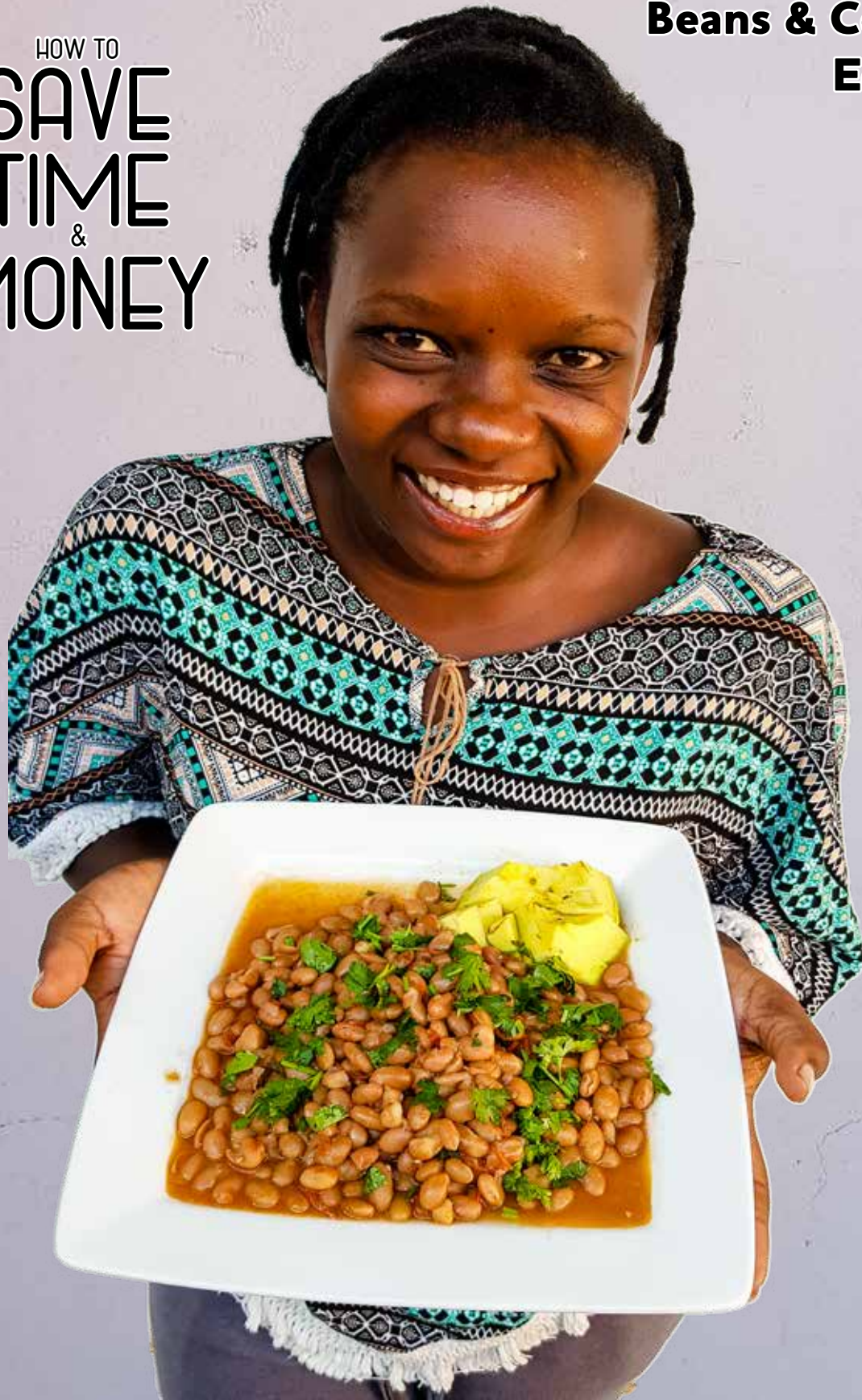


THE KENYA eCOOKBOOK

**Beans & Cereals
Edition**

HOW TO
**SAVE
TIME
&
MONEY**



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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 six 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 boiled an immense amount of beans to test the recipes & recommendations in this cookbook.

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Bill Cowan and his team, who's research with cooks in the South African township of Imizamo Yethu inspired this cookbook.

Simon Batchelor for his inspirational vision of eCooking as an tool for enabling access to modern energy cooking services for all across Kenya and beyond.

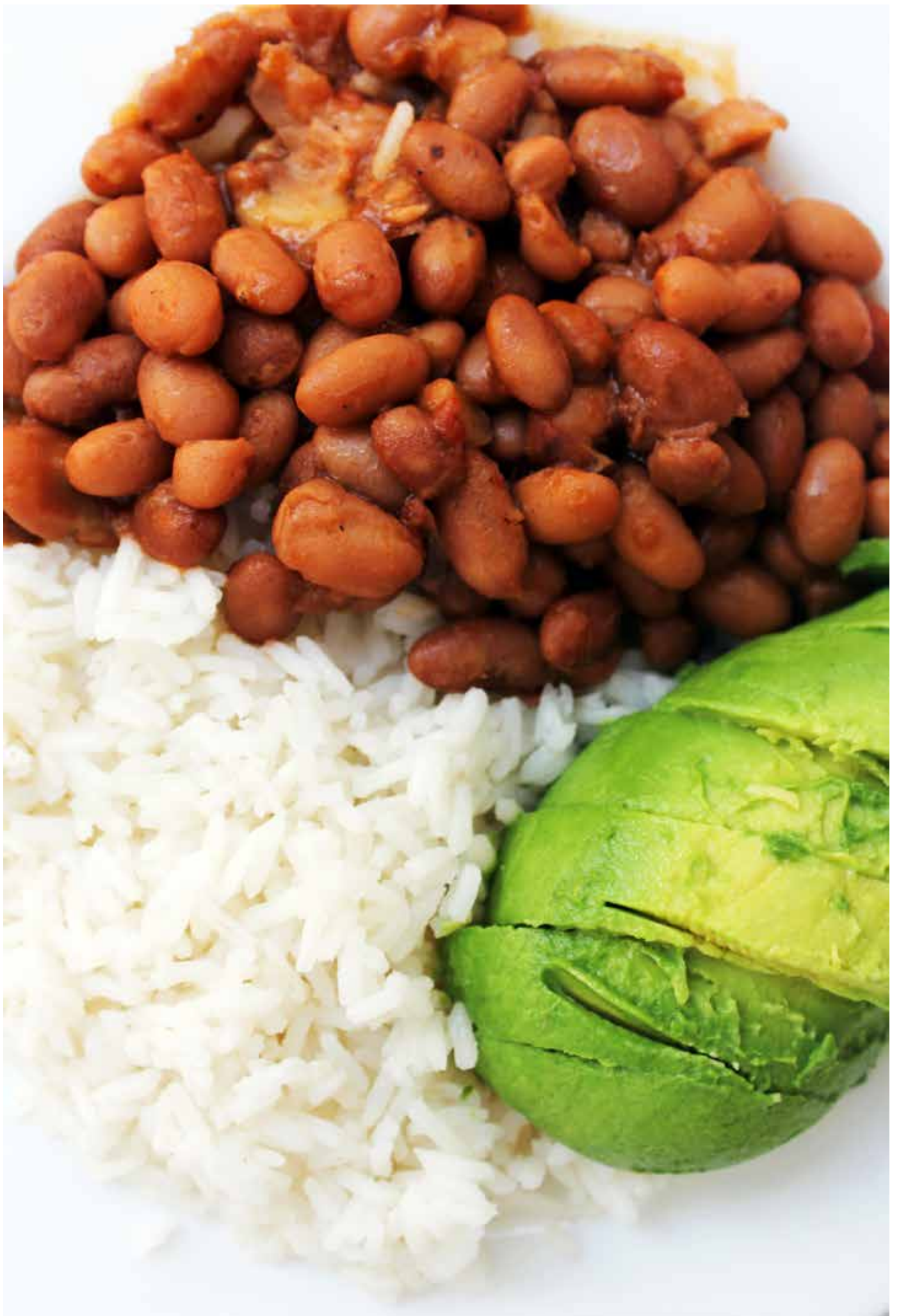
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www.sussex.ac.uk/spru/research/projects/lct

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INTRODUCTION

This edition of the eCookBook was produced in Nairobi and focusses on one of the most energy intensive popular food groups: beans and cereals. 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 began 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*’ and continued under the ‘*Modern Energy Cooking Services Programme*’, both of which were 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 switched to cooking solely with electricity for the next 4 weeks, continuing to record data.

Renewable energy generation is increasing access to affordable and reliable electricity and opening new windows of opportunity for cooks across Kenya. However, most people have very little idea how much electricity is needed to cook, let alone how much it actually costs compared to the other fuels available on the market. Many are also unaware of the broad range of modern energy-efficient cooking appliances that are now available and how compatible each one is with popular dishes, such as beans. This eCookBook seeks to change this by exploring the relationship between energy use and cooking to inform cooks on how best to take advantage of these new opportunities.



OVERVIEW

For this eCookBook, we focussed in on four 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 eRecipes, describing what each cook did and what the energy implications of cooking in that way were.

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, energy and money and just how much. We also compared this to the fuels and 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'.

USE ENERGY EFFICIENT APPLIANCES



An efficient appliance like an EPC **can save you a lot of time & money**. Combined with other energy saving tips, you could **save over 90% of the cost & 75% of the time** versus cooking inefficiently on a simple hotplate. However, if you don't have an efficient appliance, the rest of these tips apply to just about any stove using any fuel.

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. Older cereals will have had more time to dry out, so are likely to benefit most from soaking.

SIMMER WITH A LID ON



Steam escaping is energy & money escaping. Trapping it inside with a lid makes cooking cheaper, but **you'll only save money if you also turn the power down and simmer**. You'll use less water too.

