



**MECS-TRIID Project Report
(Public Version)**

**Enhancing LPG Access for Semi-Urban Populations in
Nigeria**



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Enhancing LPG Access for Semi-Urban Populations in Nigeria

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Executive Summary

The project used two large towns in South-East region of Nigeria (Awgu and Arondizuogu) as pilot cases, to explore the extent to which a fee-for-service delivery model offered through women groups can enhance a wide and sustained adoption of modern energy cooking services based on Liquefied Petroleum Gas (LPG) among semi-urban populations in Nigeria.

With around 78% of its population relying on wood, charcoal, dung, and other traditional biomass for cooking, expanding access to clean and affordable clean household energy services has long been one of the most pressing developmental challenges facing Nigeria. Cognizant of the negative impacts of 'dirty' cooking, successive Nigerian governments and their development partners have made the widespread adoption of clean cooking services a national priority over the last 10 years, but results have remained frustratingly slow. Nigeria produces over 2MTPA of LPG, but consumes an average of 30% of the production volume. With a per capita consumption of just slightly above 2kg, LPG is the least utilized in Nigeria amongst the four major cooking fuels – firewood, kerosene, charcoal and LPG. This rate is lower than several other African countries and explains the high rate of deforestation as well as deaths related to indoor air pollution in the country.

Previous works have established there are four main barriers to LPG adoption in Nigeria. Firstly, a lack of awareness of the health hazard posed by use of firewood and kerosene. Secondly, a perception that LPG is too hazardous and prone to causing domestic fire accidents. Thirdly, lack of affordability of LPG. Here, the main bottleneck is the high initial cost of procuring cylinders especially in semi-urban communities where the income level is very low. Crucially, the ownership of LPG cylinders in Nigeria is vested in the hands of end-users and there is a very limited amount (just about 2.5 million cylinders) in circulation servicing about 30 million households in Nigeria. At the same time, there are no credit facilities or flexible payment plans available to incentivize low income starters. The fourth main barrier is the lack of accessibility as LPG bottling plants are often not located in rural and semi-urban communities. The consequence is that the few households that do use LPG are forced to stack alternative fuels.

The project sought to tackle these four barriers by deploying a novel business model which involves letting members of women groups to access low-volume 6kg cylinder gas stoves and pay for LPG in a 'Pay-as-You-Use' flexible manner while the energy service provider maintains ownership of the equipment and additionally offers targeted awareness and maintenance services. To tackle the issue of lack of accessibility of LPG to rural and semi-rural communities, the project set up exchange centres within the nearest reach of end-users in the two case communities. Exchange centres are like shops where end-users went to exchange filled cylinders with empty bottles. These also provided spaces where participants and prospective users were provided with safety tips on how to use their gas stoves, how to respond to incidents of gas leaks, what to do in the event of fire, and general basic education about cylinder handling. Additionally, the project built the capacities of interested local entrepreneurs and the beneficiary women co-operative groups to develop their own supply lines and service centres in the form of social enterprises. It was expected that the innovative delivery solution combined with locally-tailored campaign and positive group influence of the women cooperative groups will catalyze uptake as well as the affordability and sustainability of supply of LPG to these communities. Throughout the project research data on perception, attitude and behavior change was collected for analysis and publication and policy advocacy purposes.

The project proved extremely successful. The cylinders were hugely oversubscribed with over 500 women indicating strong interest to participate. The beneficiaries in the two communities have successfully transformed into co-operative groups for the purposes of maintaining the exchange centres established. Nearly 100 percent of the beneficiaries say they are delighted to have been involved in the project and would gladly recommend the project to other people. Great opportunity exists for the Nigerian government, the private sector and international development partners to replicate and scale up the model as a way of facilitating access to modern energy cooking services and climate resilient and low carbon development in Nigeria.

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1. Introduction

1.1 Context and Background

The near universal use of traditional biomass cooking in rural and semi-urban populations is a major cause of death, gender inequality, deforestation, and low economic productivity in Sub-Saharan Africa. The project was concerned with how to overcome the barriers against the wide-scale and sustained adoption of LPG for cooking services in Nigeria, and Africa more broadly.

With around 78% of its population relying on wood, charcoal, dung, and other traditional biomass for cooking, expanding access to clean and affordable clean household energy services is one of the most pressing developmental challenges facing Nigeria today. Cognizant of the negative impacts of 'dirty' cooking, successive Nigerian governments and their development partners have made the widespread adoption of clean cooking services a national priority over the last 10 years, but results have remained frustratingly slow. Nigeria produces over 2MTPA of LPG, but consumes an average of 30% of the production volume. With a per capita consumption of just slightly above 2kg, LPG is the least utilized in Nigeria amongst the four major cooking fuels – firewood, kerosene, charcoal and LPG. This rate is lower than several other African countries and explains the high rate of deforestation as well as deaths related to indoor air pollution in the country.

Previous works have established there are four main barriers to LPG adoption in Nigeria. Firstly, a lack of awareness of the health hazard posed by use of firewood and kerosene. Secondly, a perception that LPG is too hazardous and prone to causing domestic fire accidents. Thirdly, lack of affordability of LPG. Here, the main bottleneck is the high initial cost of procuring cylinders especially in semi-urban communities where the income level is very low. Crucially, the ownership of LPG cylinders in Nigeria is vested in the hands of end-users and there is a very limited amount (just about 2.5 million cylinders) in circulation servicing about 30 million households in Nigeria. At the same time, there are no credit facilities or flexible payment plans available to incentivize low income starters. The fourth main barrier is lack of accessibility of gas as LPG bottling plants are often not located in rural and semi-urban communities which means that even the few rural dwellers that are interested in using gas face the challenge on making long journeys to neighboring communities to refill their cylinders. The consequence is that the few households that do use LPG are forced to stack alternative fuels.

1.2 Aims of the project

The overarching aim of the project was to catalyze the wide-scale and sustained adoption of LPG in semi-urban populations in Nigeria by addressing some of the key barriers against LPG usage in semi-rural communities in Nigeria. Using two large towns in South-East region of Nigeria – Okpanku in Aniniri Local Government, Enugu State, and Arondizuogu in Ideato Local Government, Imo State – as pilot cases, the project sought to establish the extent to which a fee-for-service delivery model offered through the communities' women groups can enhance a wide and sustained adoption of modern energy cooking services based on Liquefied Petroleum Gas (LPG) among semi-urban populations in Nigeria.

1.3 Objectives of the project

The specific objective of the project was to test the efficacy of a novel LPG business model that combines new ownership structure of cylinders, a flexible payment plan enabled by new technologies, awareness campaign, and positive group influence of women groups. Additionally, we aimed to build the capacities of interested local entrepreneurs and the beneficiary women co-operative groups to develop their own supply lines and service centres in the form of social enterprises. Accordingly, the project had the following objectives; to:

- Overcome the barrier of affordability of gas cylinders through an innovative gas cylinder ownership structures and business model.
- Enlighten the communities on the dangers of traditional dirty cooking
- Enlighten the communities on the benefits of adopting modern cooking services with an emphasis on LPG.
- Gain deeper understating of the particularities of the barriers against LPG adoption in South East Nigeria using based on the two pilot cases.
- Gain deeper understanding of household cooking ecosystem and dynamics in rural communities in the South East based on the study of the two pilot cases.
- Provide product use support services that will help the women to make and sustain the transition to the use of LPG cylinders.
- Leverage the power of positive group influence to catalyse LPG adoption and sustained use in the two pilot communities.
- Overcome the barrier of access by establishing gas cylinder exchange centres in the two pilot communities.
- Support the women to set up cooperatives or social enterprises that will develop their own supply lines and service centres to ensure the sustainability of the project.
- Widley disseminate findings from the project and feed lessons learnt to the national policies and initiatives on clean cooking transition.

