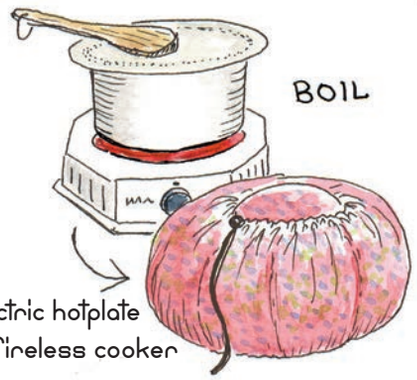
SIMMER

2-4 hours

FRY

1 onion (roughly chopped)
3 tomatoes (roughly chopped)
1/4 green pepper (roughly chopped)
1 tsp salt
1/2 tbsp mchuzi mix
1.5 tbsp vegetable oil
1 cup water

where is the money going?



electric hotplate
& fireless cooker

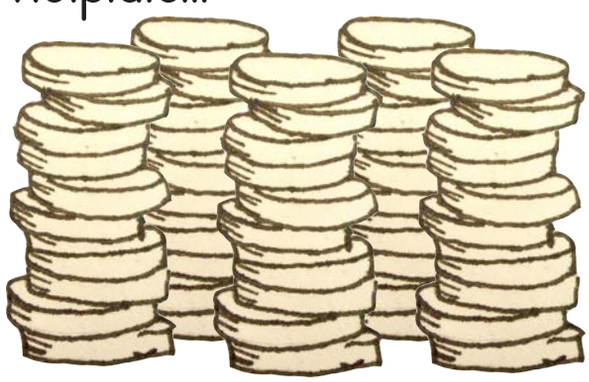
25 KSh
3hrs
1.1 units

Judy cut the boiling time in half with the fireless cooker. However, a lot of heat escapes from the pan when cooking on the hotplate. The electric pressure cooker is both insulated and pressurised, so could have saved another 15KSh.

using just electric hotplate...