GET A HEADSTART



Use **leftover hot, or warm water** to save time & money. Getting water from cold up to boiling point can take up to 20 minutes. Cooking doesn't start until you get close to boiling. If you have hot water left over after making tea, **keep it in a Thermos** until you need it. If you don't have any left over hot water, save time by heating water with a **kettle**.

THINK SMALL



Smaller pieces cook faster as they have a larger surface area to absorb heat & water. Cutting up ingredients like onions into **smaller pieces can also speed up cooking**, in particular, the energy-intensive frying stage.

In fact, you can **totally avoid frying** by putting all the ingredients in at the start, but it might not be quite as delicious as usual.



Smaller cereals, like kamande, **cook in less than half the time of bigger cereals**, like njahu. **The longer you cook for, the more it costs.** There is more information on the relative time & cost implications of different variety of beans on the following pages.

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 $\frac{1}{2}$ kg on an electric hotplate (on full power without soaking in a sufuria without a lid). Turns out, warimu is the smart choice - cheap to buy & relatively cheap to cook, unless you have an EPC of course, as any of these beans can be cooked for less than 10KSh!

nyayo

1hr 55mins (average cooking time)
2.2units / 50KSh (units used/cost)
Total cost ($\frac{1}{2}$ kg+units) **90KSh**

wairimu

1hr34mins (average cooking time)
1.6units / 37KSh (units used/cost)
Total cost ($\frac{1}{2}$ kg+units): **74KSh**

mbaazi

1hr 57mins (average cooking time)
2.2units / 50KSh (units used/cost)
Total cost ($\frac{1}{2}$ kg+units) **85KSh**

kamande

56mins (average cooking time)
1unit / 23KSh (units used/cost)
Total cost: ($\frac{1}{2}$ kg+units) **113KSh**



ndengu

1hr 1min (average cooking time)
1.2units / 28KSh (units used / cost)
Total cost ($\frac{1}{2}$ kg+units) **86KSh**

yellow beans

1hr 50mins (average cooking time)
2 units / 46KSh (units used / cost)
Total cost ($\frac{1}{2}$ kg+units) **96KSh**

njahi

2hr 38mins (average cooking time)
2.8units / 64KSh (units used / cost)
Total cost ($\frac{1}{2}$ kg+units): **104KSh**





COOKSTOVES AND FUELS



CHARCOAL

WHAT IS IT?

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



WHY IS IT USED?

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 so much for foods boiled in a pot**.

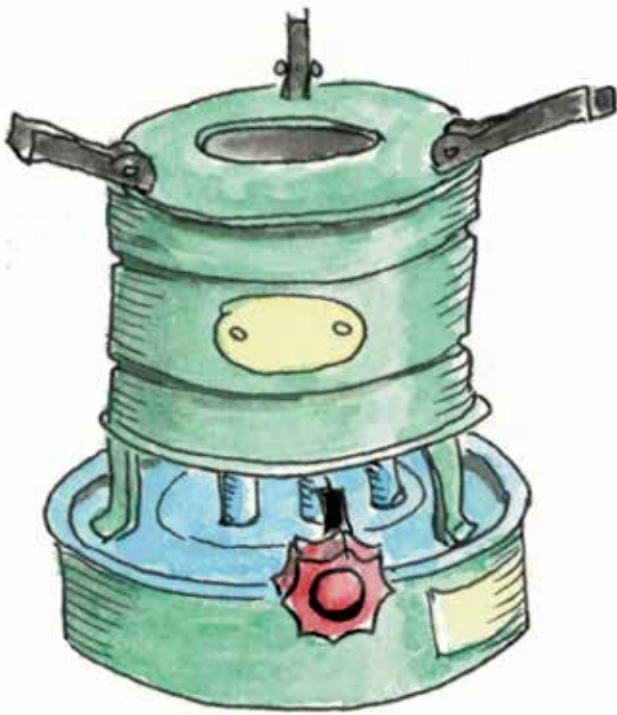


WHY CONSIDER OTHER OPTIONS?

- 1. Lighting charcoal is tedious**, especially when wet.
- 2. Charcoal smoke** may hurt your eyes less than wood smoke, but it contains far more **carbon monoxide**, which **can kill** in poorly ventilated spaces.
- 3. Charcoal prices doubled in 2018** because of the logging ban. **10kg of wood is needed to produce each kg of charcoal**, so the forests around Nairobi have been stripped & charcoal now has to be brought from further & further away.



KEROSENE



WHAT IS IT?

Kerosene is a flammable liquid derived from **crude oil**. It is widely used across Kenya for **lighting & cooking**. Kerosene stoves (pictured) are cheap and easily available.

WHY IS IT USED?

Kerosene **stoves are cheap** (500KSh+), easy to light & control the heat. Kerosene **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.

WHY CONSIDER OTHER OPTIONS?

1. The price has increased. 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**.

2. Breathing in kerosene fumes everyday puts your health at risk, specifically to **serious breathing, eye & pregnancy disorders**.



3. 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**.

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 complement 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 whilst your food simmers away for free!



WHAT TO USE IT FOR?

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

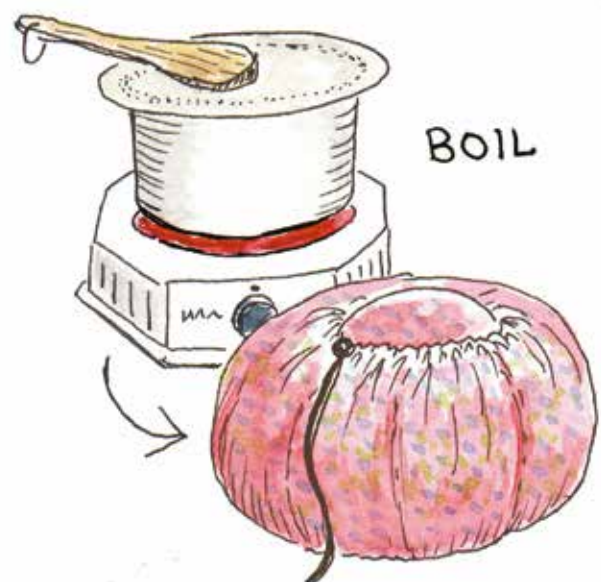
WHY USE IT?

1. Simmering times are typically **twice as long** as continuing to boil on the stove, but **fuel costs** are typically **cut in half**.

2. They are great for **keeping food warm** once its cooked.

3. They typically **cost 1,000-2,500KSh** & have no ongoing costs – **only savings!**

It should always be used as an accompaniment to another stove that can bring the pot to the boil.







LPG

(LIQUEFIED PETROLEUM GAS)

WHAT IS IT?

LPG is a fossil fuel fraction extracted alongside other petroleum products, such as kerosene and diesel, and is made up of a blend of propane and butane. Fossil fuels are produced when biomass is compressed deep underground for millions of years producing a blend of energy rich substances.

WHY IS IT USED?

LPG has become popular for cooking because it lights/extinguishes instantly and **it has a much higher energy density than conventional biomass, making it easier to transport.** It can easily be compressed and packaged into cylinders for distribution.

Although it used to be very expensive, prices have dropped a lot and a 6kg cylinder can now be refilled for 650-1,000KSh & a 13kg for 1,400-2,000KSh.

WHY CONSIDER ALTERNATIVES?

1. **LPG stoves offer cooks the ability to very finely control heat,** however electric appliances offer automatic control, so the cook can go off and do other things.

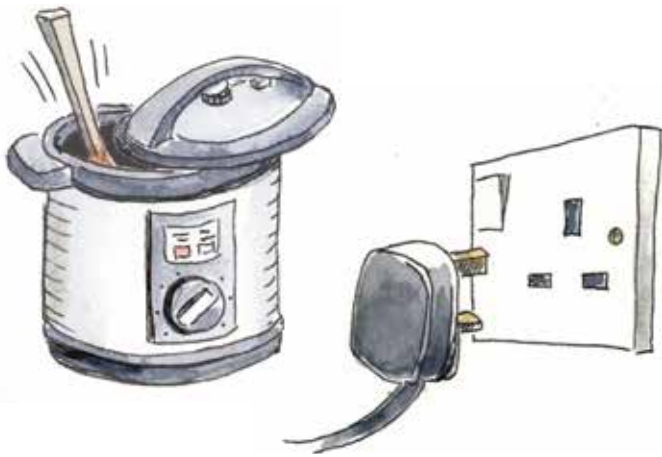
2. **LPG stoves are much cleaner and more modern than biomass or kerosene, but they still use an open flame.** Open flames present obvious hazards (fire & burns), however they also limit the efficiency of cooking, as they require airflow to keep the flame alive. This airflow carries heat away with it that could otherwise be used to heat your food.



COOKING WITH ELECTRICITY



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 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.

ISN'T IT EXPENSIVE?

Many people think it's expensive (as you'll see, it is not!). Electricity is currently (in 2019) sold at around 23KSh per unit (KWh) by Kenya Power. In fact the first 100 units used each month only cost 17KSh each. **Few dishes take more than two units to cook** (at most 46KSh), especially with an efficient appliance like the electric pressure cooker (EPC).

WHAT HAS CHANGED?

The grid is expanding all the time, connecting new households across Kenya. 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!**

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 are mostly used for warming (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. EPC).

ELECTRICITY (CONT'D)

HOW SAFE IS IT?

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.**



ISN'T SUPPLY 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.**



AREN'T ELECTRIC COOKING APPLIANCES EXPENSIVE?

The cost of a hotplate (typically 3,000KSh) or an 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. After cooking them 100 times, 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. A lot!



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.

