



Improving Access to Clean Reliable Energy for Primary Health Care Centres in Nigeria:

Situation Analysis of PHCs in the Federal Capital Territory.

The Potential for Green Development Options to Power Primary Health Care Centres in Nigeria



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List of Acronyms

AC	Area Council
AEDC	Abuja Electricity Distribution Company
AMAC	Abuja Municipal Area Council
BIR	Budget Implementation Report
BOF	Budget Office of the Federation
CSO	Civil Society Organisations
EU	European Union
EPSRA	Electric Power Sector Reform Act
FCT	Federal Capital Territory
FCTA	Federal Capital Territory Authority
HHSS	Health and Human Services Secretariat
LGA	Local Government Authourity
NG	National Grid
NGO	Non-Governmental Organisations
NPHCDA	National Primary Health Care Development Agency
PHC	Primary Health Centre
PHCDB	Primary Health Care Development Board
REAN	Rural Electrification Agency Nigeria
WHO	World Health Organisation
WHS	Ward Health Systems



EXECUTIVE SUMMARY

Over time Primary Health Care Centres (PHCs) across Nigeria have been characterized by infrastructural decay, loss of health inventory, unavailable medical equipment, poor staffing and working conditions. In most PHCs, vaccines are either unavailable or cannot be properly stored. Lack of clean potable water is another major challenge. Medical staffs are forced to source for water from local vendors without knowing the source or quality of such water. Where boreholes exist, many are either broken down or are not powered. In addition, several PHCs are unable to render services beyond 5 p.m. due to lack of power to provide illumination at night. Medical personnel therefore rely on rechargeable lamps, kerosene lanterns, or petrol powered generators for night emergencies.

Most PHCs are located in rural communities and poor settlements; out of visibility of Government and elected representatives. Ironically, the annual budget for the construction and rehabilitation of both new and existing PHCs run into millions, if not billions of Naira; with costs ranging from ₦12 million to ₦30 million [depending on the PHC model; Type 1 or 2], yet the PHCs remain in deplorable conditions, with inconsistent power supply at the heart of the problem.

The study explores the energy situation in Primary Health Care Centres (PHCs) in Nigeria, using 60 PHCs in the Federal Capital Territory, Abuja as a case study. 57% of the surveyed PHCs are on-grid, while 43% are off-grid. Evidence from this study shows that on average a Primary Health Care Centre spends between ₦3,500 and ₦19,000 monthly paying electricity bills from the grid, which provides power for an average of 4 hours or less a day. To augment the poor grid supply, the PHCs turn to petrol powered generator sets, which they

run for an average of 6 hours or more a day. The average monthly cost for this is between ₦20,000 and ₦29,000 on fueling (excluding maintenance and repairs). This averages between ₦23,500-₦48,000 a month, and between ₦282,000 and ₦576,000 a year to access electricity for 10 hours using unreliable grid electricity and polluting petrol generator sets. This still does not cover the required standard of 24 hours uninterrupted clean electricity supply all health care centres (regardless of size, location or ownership) are expected to have. These electricity expenses are usually transferred to low-income patients through health charges and personal out-of-pocket payments by the staffs. Sometimes, this additional cost is also borne by donor organisations, NGOs and philanthropists.

The central finding of this study is that access to reliable electricity is critical for the efficient running of Primary Health Care Centres (PHCs). This can speedily be delivered to PHCs through off-grid Solar PV (which the study has proven to be more economical and reliable). Therefore, there is a need to prioritize the energy needs of PHCs to encourage the provision of 24-hour services, since Nigeria's electricity grid remains constrained and limited. The study recommends the mainstreaming of standard off-grid renewable energy through Solar PV for lighting, heating and cooling in the design, construction and rehabilitation of all PHCs in Nigeria.

Finally, while there is a pressing need to increase the budget allocation to the health sector, specifically to Primary Health Care Development Agencies/ Boards, there is also the very urgent need to push for and inculcate the practice of transparency, accountability, better planning and better management of resources in the entire process.