electric hotplate

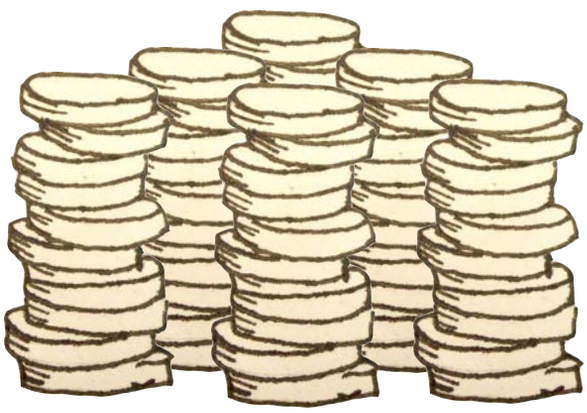
50 KSh
2hrs 6mins
2.2 units



when using kerosene stove and fireless cooker

kerosene stove
& fireless cooker

60 KSh
3+ hrs
1l kerosene

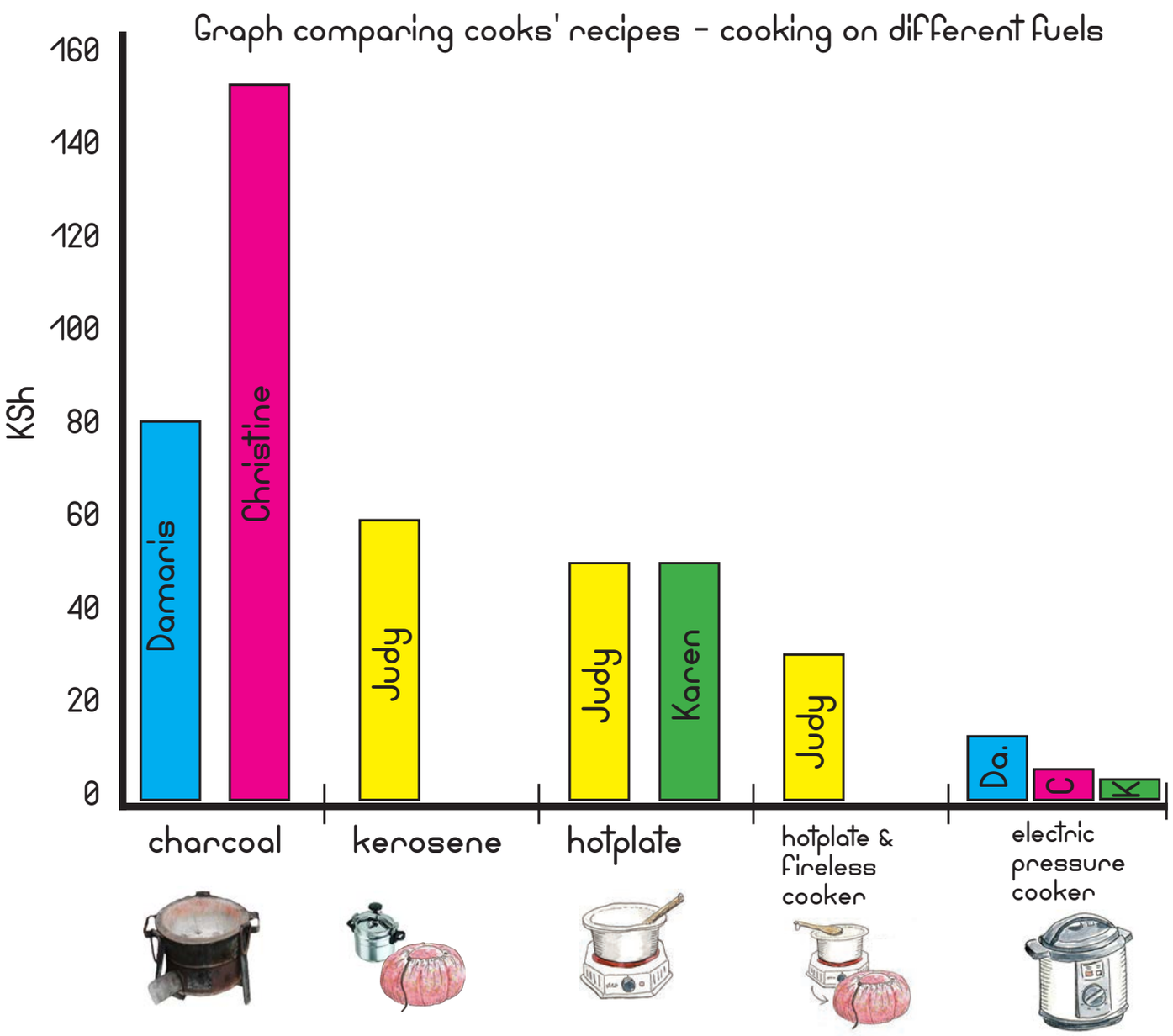


"I used to light up my little kerosene stove every Saturday morning, bring my beans to the boil, then wrap them up in the fireless cooker. I'd come back in the afternoon and they'd be soft enough for me to fry. It'd cost me twice as much to cook the whole thing on kerosene!"

- Judy

CROSS COMPARISON

There are huge savings to be made by switching to electricity. Despite what most people believe, even boiling the beans, as well as frying the sauce, on the hotplate is cheaper than kerosene or charcoal. In this section are comparisons of the different cooks fuel and cost data over the course of the study.



In the graph above, we can see that Judy cut the cost in half by using a fireless cooker to simmer the beans. This works equally well on charcoal, kerosene, an electric hotplate or even LPG.

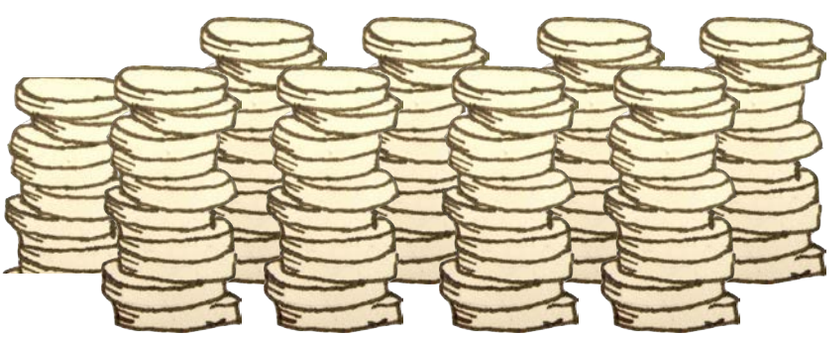
However the real winner is clearly the electric pressure cooker, which is at least 5, and up to 20, times cheaper than charcoal!

WHAT'S THE SMARTEST WAY TO COOK CEREALS WITH ELECTRICITY?

THE SLOW AND EXPENSIVE WAY:

hotplate, no lid | *too much cold water* | *coarsely chopped, boil then fry*

= 87 Ksh
3hrs30
3.8units



THE QUICK AND CHEAP WAY:

EPC just boiling, depressurising once | *just the right amount of hot water* | *finely chopped, all ingredients at start*

= 4 Ksh
30mins
0.15units

WHAT MAKES THE BIGGEST DIFFRENECE?

The **cheapest and fastest way to cook beans**, is to use an **Electric Pressure Cooker** (EPC) and **combine all of the energy-efficient practices**. In contrast, the fireless cooker sacrifices time to save money.