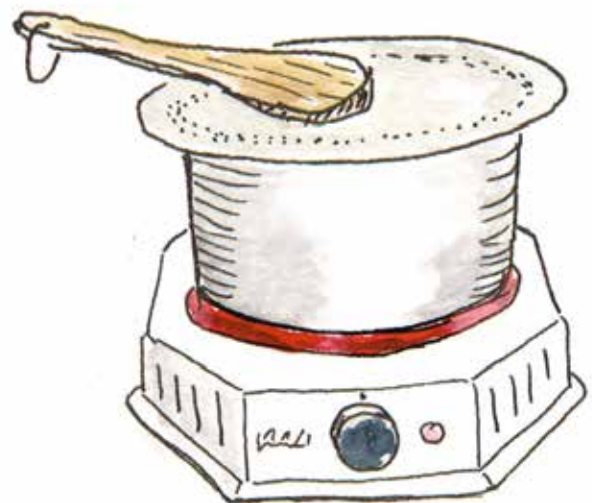
Electricity is currently sold at around 23KSh per unit (KWh) by Kenya Power (May 2019). Reliability has improved significantly in recent years, with blackouts diminishing and the voltage stabilising. In fact, **Kenya will soon have excess electricity on the national grid, so the time is right for electric cooking in Nairobi.**

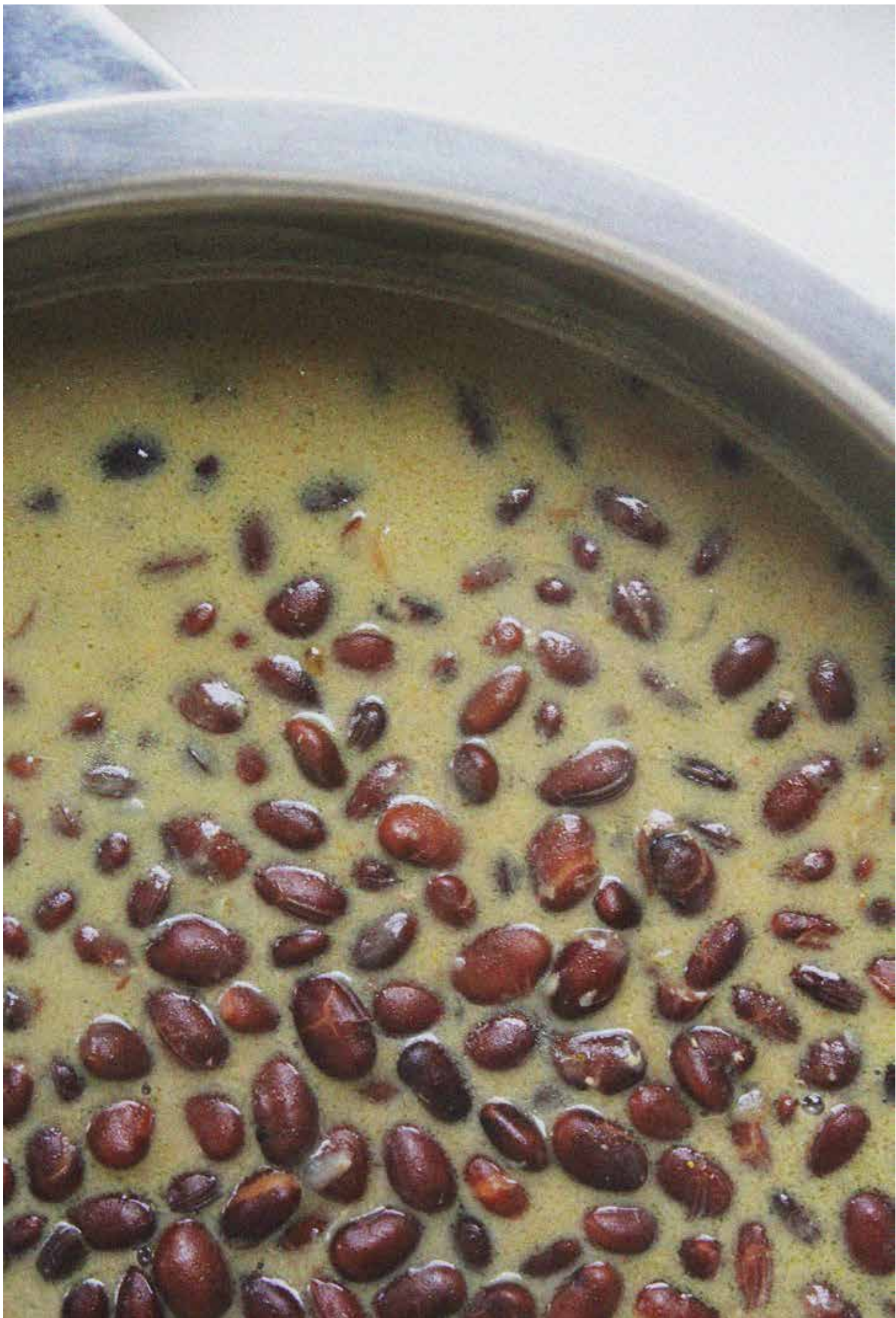
WHY USE IT?

They are fairly cheap. They typically sell for 2,000-5,000KSh for a single or double hotplate. **You will likely use more than twice as many units than if you were cooking the same dishes on an electric pressure cooker,** however, a hotplate is still cheaper to use than charcoal.

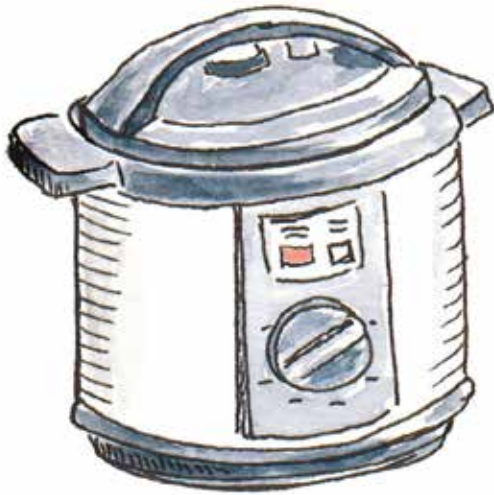
WHAT TO USE IT FOR?

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.





ELECTRIC PRESSURE COOKER (EPC OR MULTICOOKER)



electric
pressure
cooker [EPC]

=



fireless cooker

+



electric hotplate

+



pressure cooker

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) - with a fully automated control system.

WHY USE IT?

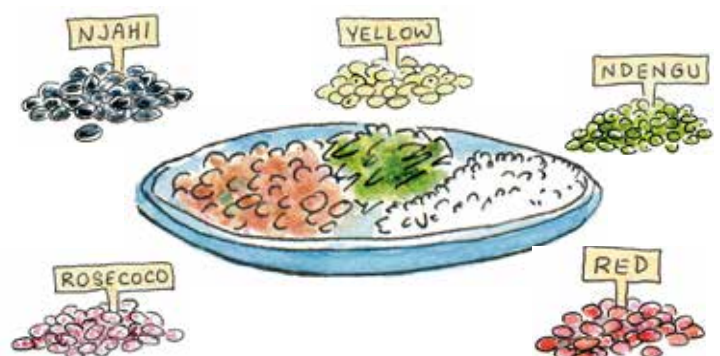
1. It is faster, a pressure cooker raises the temperature above boiling point so that it can cook much faster.

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?

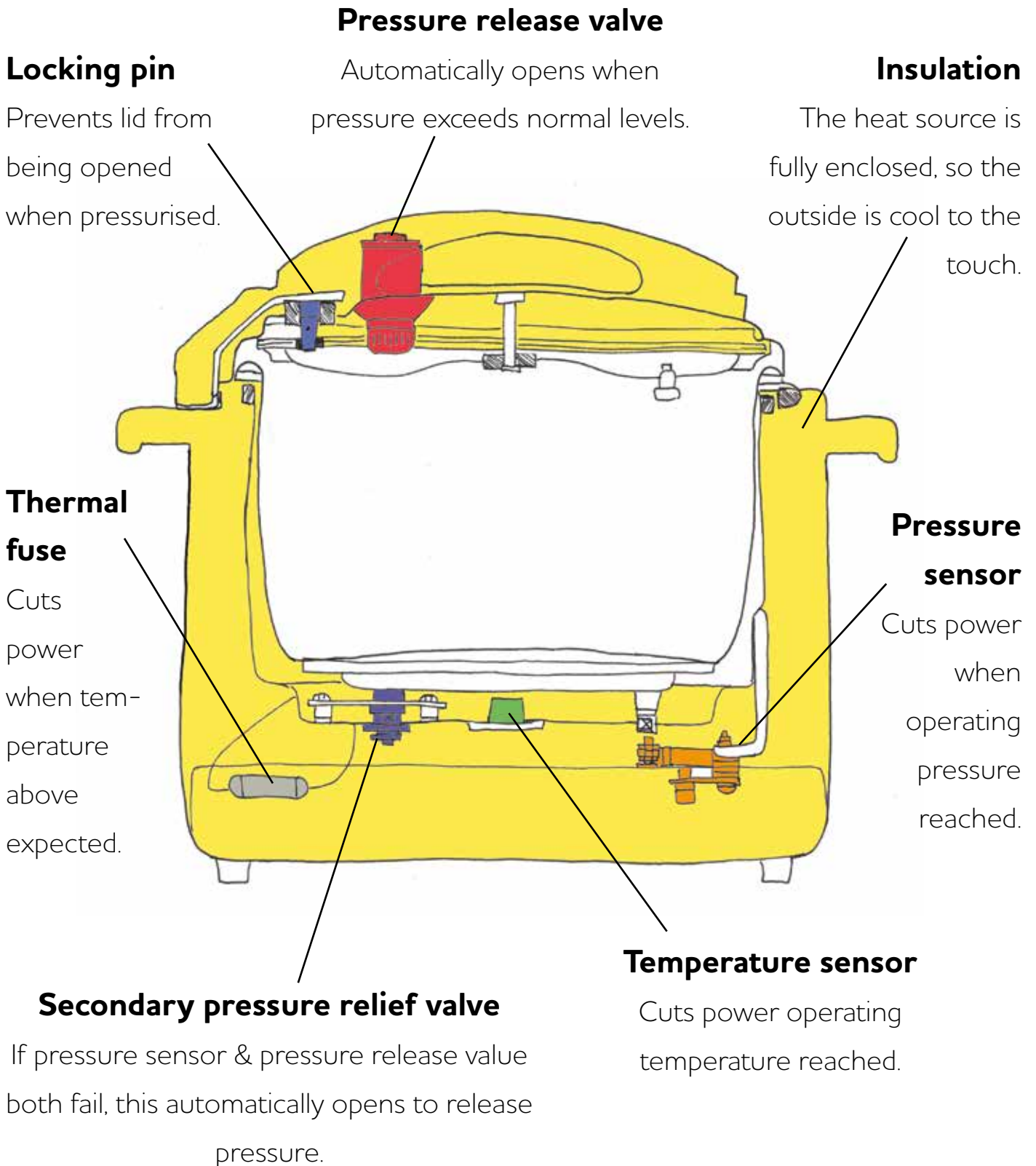
It's best for 'heavy foods' like beans, githeri or matumbo, but can also cook: ugali, matoke, sukuma wiki, rice, eggs, meat/fish/veg stew, fried/boiled meat/fish/veg, mokimo and many more of your favourite dishes. It can cook 'heavy foods' in half the time and with a fraction of the energy/cost.