2. Methodology

2.1 Key Steps and Approaches

The project sought to tackle the aforementioned barriers to LPG adoption in Nigeria by combining a number of change inducing strategies and approaches. A key aspect involved deploying a novel business model which entailed letting members of community women groups to access low-volume 6kg cylinder gas stoves and pay for LPG in a 'Pay-as-You-Use' flexible manner while the energy service provider maintains ownership of the equipment and additionally offers targeted awareness and maintenance services. A second step involved targeted campaigns and advocacy to enlighten the two communities on the dangers of traditional open fire cooking and the benefits of modern energy services especially the use of LPG gas cylinders. The campaign and advocacy made use of local imageries, narratives and discourses to ensure that the messages were effective. It also involved the use of local people of influence, pastors, teachers, traditional rulers, etc in the form of LPG champions. A third strand involved the provision of product support services to help the women beneficiaries get acquainted with the use of the LPG cylinders and to address any issues of concern.

Furthermore, the approach also involved the provision of cylinder exchange centres in the communities to help overcome the barrier of women having to travel a long distance to refill their cylinders as well as advisory services to enable the women groups to set up social enterprises dealing in LPGs as well as for brand franchising to interested entrepreneurs. The expectation was that the combination of innovative delivery solution with locally-tailored campaign and positive group influence of the women cooperative groups will catalyse the uptake as well as ensure the sustainability of supply of LPG to these communities. Throughout the project research data on perception, attitude and behaviour change was collected for analysis and publication and policy advocacy purposes.

Low volume (6kg) cylinders and accessories were made available to participants on two different options. The one was a borrow-and-use basis where women could keep the cylinders for as long as they wanted provided they are topping up fuel from the energy service provider who maintained ownership of the cylinder. The other was a 'mortgage-type' basis where women could start to use the LPG while paying towards the eventual ownership of the cylinder on instalment basis. In both cases, our project partner, Techno Oil, offered to provide regular maintenance services on the cylinders (e.g. change of valves, rubber seal, periodic pressure testing and re-qualification) as part of the benefits of membership to the scheme. This model borrows from the Cylinder Deposit Scheme (CDS) operated by Total PLC in Lagos Nigeria which had an outstanding success with several thousand households participating in the scheme. Unlike the CDS, which used 12kg cylinders, we focused on 6kg cylinders because the price of 6kg cylinders are cheaper compared to the 12kg and so families that choose to get the cylinders on a 'mortgage basis' could reasonably hope to pay off their 'mortgage' over a period of two years.

As noted, the proposed model also involved the localization of exchange centers within the nearest reach of end-users. Our Partner, The localization of exchange centers in semi-urban communities is not yet a widespread practice in Nigeria with emphasis so far focused on urban and peri-urban centers. Makeen Energy is currently practicing the model in Cameroon and claims it has helped to raise the adoption level of LPG from 15% to over 40% in case study locations. KopaGas Pay-As-Go/Cook Service in Tanzania is another example of success which relied in combing a borrow-and-use cylinder model with smart technology to make LPG affordable, accessible and available to low income earners. Telecom and electricity

distribution companies in Nigeria are using smart and prepaid meters to allow for pay as you can/use.

The third aspect of innovation involved leveraging the co-operation and support of women groups in the two project communities to gain penetration and trust for LPG use as well as reinforce positive group influence and project ownership. To ensure long term sustainability and ownership these groups were supported to create a social enterprise. Moreover, opportunity was given to interested local entrepreneurs to develop their own supply lines and service centres. We appointed influential members of these organizations and opinion leaders within the communities such as the village headmistresses and wives of traditional rulers as LPG Champions to act as LPG champions. It was envisaged that LPG champions will play a central role in getting the buy-in of the co-operative groups, in mobilising the communities for the initial awareness campaign and in sustaining momentum of promotional campaigns and advocacy beyond the project lifespan to enhance sustainability.

. Our hypothesis was that deploying our novel Positive Group Influence [PGI] business model combined with the borrow and use model and flexible Pay-as-You-Use manner enabled by metering sales and instalment payments as well as targeted awareness campaigns has manifest potential to simultaneously tackle the four major barriers against the wide adoption of LPG in Nigeria and indeed Africa.

Techno Oil in 2013, worked with Onyigbo Market Women Association, Traditional Chiefs and Faith-based women groups in Ebutemeta and Onyigbo on LPG adoption campaign. 160 women were given cylinders with complete accessories each by Techno Oil for free, and over 1,000 women switched to LPG in the course of the campaign.

The two communities were chosen because each has an LGP filling station within a 3km distance. It was necessary to ensure availability of LPGs to the local service centres to avoid so beneficiaries could refill their cylinders promptly when needed. Furthermore, anecdotal evidence shows that the two communities also have a sizable population that are able to afford the fuel if the cylinders are provided under the scheme described above.

2.2 How the idea was generated

The application was a product of co-production process between the partners. There was some input from some women in the two communities. Mr Stanely Ijeoma of Schrödinger Technology also made substantial input into the project conceptualization although he could not be included as a project partner because of the number limitation (maximum of partners) set by MECS. The Centre for Climate Change and Development – a new and dynamic research think-tank based at the Alex-Ekwueme University in Nigeria – coordinated the project application process, leveraging the experience of the Director, Professor Chukwumerije Okereke. The Centre sought and pulled in credible researchers and project research assistants [PRAs] to form a strong group of project implementation team with complimentary expertise, skills and experience. The Centre also provided strong international research quality and project management skills that enhance conceptualization of the project, the knowledge management and the capacity of the other two official project partners.

Techno Oil Limited is one of Nigeria's biggest indigenous LPG companies with capacity to locally manufacture LPG cylinders for both local consumption and export. They provided specialised knowledge on LGP distribution, marketing, sales and servicing which will be of value to the other project partners as well as the target communities.

Africare is a foremost NGO that is deeply involved in several sustainable development campaigns in favour of vulnerable groups and marginalized demography with a focus on clean cooking and achievement of bottom of the pyramid empowerment programs via increased LPG adoption in Nigeria. They contributed specialised knowledge on community engagement and behaviour change communication which has benefitted and enhanced the capacity of the rest of the project partners.

2.3 Intellectual Property Rights

There are no intellectual property right implications arising from the project.

2.4 Assumptions made

Project was deemed to have a low risk profile due to the flexible nature of the business model and the extensive experience of the team working in the chosen localities. It was assumed that targeted advocacy, positive group influence and the enlistment of the (non-financial) support of influential clergy, traditional rulers and local government administration will help to overcome the negative perception among the communities that the use of LPG is unsafe. It was further assumed that the knowledge the project team have of the two communities will translate into a good working relationship with the women groups which will help to make the project a success.

3. Implementation

3.1 The work conducted

The project commenced with trust building among the project partners. Meetings involved the sharing of expectations, clarification of method, approaches, timelines, deliverables, reporting processes, and management structures among others (see Appendix A). Following these meetings, partners drafted and signed MOUs. Next, the project team embarked on visits to the two pilot communities to build trust with, and sensitive the women groups and the wider communities about the project. Leaders of influence including pastors, traditional rulers, teachers, were identified and engaged well in advance of the physical visits. Some of these community leaders helped to organise the visits and participated actively in the meetings. This helped to confer strong legitimacy to the project. A key agenda in the initial visits was the formation of project committees comprising respected women to help manage the project and serve as liaison between the women groups and the project team. The initial meetings revealed very quickly that there was a need to recruit Research Assistants that will live among the women and provide hands on support with the delivery of the project. Following this, adverts were placed in local church newsletters, village squares and social media. Subsequently four enumerators – two in each of the communities were recruited to help with the administration of survey questionnaire, the mobilisation of the women, training, information dissemination, and now the planning of the open-air launch and the provision of post cylinder distribution product-use services. This proved to be a great decision. It meant that the women enjoyed plenty of visits from the project team, received plenty of training and support, and had any concerns addressed promptly.

The phone numbers of the project committee members and leaders were collected. The phone numbers of the champions in the two communities were also collected. The project team interacted regularly with the project committee members and especially their leaders. Interaction with the key champions in the two communities (a Revered Father and Parish Priest in Arondizuogu and a Chief in Okpanku) is also very regular.

The project team conducted two rounds of survey in the course of the project. A baseline survey was conducted very early on in the project (soon after the initial project sensitization visit) to ascertain key demographic information from the two communities. The survey showed that the average age of the potential beneficiaries was approximately 46 years; the average household had 5 members and earns about 13,700 (Nigerian Naira) (GBP30) per month (The distribution of the monthly income of beneficiaries in the two communities is presented in Appendix B). The survey also revealed that the average years of educational attainment in the sample is 8 years; and about 80 percent of the respondents are married (See Table 1 Below).