Simply selecting **smaller varieties of cereal** (e.g. ndengu) is the most effective change you can make to the way you cook. However, if you prefer the taste of bigger beans like njahi, you can **save a lot by soaking** them.

How much you actually save will depend on how you are currently cooking, which techniques you combine and how effectively you implement each one. For example, if you currently cook njahi the slow and expensive way and switch to the slightly smaller nyayo bean, you might save up to 30mins/14KSh, but if you switch to ndengu, you could save up to 2hrs/50KSh. Alternatively, you could have saved up to 1hr30/20Ksh by soaking the njahi beans, but soaking ndengu will likely only save you up to 20mins/9Ksh.

The biggest savings are available to those who currently cook without using any energy-efficient practices (see 'the slow and expensive way') and choose to combine all the techniques (and carry them out most effectively), whilst also upgrading to the most efficient appliance. This can result in **time savings of up to 86% (or 3hrs)** and **cost savings of up to 95% (or 83KSh)**.

HOW MUCH CAN I SAVE BY CHANGING THE WAY I COOK?

Costs & times based on electric hotplate, but all tips also apply to:

...or any stove heating an uninsulated pot from below

THE SLOW AND EXPENSIVE WAY

+

+

+

+

=

87 Ksh
total cost

3hrs30
total time

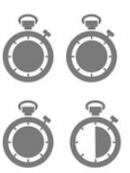
the biggest cereal

hotplate, no lid

6 litres cold water

dried & unsoaked

coarsely chopped, boil then fry



Cook faster with smaller varie-ties of cereals

Put on a lid & turn down to simmer

Use leftover hot water & put just enough

Cook faster by soaking for 3hrs+

Finely chop ingredients & avoid frying by putting everything in at start

save up to 77 KSh 2hrs

50Ksh, 2hrs

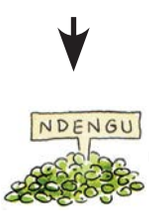
30Ksh, 0hrs

20Ksh, 45mins

20Ksh
1hr30

10Ksh, 15mins

BY COMBINING ALL ENERGY EFFICIENT PRACTICES



+

+

+

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=

10 Ksh
total cost

1hr
total time

smallest cereals

hotplate, with lid turned downto simmer

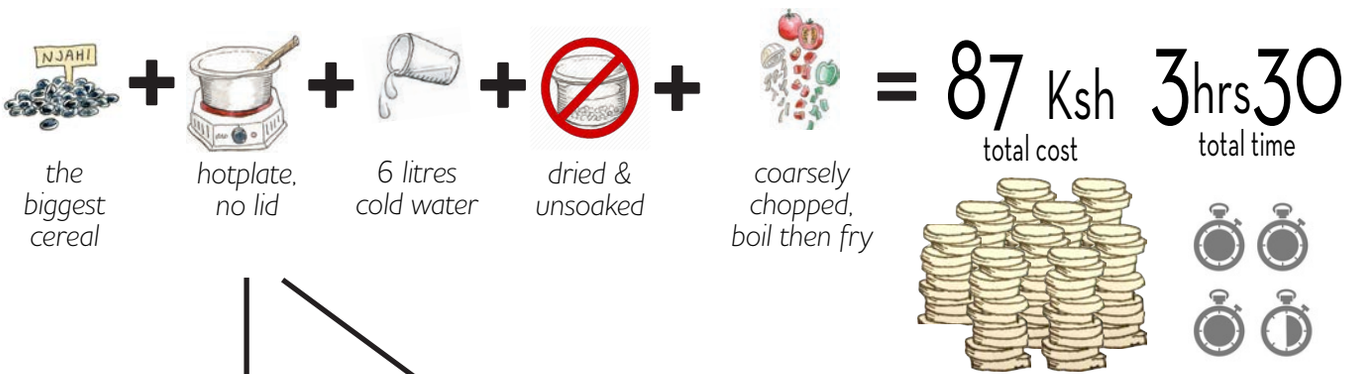
1.5 litres boiling water

fresh or soaked for 3 hrs+

finely chopped, all ingredients in at start

HOW MUCH CAN I SAVE BY CHANGING MY APPLIANCE?