EPC SAFETY FEATURES

EPCs have *multiple safety mechanisms*, so even if one fails, there are several more there to protect you. This means that they are actually *one of the safest cooking appliances on the market today*.





ELECTRIC PRESSURE COOKER

+ PROS

- **Fast** - a pressure cooker raises the temperature above boiling point.
- **Cheap** - it is energy efficient. There is insulation around the pot so that the heat stays in there.
- **Convenient** - the whole cooking process is automated. Once you set the time, the temperature is controlled by the EPC, so that you can go off and do other things
- Can **fry, boil, steam** and even **bake!**
- **Safer** than ordinary sufarias - locks shut when pressurised.
- **Less stirring and water** needed - completely sealed during pressure cooking, so food cannot dry out
- **Lid can be taken on and off freely** when frying, boiling, steaming or baking.

- CONS

- Not ideal for certain dishes such as mandazis (deep frying) or chapatis, where you need to manually control heat or use a shallow pan.
- Not yet available in most Kenyan stores.
- The appliance costs about twice as much as an electric hotplate.
- Looks complicated at first,







COOKS AND RECIPES



CHRISTINE

Who do you cook for?

My family of six, most of the time.

How did you learn to cook?

From my mother

What fuels have you cooked with?

I primarily used charcoal, kerosene and gas for the study. Charcoal is good when cooking meals like beans which take a lot of time and energy, hence costly. One disadvantage is lighting it, takes quite some time to do so. As for kerosene it is more efficient than charcoal but more expensive with meals like beans and depending on the quality of stove it can be messy.

Gas is definitely the better option of the two but it can be costly hence the need to supplement it with charcoal with long cooking meals (e.g. beans).

How much did you spend on fuel?

I started using a baby Meko gas cylinder which cost 800KSh to refill but I graduated to a 13kg cylinder costing 2000 KSh per refill.

How much did you spend on electricity before the study?

I spent around 2000KSh and this includes use of a water heater and other electric appliances like a microwave and a kettle.

You actually spent a bit more cooking solely on electricity - were you surprised?

Not really. The hotplate consumes a lot of units. Going forward, I'll continue to use the efficient appliances, alongside my LPG stove if I need to control the heat very closely or use different shape pots.

What are the best things about cooking with electricity?

I didn't need to start cooking early, electric cooking saves time! You can multi-task, as the devices are safe to leave unattended, especially the EPC.

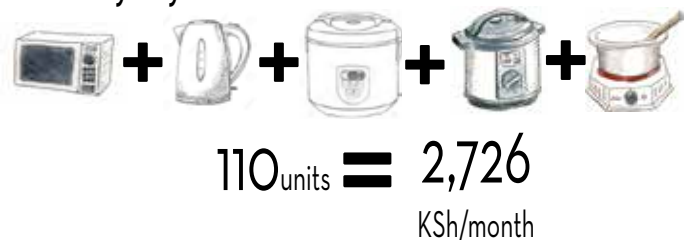
What are the worst things?

The hotplate consumes a lot of units. Also, when the electricity was off, I had to use LPG to cook our meals.

Previous fuel mix



Electricity only

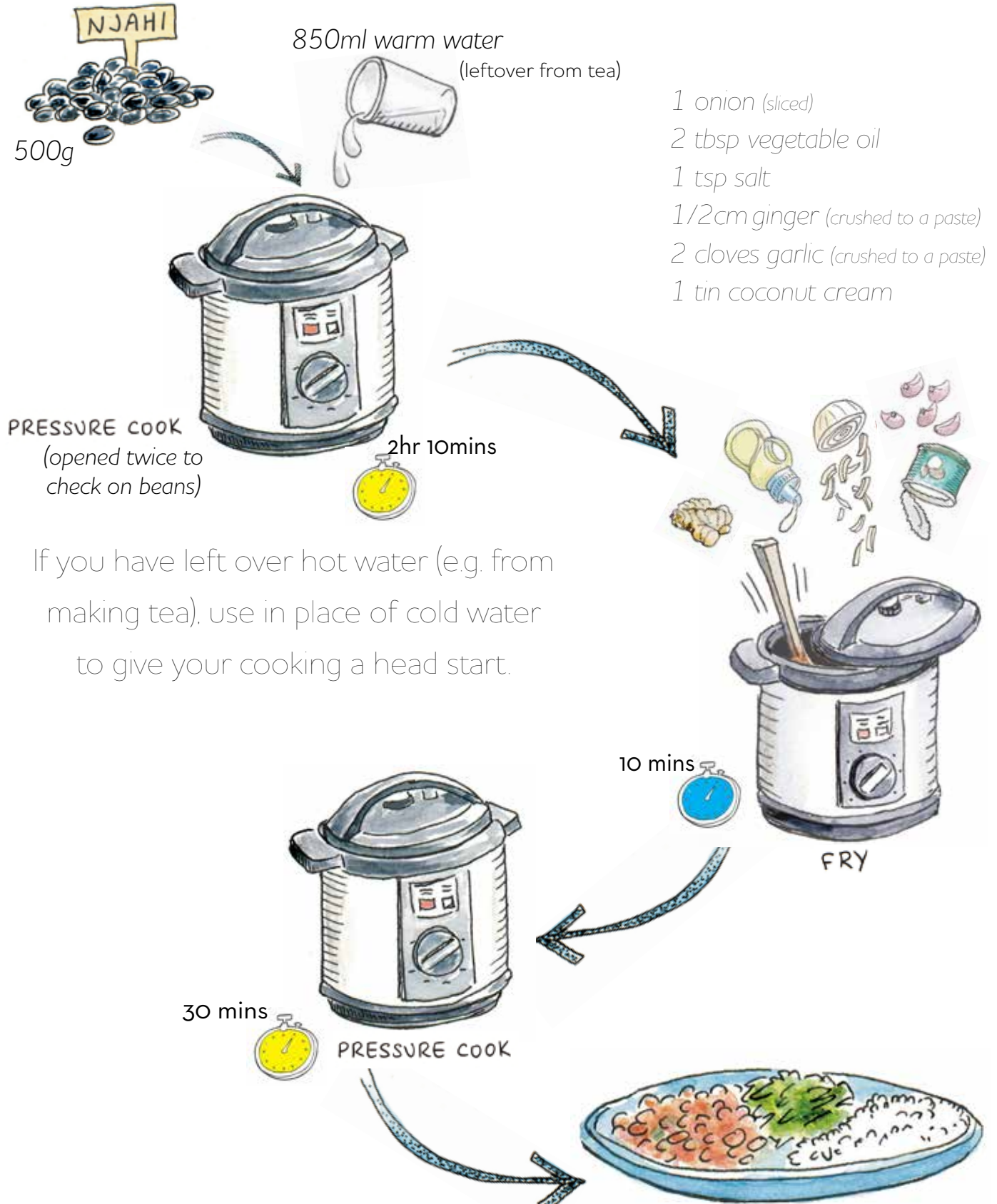


CHRISTINE'S

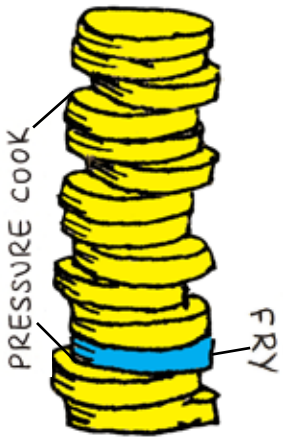
NJAHI BEANS

WITH COCONUT MILK

method



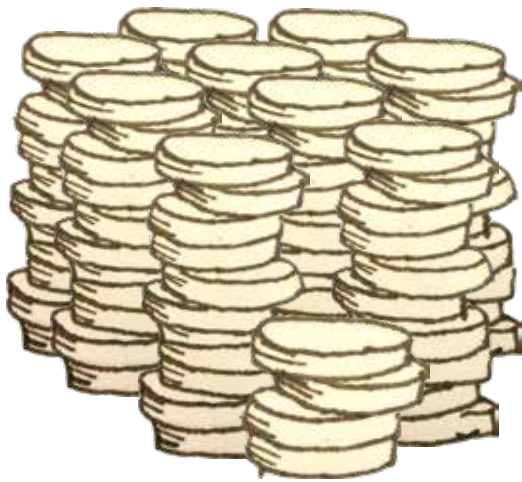
where is the money going?