Caution needs to be taken as regards building new PHCs without proper provision to ensure their functionality. Central to their functionality should be the MANDATORY provision of off-grid clean reliable energy to power the facility and equipment in the PHCs.

PART ONE:

The Case

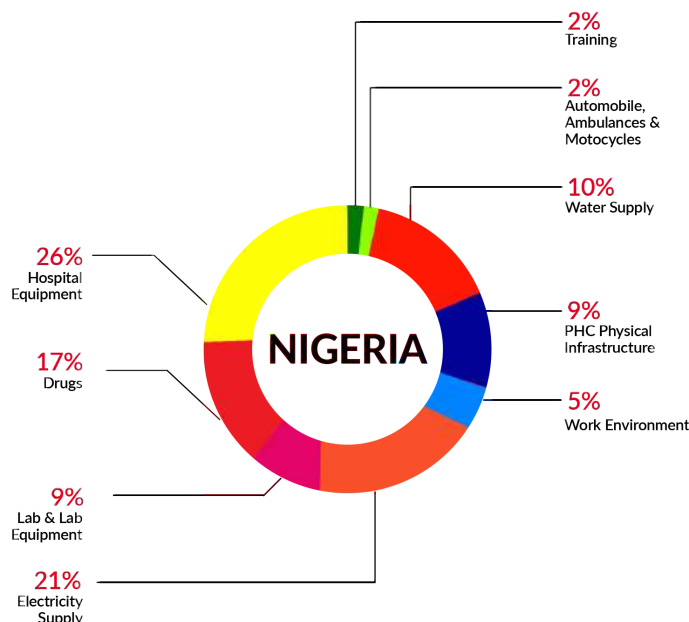
Preamble:

"At its heart, primary health care is about caring for people, rather than simply treating specific diseases or conditions. PHCs are usually the first point of contact people have with the health care system. They are designed to provide comprehensive, accessible, community-based care that meets the health needs of individuals throughout their lives. This includes a spectrum of services from prevention (i.e. vaccinations and family planning) to the management of chronic health conditions and palliative care."¹
- WHO (2018)

INTRODUCTION: From Darkness to Death

A 2017 survey by BudgIT sought to gather the opinions of health workers on what they perceived as barriers to improved performance in health care centres. The survey revealed that in Nigeria, lack of appropriate hospital equipment and surprisingly access to reliable energy supply were the leading barriers to improved health care delivery with 26% and 21% respectively. Other barriers listed in the survey were low drug availability (17%), lack of access to clean water supply (10%), lack of functional laboratory and laboratory equipment (9%), poor PHCs physical infrastructure (9%), non-conducive work environment (5%), lack of automobile, ambulance and motorcycles (2%), and minimal or non-existent staff training (2%).²

Hospital Equipment and Electricity Supply - The Leading Barriers to Improve Performance in PHCs with 26% and 21% respectively in 2017.



Source: BudgIT 2017: Ebola: Primary Health Care System Survey in Focus

budgIT

A 2017 survey revealed that lack of appropriate hospital equipment and access to reliable energy supply were the leading barriers to improved health care delivery in Nigeria

1. WHO - Global Conference on Primary Health Care in Astana, Kazakhstan 25-26 October 2018 <http://www.who.int/primary-health/en/> (September 2018)
2. BudgIT (2017) EBOLA: Primary Health Care System Survey in Focus Countries: Reviewing the PHC systems in Ebola Affected Countries

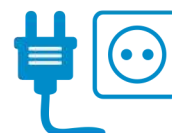
A good observation and questioning of the functionality of the aforementioned 79% of the other barriers (access to clean water, drugs storage, functional laboratory, conducive work environment, working infrastructure, etc.) places access to steady electricity as central.

One would agree that without reliable energy supply the following will not function properly: laboratory equipment, pumping machine for supply of water, illumination and cooling for the PHCs and drugs and vaccines cannot be properly stored. With the reality of global warming caused by climate change, the hospital work environment will not be conducive without the availability of clean steady energy.