Variable	Mean or Percentage	Standard Deviation
Education (years spent in school)	8.43	4.76
Gender (Dummy)		
▪ Male	01.29%	
▪ Female	98.71%	
Age (years)	45.74	14.03

Marital Status (Dummy)		
▪ Single	3.44%	
▪ Married	79.85%	
▪ Widowed	16.46%	
▪ Separated	0.25%	
Household Size (Number of persons)	5.96	2.73
Monthly Income (Naira)	13,737.77	14,840.39
Member of Cooperative Society (Dummy)		
▪ Member	89.98%	
▪ Non-member	10.02%	
Access to Credit (Dummy)		
▪ Access	5.90%	
▪ Non-access	94.10%	
Kitchen enclosed indoors in the living area with partition (Dummy)		
▪ Yes	48.89%	
▪ No	51.11%	
Separate indoor kitchen outside the living area (Dummy)		
▪ Yes	83.78%	
▪ No	16.22%	
Do you have open air kitchen outside the living area (Dummy)		
▪ Yes	86.24%	
▪ No	13.76%	
Sample Size (N)	407	

Note: The monetary values are denominated in Nigerian Naira (NGN). \$1 = NGN305

Table 1. Demographic characteristics of the respondents

With regards to the household kitchen characteristics, 48 percent of the respondents have kitchen enclosed indoors within the living area with partition; 83 percent of the respondents have kitchen separated from the living area; while 86 percent have open air kitchen outside the living area.

Table 2 is a frequency distribution table which reports results of the main sources of cooking fuel in rural communities under study. The major source of fuel in the communities studied is fuelwood, which represents 96.81 percent of the total source of fuel for cooking. The other minor sources of fuel are kerosene, LPG and charcoal, which represent a 1.97, 0.74, and 0.49 percent, respectively.

Table 2. Main source cooking fuel

Main Source	Frequency	Percentage
Fuelwood	394	96.81
Charcoal	2	0.49
Kerosene	8	1.97
Liquefied Petroleum Gas	3	0.74
Total	407	100.00

The survey showed that the average daily quantity of wood used in the two communities was 3.49kg (Appendix C); average number of times meal is prepared daily was three (3) (Appendix D); and average time spent in cooking on daily basis (in minutes) per household was 110.16 (Appendix E). The typical meals cooked in the two communities are native soup and garri, fufu (fermented cassava), boiled yam, cocoyam, yam porridge, and beans. It takes an average of 35 minutes to prepare each of these meals (for an average family). Rounded metal pots are the popular choice of cooking ware and none of the women raised any issue or expression of dissatisfaction with metal pots.

Furthermore, the baseline survey confirmed that accessibility of gas refill station; a sense that LPG and its accessories are expensive and the perception that cooking with gas is hazardous as the three main reasons why women in the two communities general shun the use of gas for cooking (see Table 3 below). It was found that a vast proportion of women in the two pilot communities as a general practice do not spend money on buying wood but collect the firewood they need for cooking from nearby bushes and forest. The very few that said they spend on charcoal, kerosene and wood noted that this happens periodically and estimated that the amount 1000 naira (GBP 2.17) a month.

Table 3. Reasons for not using LPG

Reason	Mean
Refilling LPG is expensive	2.52*
LPG cylinder and its accessories are expensive	2.59*
LPG is highly flammable and can constitute hazard	2.60*
Supply of LPG is uncertain	2.53*
Point/location of refilling LPG is far from my home	3.29*
Foods cooked with LPG are not tasty	2.35
Cooking with LPG takes longer time than other fuels	2.33
Method of preparing our meals require cooking with fuelwood than LPG	2.44

Note: *important reason

At the same time that the survey data was being obtained, the project team engaged with and received several valuable advices from the women leaders, committee members, and the LPG champions as well as directly from the women during the project meetings. The feedback received from the women was incorporated in several key decisions including the design of the campaign/advocacy materials, the choice of the days of visit, the location of the exchange centres and the planning of the open-air project launch among many others. One of the things that became obvious from the series of consultations with the women was that there was an overwhelming preference for the option of receiving the cylinders on a use and pay basis (the rent option) while the pay and own (mortgage) option did not receive support. The beneficiaries cited lack of money as the main reason why they preferred the rent option. For this reason, it was decided to distribute all the cylinders on use and pay basis. However, each of the beneficiaries paid 3,000 (GBP 6.50) for the initial filling of the gas cylinders.

In preparation for the open-air project launch the project procured 150 cylinders (6kg) from the technical partner, Technoil. These were delivered to gas filling plants closest to the pilot communities. The period before the project launch witnessed a very intensive interaction with the two local communities mostly through the leaders of the women groups. This proved very helpful in planning the open-air launch. It helped tremendously that there were RAs on the ground. This made discussion and agreement on several issues - date of launch, venue of launch, dispatch of invitation letters, programme for the day, refreshment, hiring of chairs and canopy, arrangement for the dance groups, etc - very smooth. The open-air product launch was very successful featuring women dance groups, rally, gas cylinder handling and safety demonstration, and testimonies from some project beneficiaries (See Appendix F).

The next phase of the project involved post distribution support, training, monitoring and evaluation. It also involved the establishment of "Exchange Centres" in the two project communities as well as the establishment of protocol and register in the two exchange centres to document the frequency of exchanges of cylinders (See Appendices G and H). Other activities included providing supporting services to the women steering group to help them transform to a social enterprise and reaching out to policy makers to promote project and explore options for scale up. The final phase involved visit to the two communities to offer (re)training on safety and cylinder maintenance. The phase also involved the administration of survey and holding focus groups to get feedback from the women on various aspects of the project.

Knowledge management targeted at local communities was provided throughout the lifecycle of the project. Communities learnt about the negative impacts of tradition cooking, the benefits of switching to LPG and the how to maintain their cylinders.

3.2 Any challenges faced and their resolution/mitigation

The scale of enthusiasm and engagement of the women took the project team by surprise. Despite repeated communication stating that there were only 75 cylinders available for distribution in each of the communities; the two women committees came under intense pressure from their members and indeed from the rest of the villagers to be included on the list of beneficiaries. In one of the project communities, the group caved in and pencilled the names of 130 women as potential beneficiaries. This almost caused confusion when on the project launch day with a large number of women dancing around and announcing their expectation to profit from the scheme. In the end the project team managed the situation working with the women groups. However, despite a clear and transparent selection process agreed to by everyone, those that did not receive cylinders at the end of the day were very bitter and disappointed.

Following an envisaged increase in the use of cylinders during the festive season (December/2019/January 2020) the RAs went from door to door to provide product services. They (the RAs) reported that in the two communities, they were met by women (non-beneficiaries) who were still "clamouring and saying they were patiently waiting for the next phase of the project to get their own cylinders and enjoy the same services as their neighbours". It is hard to see what could have been done differently except perhaps a bit more of tireless repetition as a way of improved expectation management.

The RAs reported that a few of the cylinders had developed faults especially with their valve system but these were promptly addressed to the satisfaction of the women. A full report on these faults was compiled and promptly communicated to Technoil the technical partner of the project and they (Technoil) offered valuable technical advice.

3.3 Inclusion: gender and equity issues

The project is devoted to increasing the adoption of modern cooking devices and services in two semi-rural communities in the South East of Nigeria. The focus and primary beneficiaries of the project in the two communities are women groups. The project team have so far engaged over 400 women from the two communities. The women groups have been fully included in the design and implementation of the project. There was several face-to-face meetings and telephonic interaction with the women leaders and the local project committee members.

3.4 The project findings and implications

The project revealed gross lack of awareness about the negative health, environmental, and climate related impact of traditional open-air cooking and the many advantages of transiting to modern cooking services. Given the rate of adoption and frequency of usage, it can be assumed that the project is leading to improved health and economic empowerment of the women. We found that that campaign, awareness creation, and advocacy is critical to ensuring the success of similar interventions in the future.