14 KSh
2hrs 50mins
0.6 units

Smaller beans are generally faster and therefore cheaper to cook. 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 and lpg...



94 KSh*
4+ hours
1.25 tin charcoal
40g gas (for sauce)



*measured during 2018 charcoal ban, actual cost at the time was 150KSh per tin



KAREN

How did you learn to cook?

From my grandmother in Mount Elgon.

Who do you cook for?

I 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, because I thought it would be really expensive, but I gave it a try.

How much did you spend on 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 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. 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 electric appliances?

We had already started experimenting with many different appliances and now we use an EPC and other energy-efficient appliances for most of our cooking. 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!

Previous electric appliances



Including efficient electric 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



SOAK

overnight

soak beans to reduce cooking time by half

PRESSURE COOK

60 mins



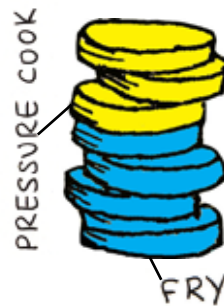
"I ate beans and githeri so much at school that I never wanted to cook them myself. Plus they take so long on the electric hotplate. But with the electric pressure cooker its way quicker, cheaper and easier. If I put all the ingredients in at the beginning, I can cook beans from scratch in just over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

- Karen

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





DAMARIS

How did you learn to cook?

I learnt from my mother in rural Kiambu county.

Who do you now cook for?

For my 2 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 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 electricity did you use?

I share a meter with my landlady & her other tenants, so I pay a fixed rate of 500 bob a month.

Were you surprised at the amount you spent cooking with electricity?

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 electric 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.

Previous fuel mix



Electricity only



DAMARIS'

YELLOW BEANS

WITH GREEN PEPPERS, ONIONS AND TOMATOES

method

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



PRESSURE COOK 110 mins

(opened three times to check on beans)



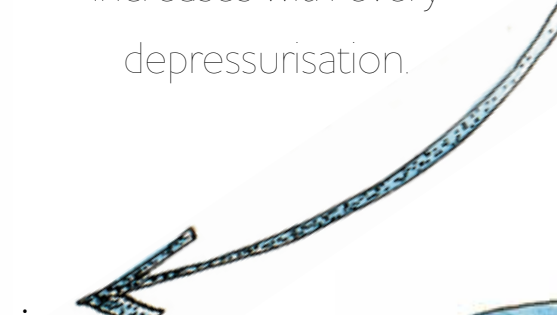
FRY 10 mins



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



PRESSURE COOK 5 mins



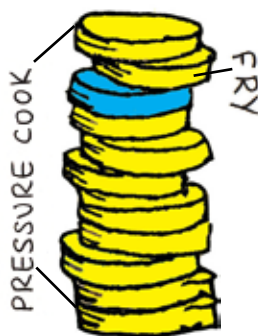
"I used to cook beans on charcoal because I thought it was the cheapest option. I was so surprised to find out that cooking beans on the electric pressure cooker was faster and cheaper!"

- Damaris

where is the money going?



11.5 KSh
2hrs 5mins
0.51 units

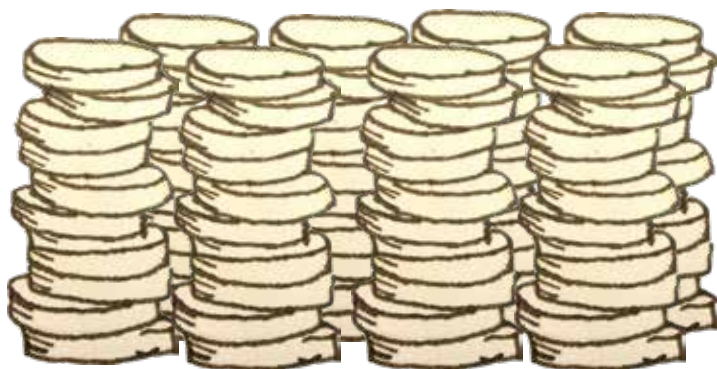


Damaris used roughly the same amount of energy pressure cooking for 10 mins, for 30, and for 100 mins. Each time the lid is opened on an EPC it adds at least 5 mins to the cooking time, and can increase the total cost by upto 50%.

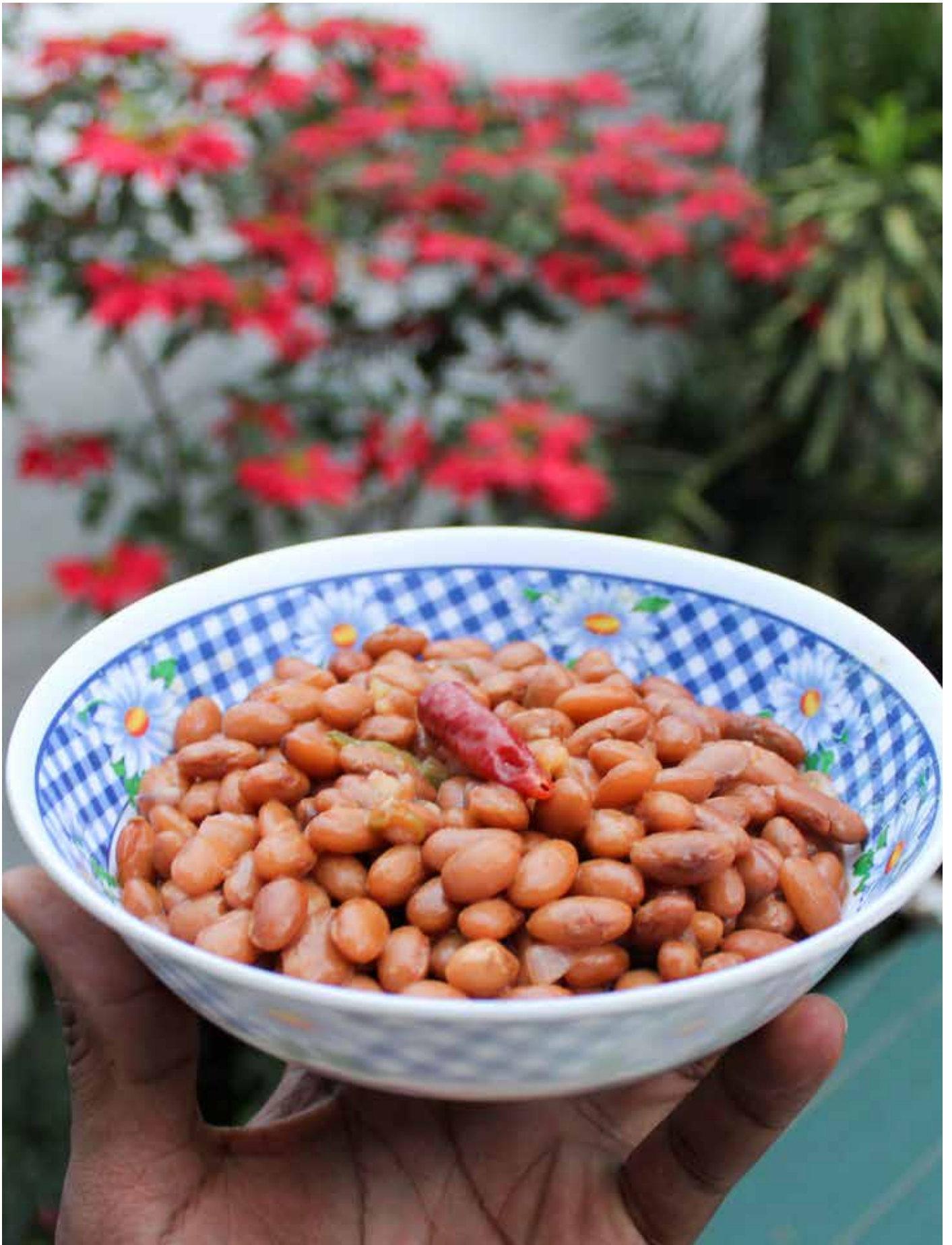
when using charcoal...



80 KSh
3+ hrs
1 tin of charcoal









JUDY

Where did you grow up?

I grew up in Meru, where my mother taught me to cook.

What fuels have you cooked with?

We used to collect firewood with my sisters, until I moved to Nairobi to study in the 70s, where I had to buy it, as it was hard to find 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 other fuels?

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.

How much did you spend on electricity?

I spent about 1.500KSh per month on electricity

Was it difficult to cook with electricity appliances?

No, I don't think so. It was also 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.

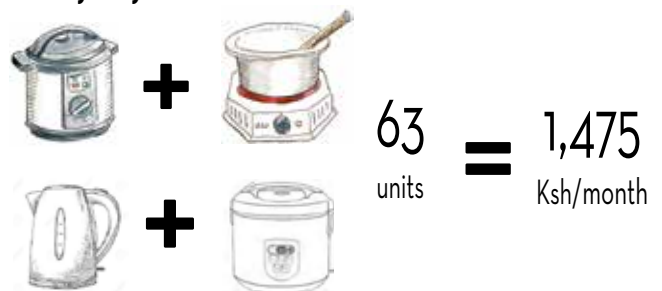
What are the worst things?

I thought it would be a lot of work but it is actually very easy. And it was very safe.