THE SLOW AND EXPENSIVE WAY



the biggest cereal + *hotplate, no lid* + *6 litres cold water* + *dried & unsoaked* + *coarsely chopped, boil then fry* = 87 Ksh total cost, 3hrs30 total time

Electric Pressure Cooker (EPC)

Lid off to fry & depressurise several times during boiling to check

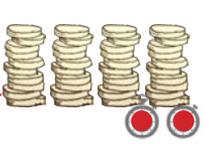
save up to

65Ksh, 1hr

Hotplate & fireless cooker

Lid off when bringing to the boil & frying on hotplate, lid on when simmering in fireless cooker

save up to



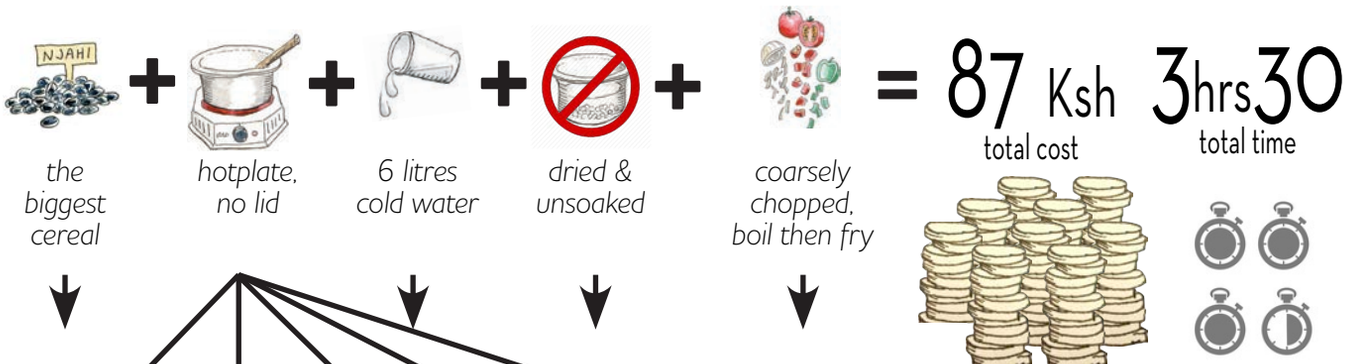
40Ksh, 2hrs longer

Costs & time savings for fireless cooker are based on the electric hotplate, but you can also use a fireless cooker with:

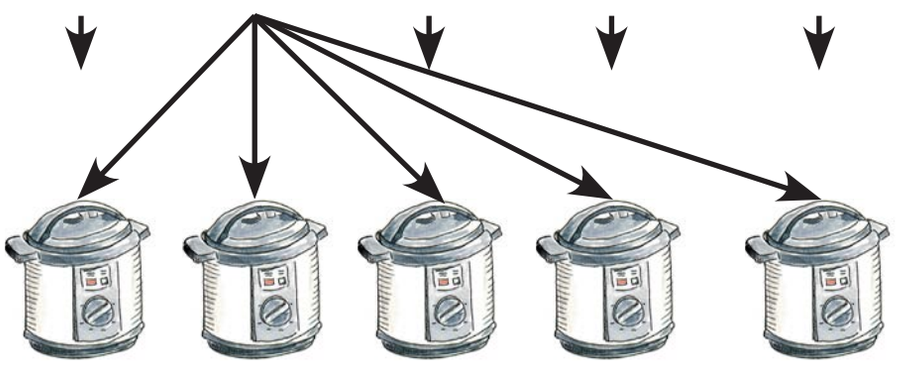
...or any stove heating an uninsulated pot from below

HOW MUCH CAN I SAVE BY CHANGING MY APPLIANCE & THE WAY I COOK?

THE SLOW AND EXPENSIVE WAY



the biggest cereal | *hotplate, no lid* | *6 litres cold water* | *dried & unsoaked* | *coarsely chopped, boil then fry*



Cook faster with smaller varie-ties of cereals

Lid on to fry, depres-surise only once

Use leftover hot water & put just enough

Cook faster by soaking for 3hrs+

Finely chop ingredients & avoid frying by putting everything in at start

75Ksh, 2hrs | 75Ksh, 1hr30 | 70Ksh, 1hr15 | 75Ksh, 1hr30 | 70Ksh, 1hr15

BY SWITCHING TO AN E.P.C. & COMBINING ALL ENERGY EFFICIENT PRACTICES

smallest cereals | *hotplate, with lid turned downto simmer* | *0.5 litres boiling water* | *fresh or soaked for 3 hrs+* | *finely chopped, all ingredients in at start*

The Kenya eCookBook: Beans & Cereals Edition *is the first of a series of eCookBooks designed to support you to make more informed choices about the fuels & appliances you use at home.*

We will show you **how energy relates to money & time** *so you can understand how to* **save both** *by using smarter cooking techniques, fuels & appliances.*

The focus is on ***electricity*** *& the time/money you could save by* **switching from other fuels**. *We will then show you how to save even more, by adopting energy-efficient cooking practices (e.g. soaking beans) & energy-efficient cooking appliances (e.g. an Electric Pressure Cooker or EPC).*

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