We found that while the women were touched by the impact of open fire cooking on the environment – contribution to deforestation, climate change, soil leaching and erosion, it was the information on the (potential) health impact of indoor smoke inhalation that ‘grabbed’ the women the most. Many confessed that they had been having eye problems and wondered whether this may be connected to indoor air pollution. Realising these we, highlighted the health risks of indoor open air cooking a bit more in subsequent communication, meeting and advocacy materials. The lesson here is that future programs of this kind must avoid copying universal broad messaging but seek to understand the risks and disadvantages of traditional open-air cooking which resonates the most with the target communities.

Although we suspected this from the outset, the use of community groups proved to be a very effective approach on many fronts. It made the mobilisation of the women easy. It helped in establishing clear communication channel with the communities and the beneficiaries of the project. It made the entire project management stress free. We also found that people of influence in the two communities play major role in helping the women and the entire communities to embrace the project. The trust and legitimacy gained through the endorsement and participation of these ‘champions’ and change agents, made it easier to convince many women who have long held the view that LPG is dangerous to agree to give it a try. Our survey showed that in Arondizugo, what women liked most about the project was the honesty and transparency with which the project was executed (Figure 1 below) while Okpanku in most the popular reasons given by the women were the clean cooking services which they were exposed and the proximity of the exchange centres.

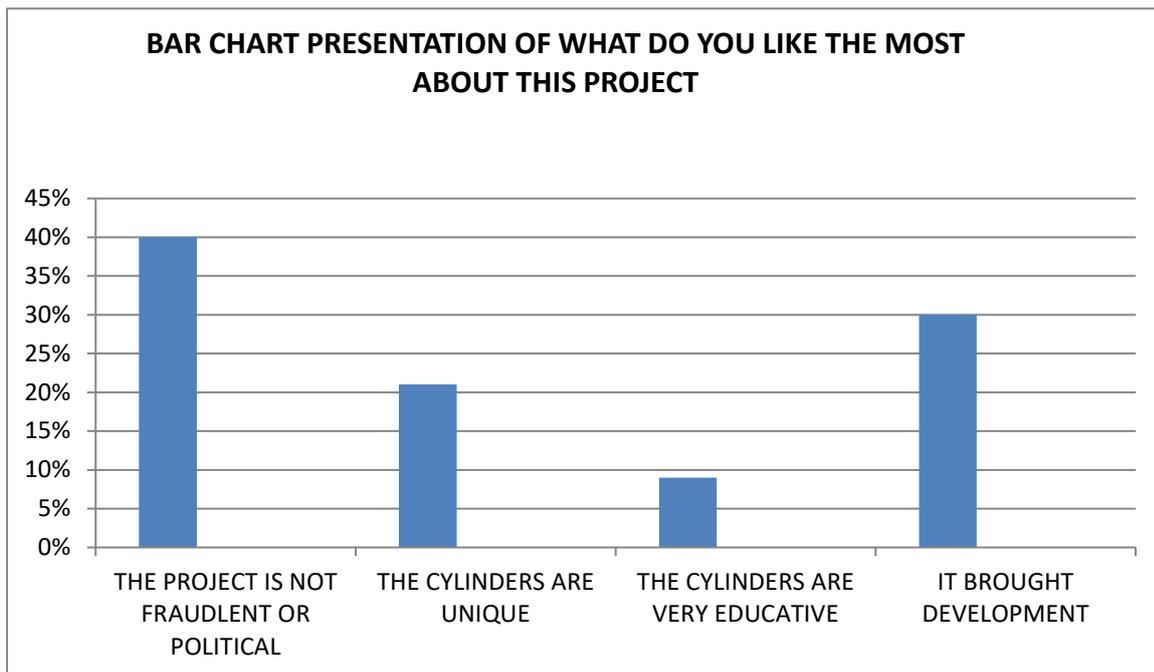


Figure 1: Bar Cart showing what women liked the most about the project in Arondizuogu

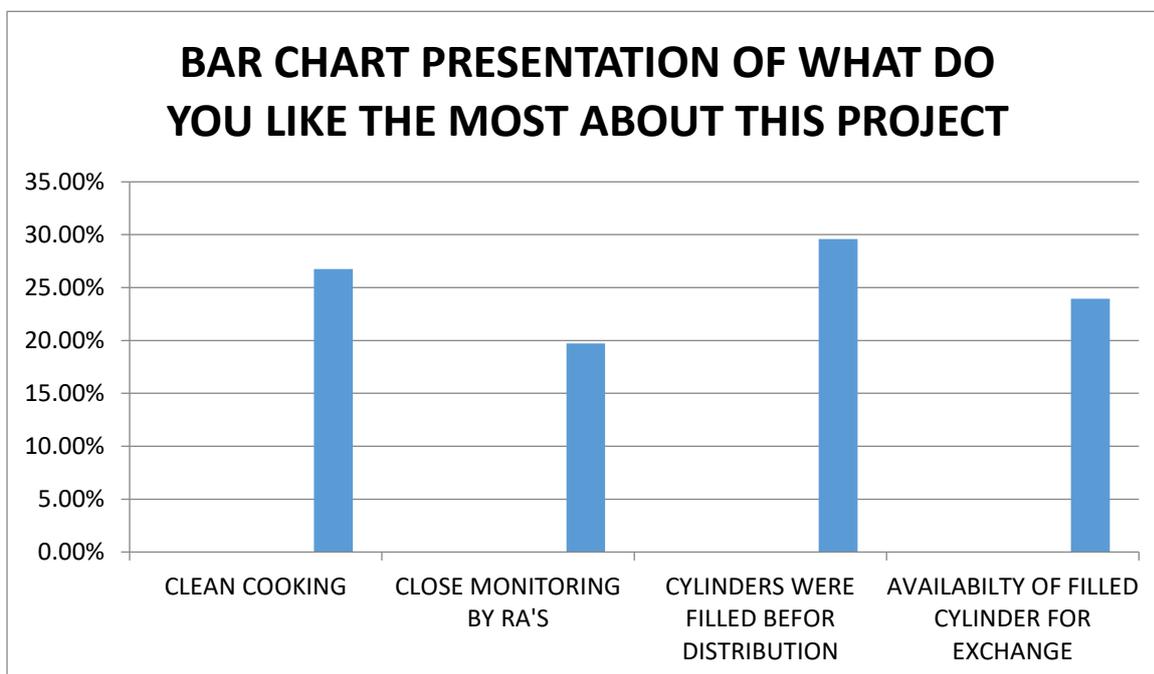


Figure 2: Bar Cart showing what women liked the most about the project in Okpanku

Our survey showed that the least liked thing about the project was the short project duration (in Okpanku) (Figure 3 below) and that many subscribers were unable to benefit from the project (in Arondizuogu) (Figure 4)

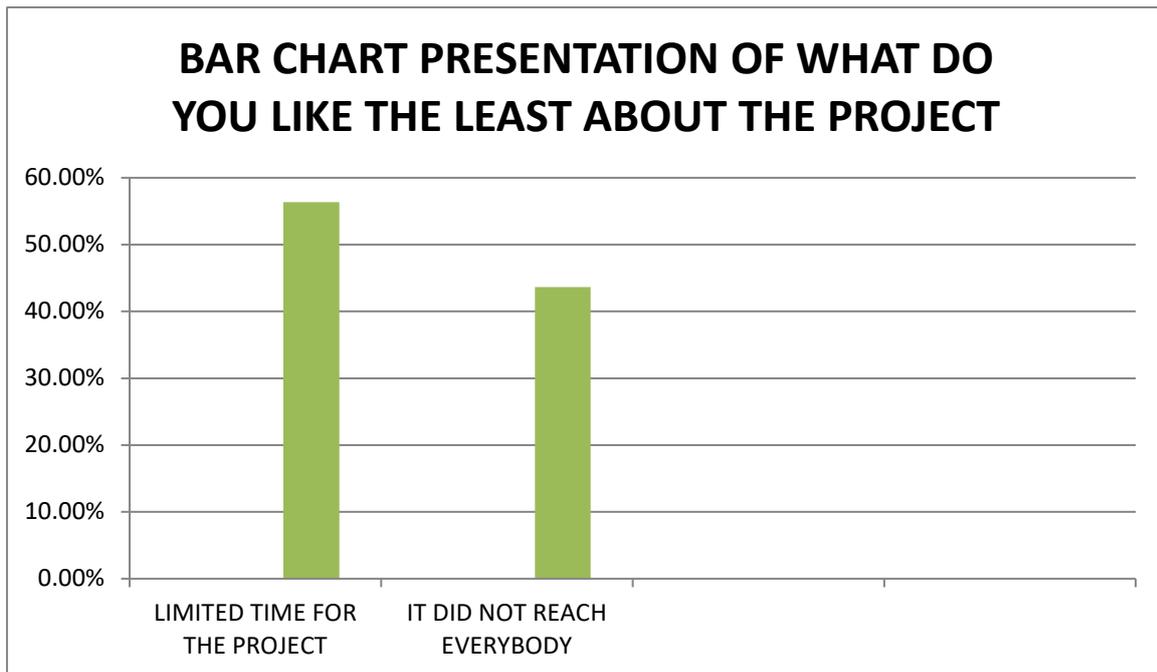


Figure 3: Bar Chart showing what women liked the least about the project in Okpanku