Previous fuel mix



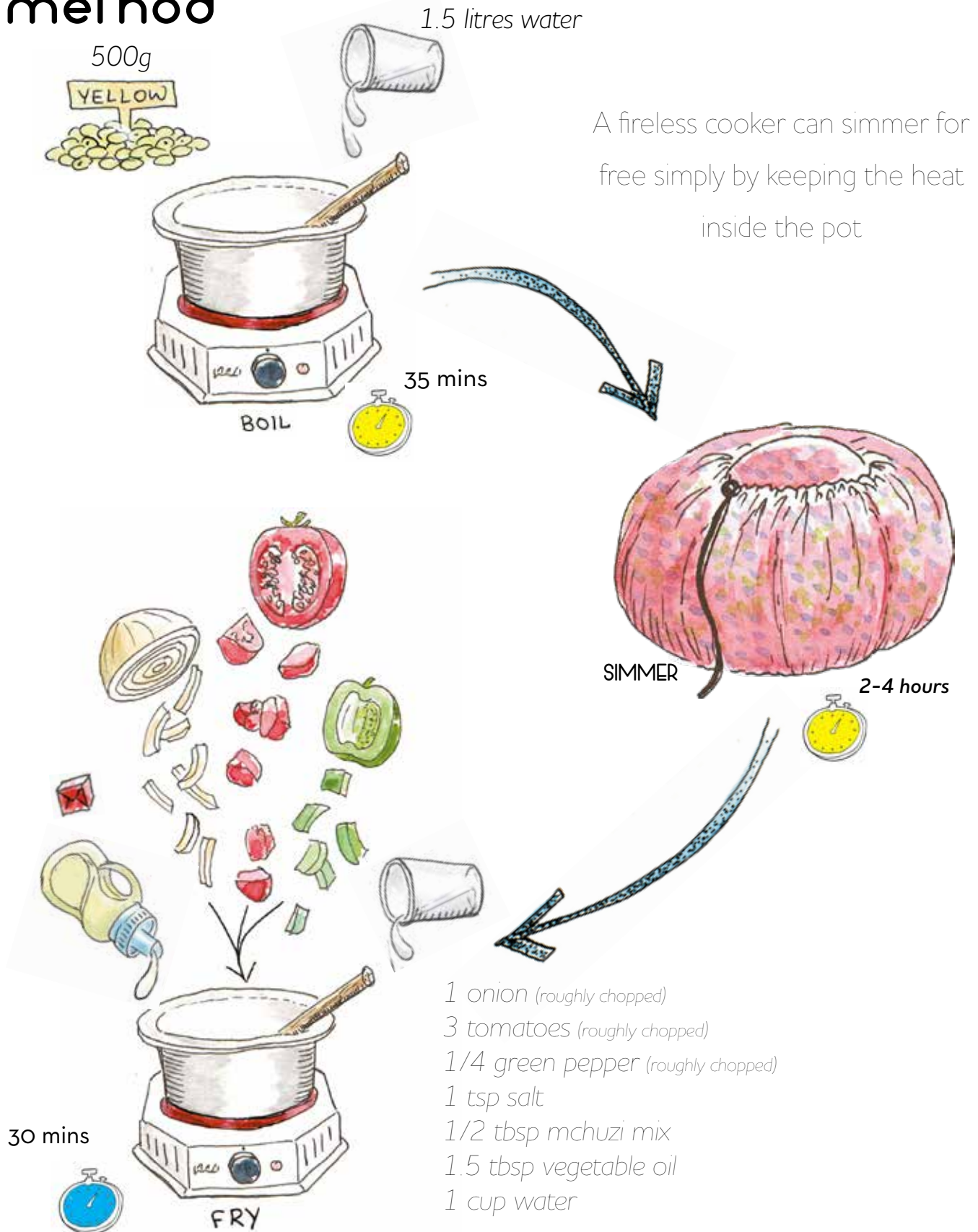
Electricity only



YELLOW BEANS

WITH GREEN PEPPERS, ONIONS AND TOMATOES

method



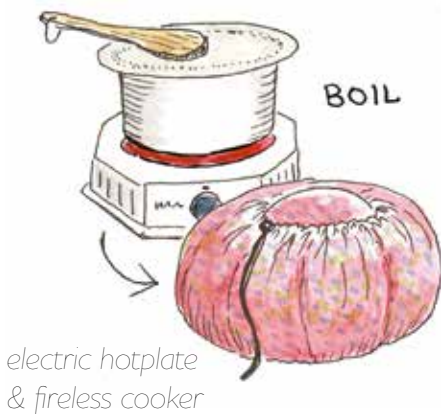
"I used to light up my little kerosene stove every Saturday morning, bring my beans to the boil, then wrap them up in the fireless cooker. I'd come back in the afternoon and they'd be soft enough for me to fry. It'd cost me twice as much to cook the whole thing on kerosene!"

- Judy

where is the money going?

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 EPC is both insulated and pressurised, so could have saved another 15 KSh.



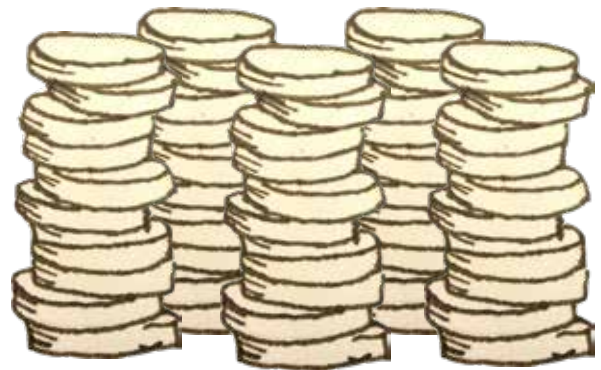
25 KSh
3+hrs
1.1 units



using just electric hotplate...



50 KSh
2hrs 6mins
2.2 units

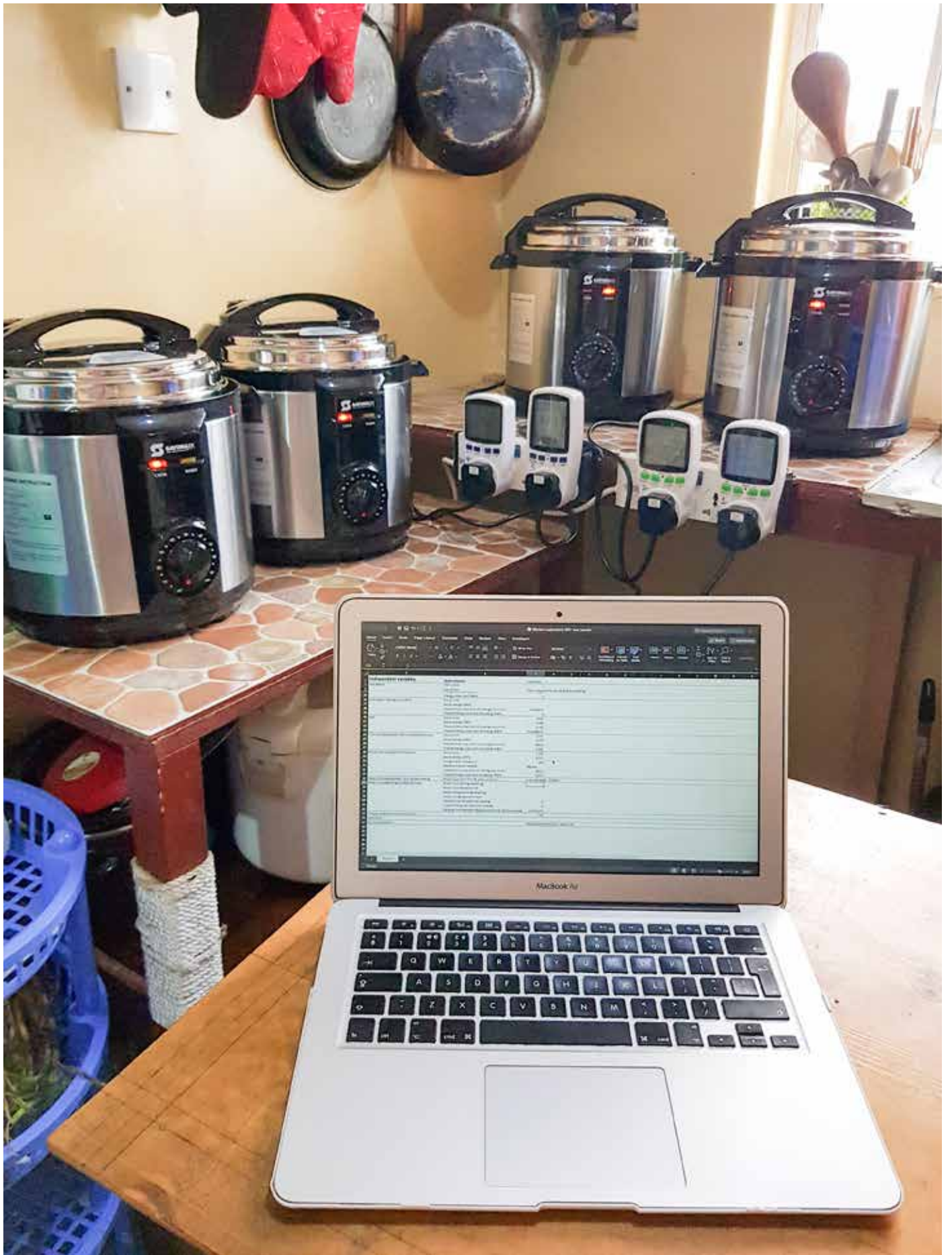


when using kerosene stove and fireless cooker



60 KSh
3+ hrs
1 kerosene





THE KITCHEN LABORATORY



HOW TO RECORD AN E RECIPE

Most people have no idea how much electricity is required to cook the foods they eat every day. Where the electricity goes after it passes through Kenya Power's meter is a big mystery - it could be disappearing into the shower, the TV or a cooking appliance. Nobody really knows!

TIME AND ENERGY

Time & energy are the two key ingredients for an eRecipe. To record each of the eRecipes featured in this book, we simply observed each cook as they prepared their version of beans, noting down time & energy at the critical points during each recipe. Critical points include reaching boiling point, changing process (e.g. frying to boiling) & adding new ingredients. This allowed us to pull apart exactly where time & money was being spent, as money is directly proportional to energy.

RECORDING ENERGY

Recording time is simple enough, but energy is more difficult. For gas, kerosene & charcoal, we weighed each fuel before and after cooking to get the total energy used. For electricity, we used a plug-in energy meter, which gave us a live readout throughout the cooking process.