According to the World Health Organization (WHO)³, standard operating procedures for most hospitals require energy use for water supply, temperature control, lighting, ventilation and clinical processes. Modern health facilities in high- and middle-income countries are among the largest commercial consumers of energy, with associated climate and environmental impacts. Many small rural and public facilities in resource-constrained settings suffer from unreliable energy networks, impeding health service provision.

Primary Health Care Centres in Nigeria lag behind in the delivery of quality health care services. The 2017 Health Care Access and Quality Index ranks the country at 140th position out of 195 countries assessed. In a 2018 report, the World Health Organization (WHO) ranked Nigeria's health care system at 187th out of 190. These indexes measured the accessibility of health care across countries from 1990 to 2015. It focused on the number of deaths from 32 causes that could have been prevented by 'timely and effective medical care'.

According to a recent UNICEF, WHO, UN Population Fund, and World Bank report, 1 in 13 women is most likely to die during pregnancy and childbirth in Nigeria, putting the maternal mortality ratio for Nigeria at 814 deaths per 100,000 live births. The report shows an increase in maternal deaths in Nigeria from 55,000 in 2011 to 58,000 in 2015. The report suggests that Nigeria, with approximately 58,000 maternal deaths, accounts for 19% of global maternal deaths of the 303,000 women that died globally due to complications from pregnancy and child births in 2015.



WHO: standard operating procedures for most hospitals require energy use for; water supply, temperature control, lighting, ventilation, and clinical processes..



140TH OUT OF 195

ALSO (WHO) RANKED NIGERIA'S HEALTH CARE SYSTEM AT **187TH OUT OF 190.**



3. WHO (2018): Health and Sustainable Development: Energy Access and Resilience. A Case Study: A New High Impact Opportunity on Energy for Women and Children's Health. <http://www.who.int/sustainable-development/health-sector/health-risks/energy-access/en/>

4. UNICEF, WHO, UN and World Bank Report (2018): Trends in Maternal Mortality: 1990 to 2015 by WHO, UNICEF, World Bank and United Nations Population Fund, 2018

5. Red Care HMO (accessed 17 October 2018): Maternal Health in Nigeria : <http://redcarehmo.com/2018/03/19/maternal-health-nigeria/>

Another of the report's finding is that 9 per cent of all new-born deaths in the world occurred in Nigeria. The same report reveals that 15,000 children died globally before their fifth birthday in 2016. Another finding is that five countries accounted for half of all new-born deaths, with Nigeria third in the list. These countries are India (24 per cent), Pakistan (10 per cent), Nigeria (9 per cent), the Democratic Republic of the Congo (4 per cent) and Ethiopia (3 per cent). The new born mortality rate for Nigeria is reported high at 68.7 new-born deaths for every 1,000 live birth . Every single day, Nigeria loses about 2,300 under five-year-olds, making the country the second largest contributor to the under-five mortality rate in the world. This is 108.7 under-five deaths for every 1,000 live births.

Many of these deaths are highly preventable if effective (functional) Primary Health Care Services are in place.

Unreliable electricity access leads to vaccine spoilage, interruptions in the use of essential medical and diagnostic devices, and lack of even the most basic lighting and communications for maternal delivery and emergency procedures. According to WHO, as disease patterns change, more energy is required to expand services for the prevention and treatment of non-communicable diseases (NCDs). These include the diagnosis and treatment of breast cancer, cervical cancer, and other NCDs where women have a particularly heavy burden.

The World Bank has ranked Nigeria as the second country in the world after India and the first in Sub-Saharan Africa with more of her population without access to electricity. Over 80 million Nigerians, representing 60% of the country's population, lack access to grid electricity⁷.

Currently, Nigeria's power generation, transmission and distribution rates are not commensurate with energy demands of the population, giving rise to consumers depending on dirty and outdated energy sources that have adverse health and economic consequences on them and the society at large. Nigeria's energy demand is estimated to rise to 88,282MW by 2020 from 15,730MW in 2016 .