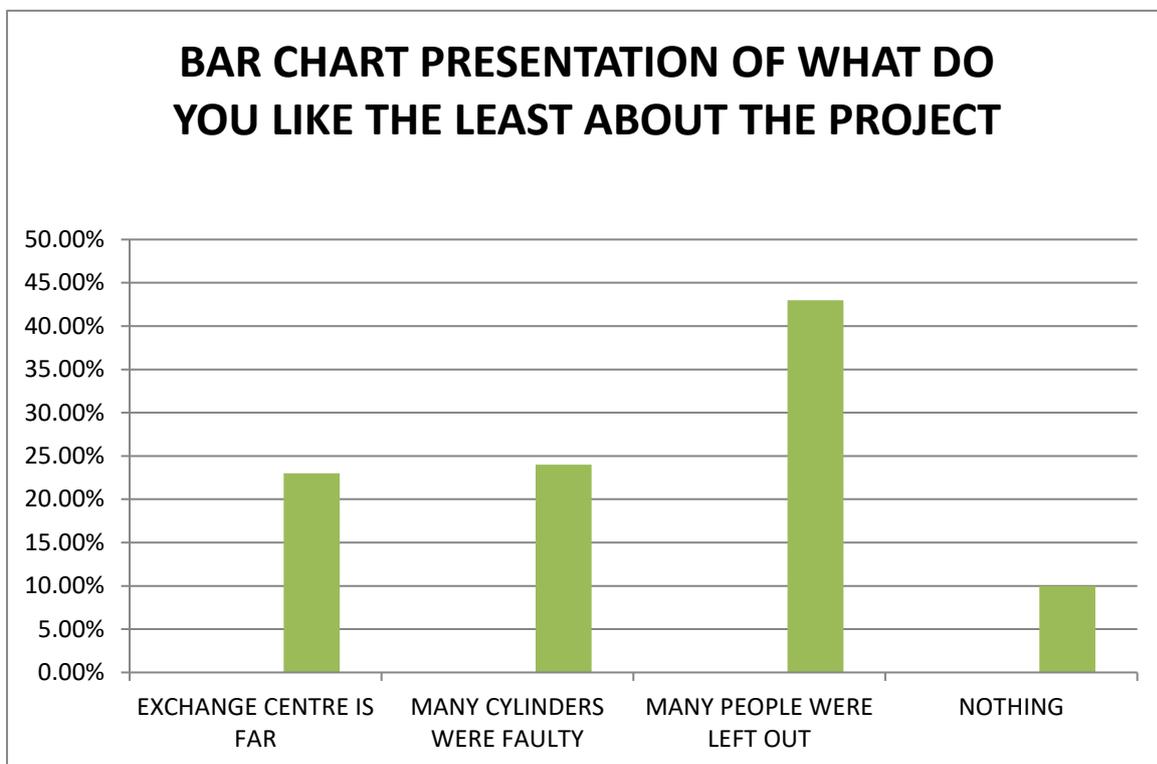
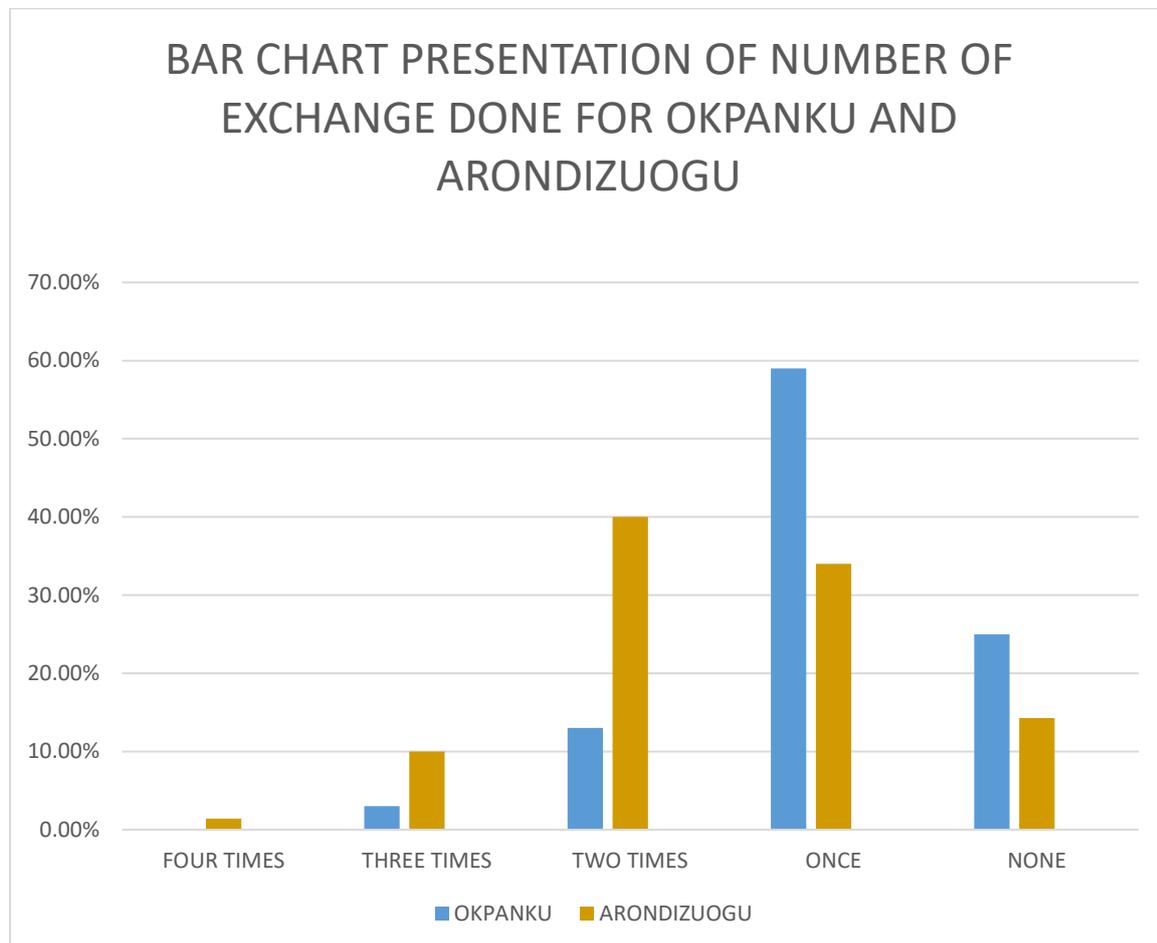


Figure 4: Bar Chart showing what women liked the least about the project in Arondizuogu

The figure below shows the number of exchanges done by the women in both communities. The chart above shows that 0(0%) of the beneficiaries from Okpanku has gone for exchange four times and in Arondizuogu 1(1.4%) of the beneficiaries has gone for exchange four times.



The figure shows that (3%) of the beneficiaries from Okpanku has gone for exchange three times and in Arondizuogu (10.0%) of the beneficiaries has gone for exchange three times. The records show that (13%) of beneficiaries from Okpanku has gone for exchange two times while the number in Arondizuogu was (40.0%). Records show that 59% of the beneficiaries from Okpanku has gone for exchange once while in Arondizuogu 24(34%) of the beneficiaries has gone for exchange once. 25% of the beneficiaries from Okpanku are yet to go for exchange compared to 14.3% in Arondizuogu.