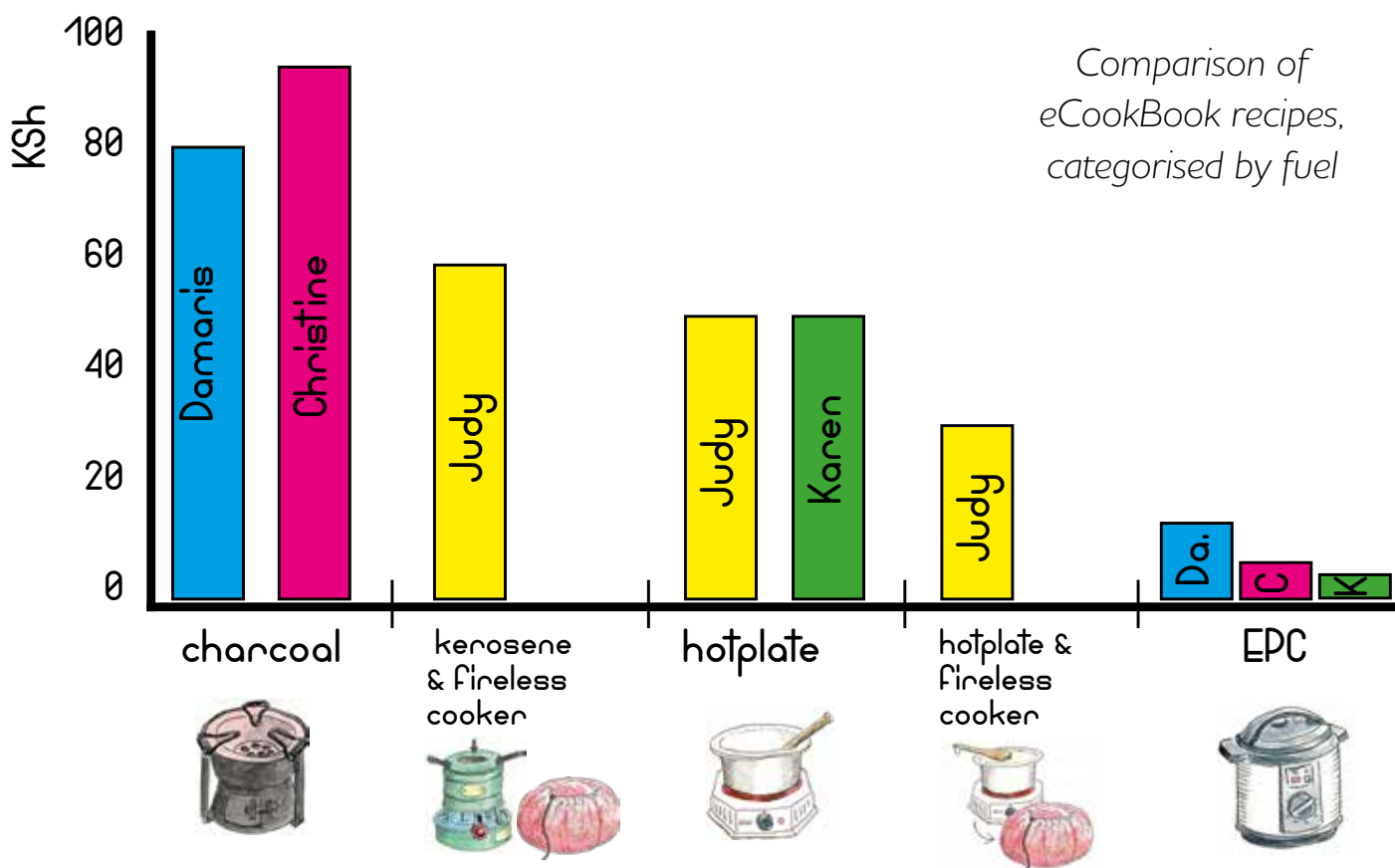
HOW CAN I RECORD AN E RECIPE AT MY HOUSE?

Plug-in energy meters are specialist equipment, but you can still record an eRecipe even if you're not able to get your hands on one. You can use your prepaid electricity meter, however you'll have to make sure that everything else in the house is switched off. Whilst an LED lightbulb or a phone charging is unlikely to make a big difference to your reading, a water heater, iron box or freezer will.



WHICH RECIPE IS CHEAPEST?

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, we firstly compare the recipes of each cook and then carry out controlled experiments in our kitchen laboratory to explore which factors make the biggest difference to the time and money you spend in the kitchen.



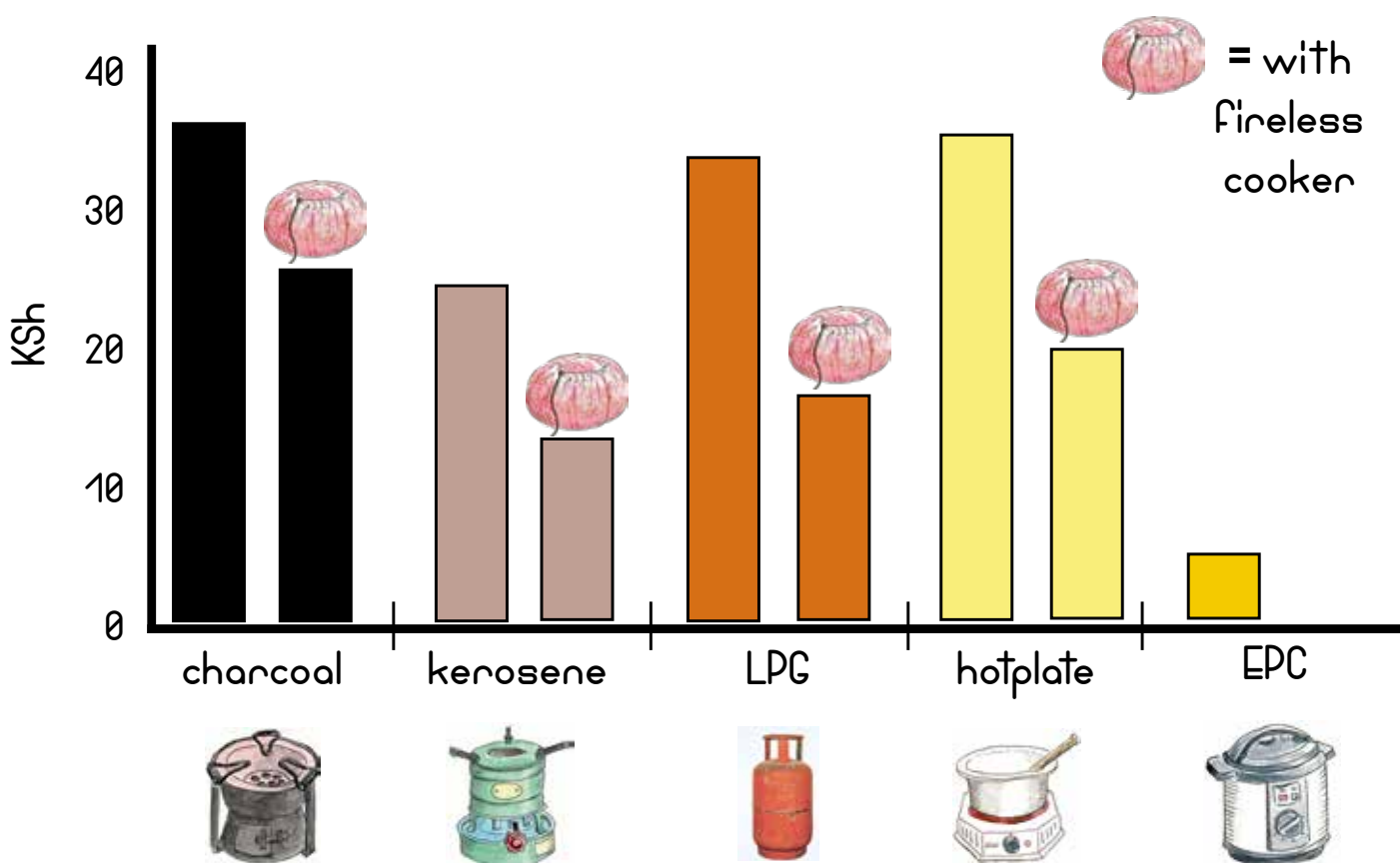
In the graph above, we can see that Judy cut the cost in half by using a fireless cooker to simmer the beans. This works equally well on charcoal, kerosene, an electric hotplate or even LPG.

However the real winner is clearly the EPC, which is 5-20, times cheaper than charcoal!



WHICH FUEL IS CHEAPEST?

We wanted to know if anything could beat an EPC on cost, so we boiled 500g of yellow beans as carefully as we could on charcoal, kerosene, LPG, an electric hotplate and an EPC. We did it side by side & just precooked them so that we could directly compare between them.



We used all the tricks in the book - lids on the sufarias, turning down to a simmer, just enough water, etc. However, even using a fireless cooker, we still couldn't get close to an EPC.

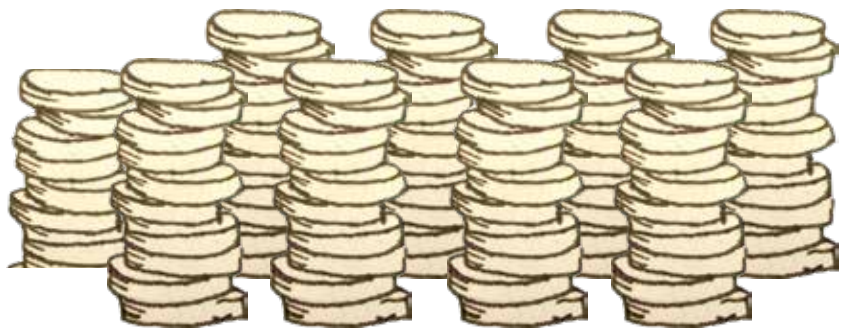
Interestingly, despite what many people believe, cooking 'heavy foods' on an electric hotplate costs about the same as on LPG or charcoal.

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

THE SLOW AND EXPENSIVE WAY:



= 87 Ksh
3hrs 30
3.8 units



THE QUICK AND CHEAP WAY:



= 4 Ksh
30 mins
0.15 units



WHAT MAKES THE BIGGEST DIFFERENCE?

The **cheapest and fastest way to cook beans**, is to use an **Electric Pressure Cooker (EPC) & 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** **3hrs 30**
 total cost total time

- ↓ **Cook faster with smaller varieties 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

BY COMBINING ALL ENERGY EFFICIENT PRACTICES

save up to 50Ksh, 2hrs
save up to 30Ksh, 0hrs
save up to 20Ksh, 45mins
save up to 20Ksh, 1hr 30
save up to 10Ksh, 15mins

+ + + + = **10 Ksh** **1hr**
 total cost total time

HOW MUCH CAN I SAVE BY CHANGING MY APPLIANCE?

THE SLOW AND EXPENSIVE WAY

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

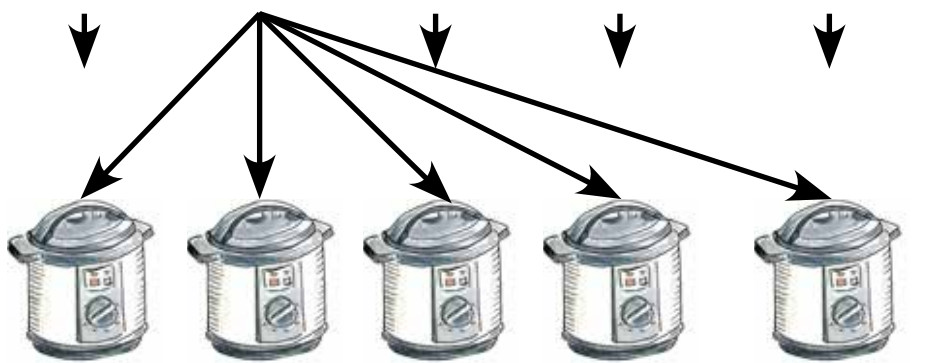
HOW MUCH CAN I SAVE BY CHANGING MY APPLIANCE & THE WAY I COOK?

THE SLOW AND EXPENSIVE WAY

 +
  +
  +
  +
  =
 87 Ksh **3hrs30**

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

total cost total time






- Cook faster with smaller varieties of cereals**
- Lid on to fry, depressurise 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**

save up to 84Ksh 3hrs

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

save up to 
 save up to 
 save up to 
 save up to 
 save up to 

75Ksh, 2hrs45 75Ksh, 1hr15 75Ksh, 1hr15 75Ksh, 2hrs 70Ksh, 1hr15

 +
  +
  +
  +
  =
 4 Ksh **30mins**

smallest cereals EPC, lid on, depressurise only once 2:1 beans : boiling water fresh or soaked for 3hrs+ finely chopped, all ingredients in at start

total cost total time

EFFICIENT EPC COOKING TIPS

These tips will help you to get the most out of your EPC, optimising your energy & time savings

USE THE RIGHT AMOUNT OF WATER

Almost no steam escapes from an EPC, so use less water than you would with normal sufarias, which have loose fitting lids.

- With **dry beans**, add **twice as much water** as beans (by volume).
- If you've **soaked** the beans, the water should **just cover** them.



DRY

SOAKED



STOP LEAKS

Listen out for any steam escaping - the pressure valve should be totally sealed.



MINIMISE FRYING TIME

***Frying** make things tastier & crispier, but it **uses full power constantly**. You might not want to miss out frying completely, but if you cut ingredients smaller, you'll be able to fry faster.*



AVOID OPENING WHILE PRESSURE COOKING

The heating process is automatically controlled & almost no steam can escape, so **stirring is not necessary during pressure cooking**, as food is very unlikely to burn.

Each time you depressurise, you add at least **5 mins to the cooking time** and increase the **cost by up to 50%**. You also lose around 100ml of water, so **if you open up, remember to top up!**

HOW LONG SHOULD I SET THE TIMER FOR?



ROTARY DIAL EPC

Rotary dial EPCs usually begin timing right away, so you'll need to add more time when cooking more food, because they'll take longer to go from room temperature to above boiling point. When starting with cold water, we suggest adding the following to the cooking times overleaf:

- 7 mins for 250g
- 12 mins for 500g
- 20 mis for 1kg



BUTTON EPC

Button EPCs usually only start timing when they reach pressure. Simply set the timer using the cooking times overleaf, regardless of how much food you are cooking.

EPC PRESSURE COOKING TIMES

This page lists **cooking times at pressure**. For **rotary dial EPCs**, when starting with cold water, **add pressurising time** according to how much you are cooking: 7 mins for 250g; 12 mins for 500g; 20 mins for 1kg

Very small, very quick grains

Dry: 15-20 mins
Soaked; 7-10 mins



Small, quick grains

Dry: 45-55 mins
Soaked; 22-27 mins



Medium size, quicker grains

Dry: 50-60 mins
Soaked; 25-30 mins



Medium size/speed grains

Dry: 70-80 mins
Soaked; 35-40 mins



Medium size, slower grains

Dry: 80-105 mins
Soaked; 40-50 mins



Bigger, very slow grains

Dry: 120-150 mins
Soaked; 60-75 mins



If you're pre-cooking, or you like your beans firm, go for the lower time, but if you like them soft or you've already put in all the ingredients in at the beginning, go for the upper.

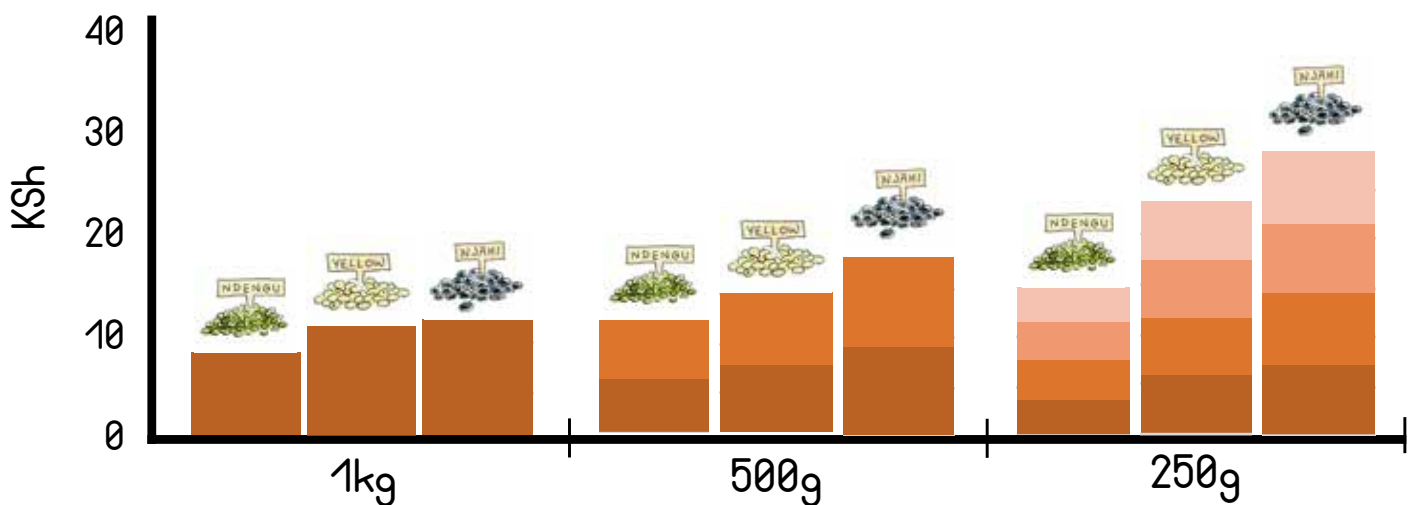


BULK COOKING

Many people save time and money by **boiling cereals in bulk**, storing them and **frying them in batches**. This certainly makes sense on charcoal, as it takes a long time to light & needs little more fuel to keep a full pot simmering away than an almost empty one.

However, **is it still worth cooking in bulk on an EPC?**

We compared the cost of cooking 1kg of cereals in one go, as two 500g batches and as four 250g batches.



For quick cooking cereals like ndengu, there's not much of a saving for cooking in bulk (40% or 6KSh). However, with slower cooking cereals like yellow beans, it starts to become worth considering (50% or 12KSh). With the slowest bean, **njahi**, you can **save up to 60%** or **16KSh** by cooking in bulk.



PRICES

This eCookBook is based upon the prices paid by our four cooks in mid-2018 when the cooking diaries study took place in Nairobi. Fuel prices are dynamic & the relative price points of each fuel will be different at different times and in different places.

At the time of the cooking diaries study, the 2018 logging ban had just begun, so charcoal prices had soared to a peak of 150KSh per tin, however the more usual price of 70-80KSh per tin is used here.

For reference, the prices of each fuel are given below:

LPG

Christine: 13kg refill at 2,000KSh (154KSh/kg)

Judy: 13kg refill at 1,940KSh (150KSh/kg)

ELECTRICITY

All cooks: 23KSh per unit

KEROSENE

Judy: 210 KSh for 3 litres (70KSh/litre)

Damaris: 70KSh for 0.6 litres (116KSh/litre)

CHARCOAL

Judy: 180KSh for 4kg (45KSh/kg)

Damaris: 80KSh for a 2kg paint tin (53KSh/kg)*

Christine: 75KSh for a 2kg paint tin (50KSh/kg)*

**actually contains 1.5kg charcoal*

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).