Overall, the record shows that about 75% of beneficiaries in Okpanku and 91% beneficiaries in Arondizuogu had gone to exchange (refill) their gas cylinder within the three months (from the time of distribution of cylinders to the time of data collection. This is hugely impressive for women that earn average of (GBP 30) a month and that have not been used to paying anything for their cooking fuels.

We would consider that the project has proved extremely successful. The cylinders were hugely oversubscribed with over 500 women indicating strong interest to participate. The beneficiaries in the two communities have successfully transformed into co-operative groups for the purposes of maintaining the exchange centres established. All the beneficiaries (100

percent) in Arondizuogu said they are delighted to have been involved in the project and would strongly recommend the project to other people (Figure 5). In Okpanku 95.77% of the women said they will strongly recommend LPG to other women in the community because the benefits of cooking with LPG is much. 4.23% of the women said they will recommend it but not so strong because the use of LPG requires carefulness and some people can be very careless.

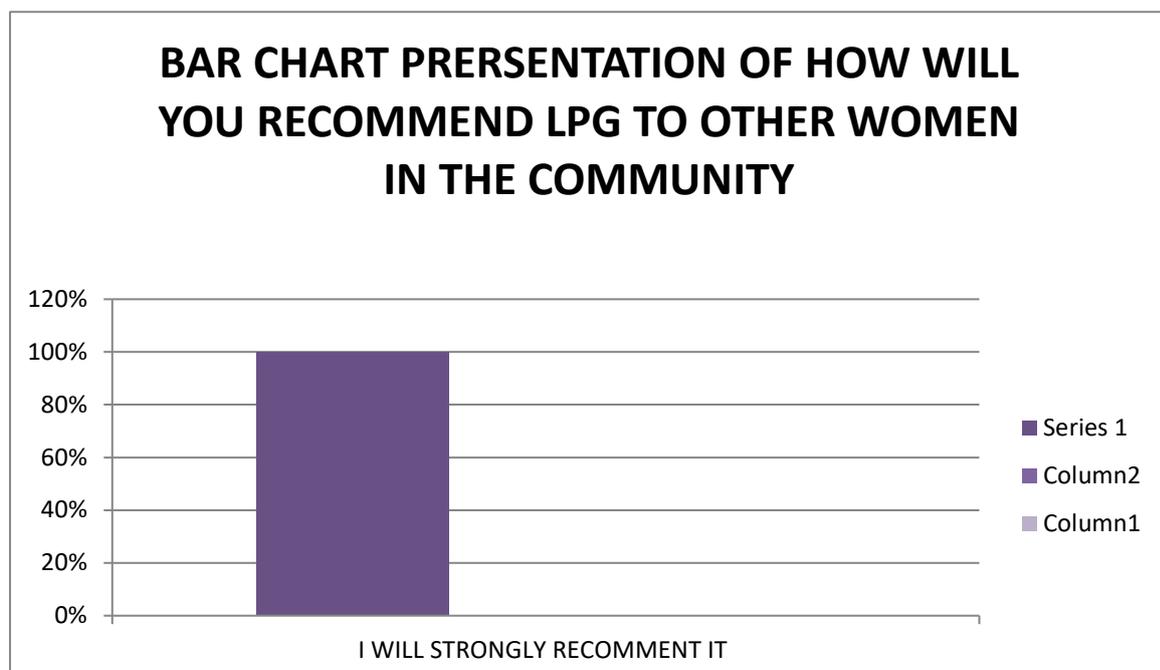


Figure 5: Bar Cart showing the percentage of beneficiaries that said they would strongly recommend the project in Arondizuogu

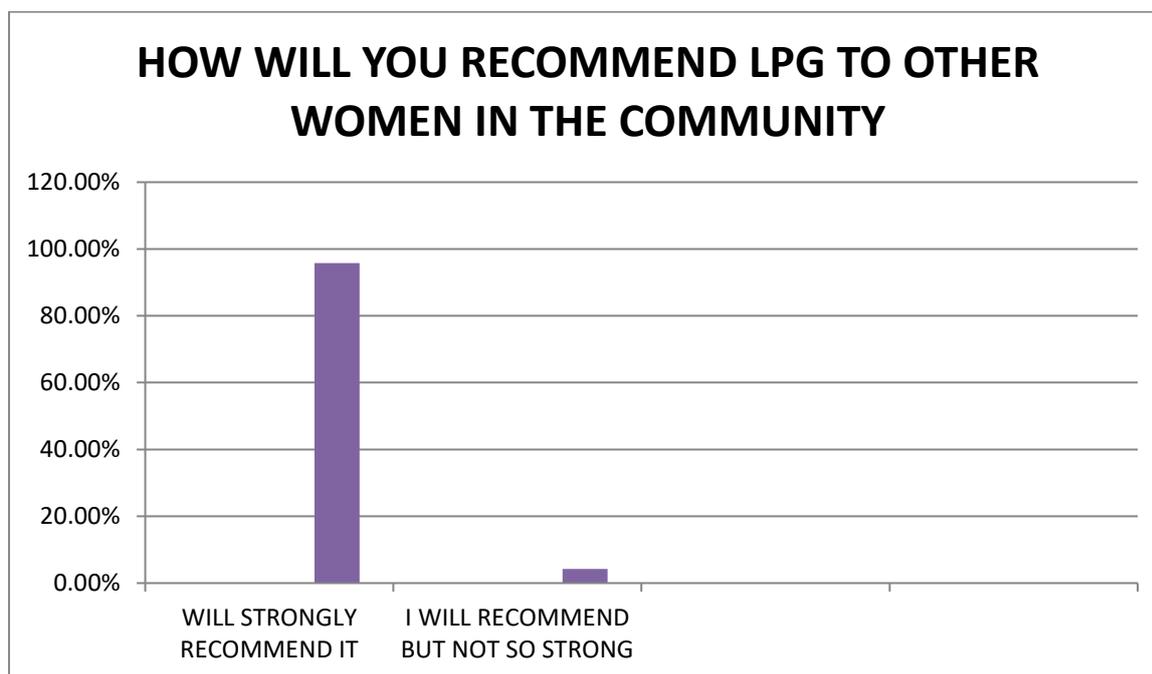


Figure 6: Bar Cart showing the percentage of beneficiaries that said they would strongly recommend the project in Okpanku

Despite strong willingness and determination by the women to embrace the use of LPG it remained apparent that lack of financial capacity is a big barrier for against the continuous use of the LPG cylinders. After the euphoria of collecting the cylinders for free and only having to pay for the gas died down, there were many women that began to complain about not having money to refill their cylinders as regularly as they would love to. While the project found a few women that made a complete transition from open air cooking to the use of the cylinders, the vast majority continued to use wood in addition to the gas. This practice of fuel stacking is well documented in the literature. Many said they used the LPG when they were in a hurry, tired, and when they are doing light cooking such as warming food. They admitted that they resorted to the use wood when they were doing ‘heavy’ cooking (by which they meant cooking local soup or beans which lasts about 40mins),and when it feels to them that the cylinder may soon be running out of gas.¹

Our pilot case provides evidence that the LPG Cylinder re-circulation model which is currently receiving huge attention from the Federal Government of Nigeria can succeed in semi-urban and rural communities in the South East Nigeria. The project provides evidence that the removal of the initial upfront payment for cylinders could make the use of gas cylinders attractive to low income women. As noted, the women identified lack of money as one of the main reasons while they were averse to the use of gas cylinders. It is therefore very remarkable that a vast proportion of them refilled at least even though a vast proportioned of them (83%) refilled in within three months. From interacting with the women (and give that the one refill at GBP 6.50 represents about 22% of the average income of the women) we are under the impression it would be a game-changer if government could find the means and

¹ We did not specifically ask them how they check to know that the gas may be running out but the common practice is to lift to feel the weight and sometimes to shake.

political will subsidize the cost of LPG gas especially for the marginalised groups in the country. However, one cannot rule out the possibility that many rural poor women may well still be able to afford to gas if they could muster the discipline to save or anticipate the bulk purchase of a cylinder refill. We are of the strong impression that the quality of the advocacy provided played an important role in encouraging women to give the gas cylinders and would strongly recommend a locally sensitive enlightenment campaign as key component of future LPG use enhancement projects.

The engagement from the women has been superlative – almost overwhelming but we have to wait and see whether the model works and especially the role of the co-operative and peer groups in enhancing access.

3.5 Limitations of the innovation/approach/design/system

There were no obvious limitations of the innovation, approach or project design. The project has been an outstanding success on all fronts. The only downside has been the limited number of cylinders compared to the number of women interested in participation in the scheme. Then again, this has always been intended to serve as a pilot project to test how successful the innovation might be. Now that it is proven that the innovation is a success it is hoped that Technoil, donor agencies, government actors (all levels), and other stakeholders would see the need to scale up the scheme.

4. Practical Applications of the Concept to the National Cooking Energy System (including costs)

Nigeria had made great but failed attempts with huge financial investments trying to introduce an improved energy efficient cook - stoves under the National Cook Stove Programme. The biggest of such failures is the National Clean Cookstoves Project awarded by the Goodluck Jonathan administration in 2011 at a whopping cost of NGN 9, 200, 000, 000 [Nine Billion Two Hundred Million Naira Only].²

The Federal Ministry of Environment (FME), the Energy Commission of Nigeria (ECN) and other Federal entities and State Governments have led interventions in the clean cooking energy sector such as the National Clean Cooking Scheme. In 2016, at the Nigeria LPG Association conference, Vice President Yemi Osinbajo, reeled out the administration's gas policy. According to him, the gas policy aims at stimulating a gas-based industrialisation. This is a noble goal, but the low LPG penetration is worrisome and needs to be addressed very quickly. This project 'Enhancing LPG access in semi – urban population in Nigeria' has turned to be the icing of the cake with great economic importance. With the success recorded in this pilot phase, efforts will now be geared toward scaling up the project, expanding its beneficiaries and then influencing policy makers cum government agencies into adopting the project as a national cooking energy system with provisions in national appropriations. This can only be possible (especially with the idea to enhance the accessibility, affordability and acceptability of LPG) when there is a regulatory framework that supports the usage of LPG by all. This would entail having a more favourable LPG pricing policy. As it was observed that despite strong willingness and determination by the women to embrace the use of LPG it remained apparent that lack of financial capacity is a big barrier for against the continuous use of the LPG cylinders. It may be required that a price subsidy should be introduced on LPG. The LPG subsidy can also be less burdensome on the government if it targets only low-income households.

A key practical application of the success of this project is the reality of the project development-based project delivery model having far higher chances of success and sustainability than the procurement-based project delivery model which is always fraught with irregularities, illegalities and inefficiencies as amply demonstrated by the failed NGN 9.2 billion national clean cooking project which has woefully failed to deliver anticipated sustainable development impacts. This is a major take-away from the success of our MECS-TRIID project

² <https://www.premiumtimesng.com/news/more-news/221460-reps-investigate-jonathans-n9-billion-clean-stove-project.html>

5. Next Steps

The overwhelming over subscription and success of the project has made its scale up a local, national and global imperative considering the manifold development benefits the project delivers for all stakeholders. To this end, some discussions have been had with a number of government departments like the National Assembly, Ministry of Niger Delta Affairs, Ministry of Environment and Ministry of Petroleum Resources. There are also plans to approach African Development Bank, EU, and other international donors with an application for project scale up. A draft outline application has been developed for TETFUND and PTDF Nigeria as well. These are targeted strategies in reaching out to policy makers and key stakeholders to promote the project and explore options for scale-up to accommodate more women in more communities.

As part of strategic engagement with critical stakeholders of the LPG Policy Dialogue for a, we will be organizing periodic project report dissemination workshops where we will be engaging and communicating to the key policy stakeholders the outcomes and recommendations from this pilot project.

More proactive advocacy measures shall be adopted to engage the Nigeria Government towards the operationalization of Nigeria's National Gas Policy of which the National LPG Policy is a part of the document and an act of the parliament which will eventually give a legal framework to private sector investors. LPG Pricing Policy to support sustainability shall also be projected through progressive partnership engagements.

6. Dissemination Plan

The project team has sought to disseminate the project activities as widely as possible. Project team members have committed to continue to leverage their media contacts to pursue engagements on national TV platforms towards influencing discussions around the MECS-TRIID LPG project in particular and clean cooking in general. So far, we have disseminated the project through the following medium:

- Oil and Gas news channels reported the visit of the project team to Techno Oil headquarters in Lagos and the meeting with Chief Executive Officer of Techno Oil, Mrs Nkechi Obi (see Appendix A).
- We attended the MECS event in Kenya – represented by Mr. Stanley Ijeoma
- We have continued to post news and updates on the project on the Face book page of the Centre for Climate Change and Development Alex Ekwueme Federal University and other social media platforms.
- We had the project launch covered by three national media houses – including print and TV (see Appendix F)
- We had project launch news report aired on national prime television time via the Nigeria Television Authority [NTA] and African Independent Television [AIT].
- Project was also mentioned during live national television primetime interviews by Prof. Okereke and Stanley Ijeoma on Arise TV News and Good Morning Nigeria Breakfast TV on NTA
- We hope to get the news reported on other national stations like Channels Television and Television Continental [TVC] News, etc.
- We sent a report on the project to one national online print media and it was published as sent.

<https://majorwavesenergyreport.com/lpg-adoption-british-aid-agency-gives-grant-to-techno-oil-alex-ekwueme-varsity-1-other/>

<https://phenomenal.com.ng/business/british-aid-agency-gives-grant-to-techno-oil-alex-ekwueme-varsity/>

<https://www.vironewsigeria.com/clean-cooking-rural-women-get-gas-cylinders-from-ekwueme-varsity-centre/>

<https://www.businessamlive.com/two-south-east-communities-gain-from-ukaid-ae-funai-techno-oil-africare-lpg-access-project/>

<https://www.pressreader.com/nigeria/business-a-m/20191202/282127818338080>

<https://guardian.ng/property/environment/ukaid-others-boost-clean-energy-cooking-in-south-east/>

7. Conclusion

The project had sought to explore the extent to which a fee-for-service delivery model offered through women groups can enhance a wide and sustained adoption of modern energy cooking services based on Liquefied Petroleum Gas (LPG) among semi-urban populations in Nigeria, using two large towns in South-East region of Nigeria (Awgu and Arondizuogu) as pilot cases. Low volume (6kg) cylinders and accessories were made available to participants on pay as you use basis alongside targeted advocacy campaign focusing on the health risks associated with open air cooking. Exchange centres were located close to the communities where beneficiaries could exchange their empty cylinders for a filled up one. Beneficiaries were encouraged to form co-operative groups to maintain the supply chain and data was collected on perception and barriers against transition to clean cooking.

The overwhelming over subscription and success of the project has made its scale up a local, national and global imperative considering the manifold development benefits the project delivers for all stakeholders. To this end, some discussions have been had with a number of government departments like the National Assembly, Ministry of Niger Delta Affairs, Ministry of Environment and Ministry of Petroleum Resources. There are also plans to approach African Development Bank, EU, and other international donors with an application for project scale up.

Despite strong willingness and determination by the women to embrace the use of LPG it remained apparent that lack of financial capacity is a big barrier for against the continuous use of the LPG cylinders. After the euphoria of collecting the cylinders for free and only having to pay for the gas died down, there were many women that began to complain about not having money to refill their cylinders as regularly as they would love to.

More proactive advocacy measures shall be adopted to engage the Nigeria Government towards the operationalization of Nigeria's National Gas Policy of which the National LPG Policy is a part of the document and an act of the parliament which will eventually give a legal framework to private sector investors. LPG Pricing Policy to support sustainability shall also be projected through progressive partnership engagements.

8. Appendix

8.1 Appendix A

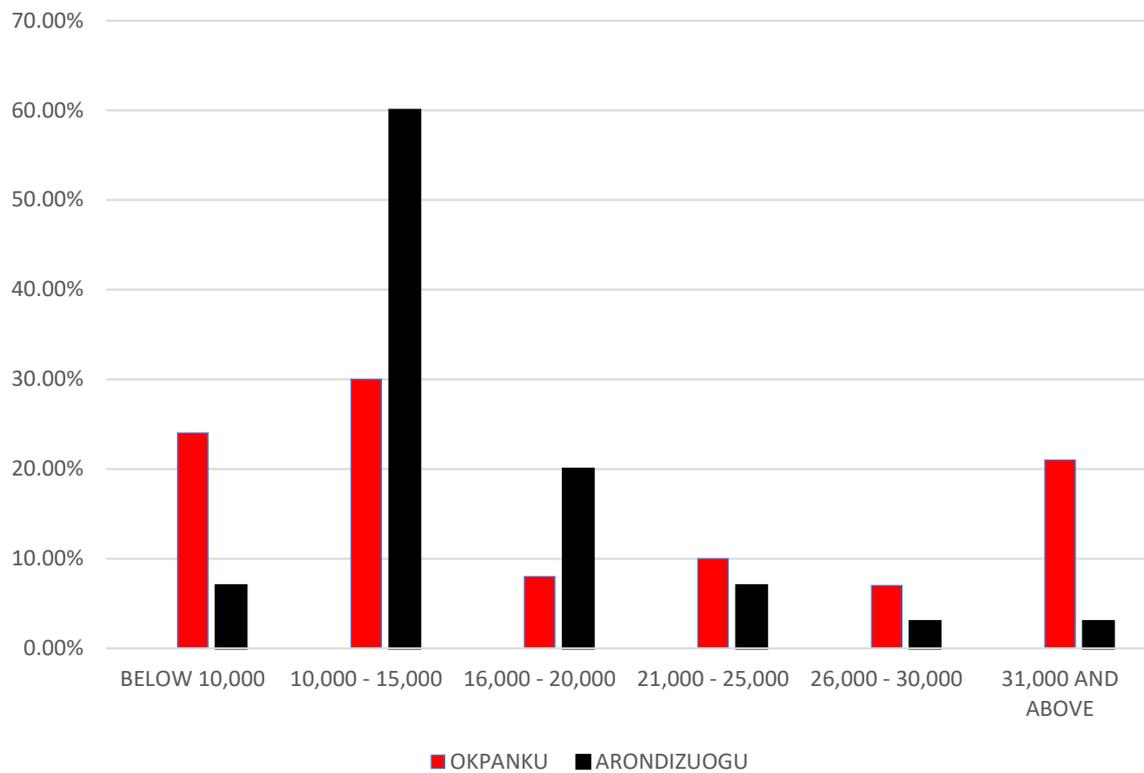
Project Team Visit to the Headquarters of Techno Oil in Lagos



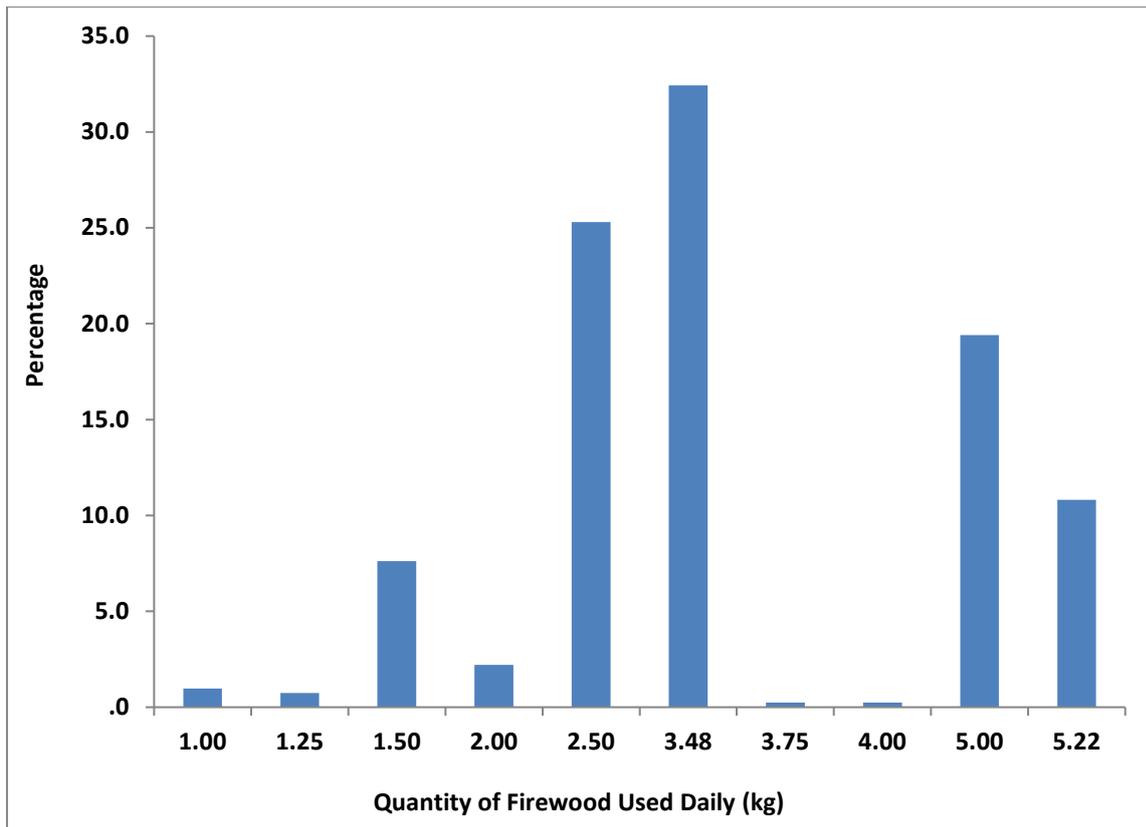
8.2 Appendix B

Household Monthly Income Chart

BAR CHART PRESENTATION OF HOUSE HOLD MONTHLY INCOME FOR OKPANKU AND ARONDIZUOGU

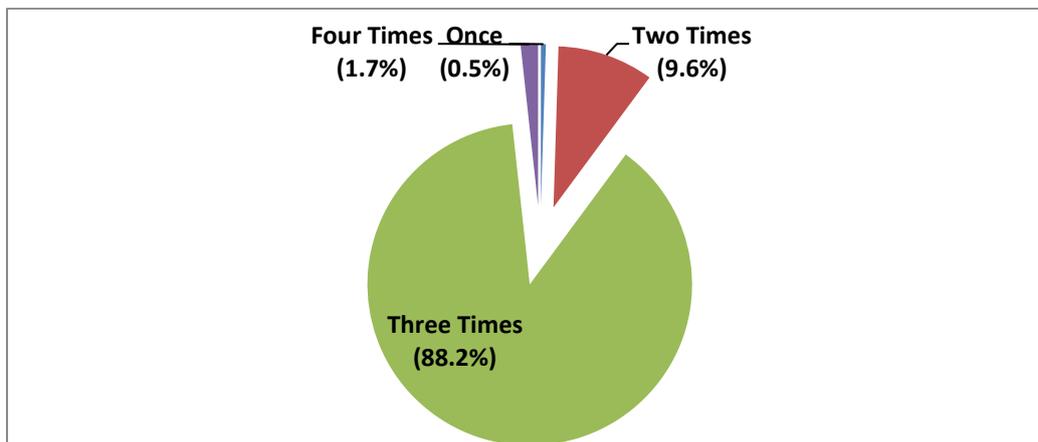


8.3 Appendix C Quantity of Firewood used (kg)



8.4 Appendix D

Number of times meal is prepared daily



8.5 Appendix E

Minutes Spent in Cooking on Daily Basis

Time Spent in Cooking on Daily Basis (Minutes)	Frequency	Percentage
30.00	5	1.2

40.00	3	.7
45.00	11	2.7
48.00	2	.5
60.00	116	28.5
75.00	5	1.2
90.00	11	2.7
100.00	1	.2
120.00	169	41.5
150.00	3	.7
180.00	78	19.2
240.00	2	.5
300.00	1	.2
Total	407	100.0
Average	110.16	

8.6 Appendix F

Selection of photos from the open-air project launch in the two communities



8.7 Appendix G

Pre cylinder distribution instruction, safety briefing and demonstrations



8.8 Appendix H

Report on the project by Guardian Newspapers which is one of the most reputable national newspapers in the country.



8.9 Appendix I

Post launch training of and product using support to beneficiaries by the RAs



8.10 Appendix J

Exchange Centres have been established and beneficiaries are already using the services.