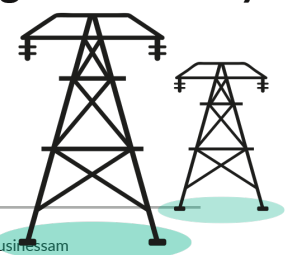
Despite the country's current installed generation capacity of 12,522MW, it generates an average of 4,500 MW, which is transmitted through its fragile National Grid, and is grossly insufficient to meet the electricity demand of its 190 million population.

The national grid breaks down after a load capacity between 4,500MW to 5,500MW.



WORLD BANK

Over 80million Nigerians, representing 60% of the country's population lack access to grid electricity



6. WHO (2017) Levels and Trends in Child Mortality 2017.

7. Goddey Odin (March 28, 2018) Nigeria ranked 2nd largest electricity access deficit in world as 80m homes live without power. <https://www.businessinsider.com/nigeria-ranked-2nd-largest-electricity-access-deficit-in-world-as-80m-homes-live-without-power/>

8. Salau, S. (2016) Nigeria's power demand to hit 88,282MW by 2020. The Guardian Newspaper. Available from: <https://guardian.ng/business-services/nigerias-power-demand-to-hit-88282mw-by-2020/>

9. World Bank (2018) Nigeria. Population, total. Available from: <https://data.worldbank.org/indicator/SP.POP.TOTL?locations=NG>

The above data on Nigeria's energy deficit explains why over 80% of the population depend on kerosene stoves and lanterns for everyday use, open firewood for cooking, small petrol and diesel generators for lighting and heating. These dirty energy sources are the reason why over 122 million Nigerians are affected by indoor air pollution, causing approximately 95,300 deaths annually; with women and children accounting for the lot¹⁰.

With no statistics on the energy demand, deficit or experiences of Primary Health Care Centres (PHCs) in Nigeria, existing reports however show that most rural households spend as much as ₦6,660 on kerosene expenses monthly¹¹. In total, an estimated ₦143.3 billion is spent monthly on kerosene by households in the entire country. Industrial and commercial sectors spend up to ₦5 trillion annually on importing, fuelling and maintenance of generators.

The government is not left out. In its 2017 budget, ₦8.4 billion was allocated for the maintenance, fuelling and purchase of new generators for government ministries, agencies and departments alone¹².

There is a need to gather accurate data on the sources of and energy cost of Primary Health Care Centres (PHCs) across Nigeria.

Nigeria would need to connect between 500,000 to 800,000 new households to the national electricity grid every year between now and 2030 to be able to achieve her targets of universal access to electricity for its citizens¹³. The Federal Government's electrification strategies tend to focus more on plans to extend the national grid; it is only recently, through her Rural Electrification Agency (REA) Off-Grid Electrification Strategy, that it now seeks to provide access to clean and sustainable electricity to millions of Nigerians. However, this Off-grid strategy seems not to give priority to the electrification of Primary Health Care Centres (PHCs)¹⁴, especially those in rural areas.

The National Primary Health Care Development Board (NPHCDB), under the Federal Ministry of Health and other Sub-National Primary Health Care Development Boards have declared the desire to have PHCs operating for 24 hours daily¹⁵.

No statistics on the energy demand, deficit or experience of primary health centers exist in Nigeria



PHCs are forgotten in electrification programmes



10. Nigerian Alliance for Clean Cookstoves: 10 million Clean Stoves by 2020- Clean Stoves, how much is 9.2billion Naira? <http://nigeriacleancooking.org/>
11. NBS General Household Survey (Panel) 2012/2013 Wave 2. Household Panel Survey conducted by the NBS in collaboration with the World Bank Living Standard Measurement Study Group. (2014)
12. Punch National Daily (December 31, 2016): FG to spend ₦8.4bn on generators in 2017 <http://punchng.com/fg-to-spend-n8-4bn-on-generators-in-2017/>
13. World Bank draft report (March 2018) Environment And Social Systems Assessment (ESSA) of the Power Sector Recovery Program (PSRP) - <https://www.businessamlive.com/nigeria-ranked-2nd-largest-electricity-access-deficit-in-world-as-80m-homes-live-without-power/>
14. Rural Electrification Agency (REA): The Nigeria Electrification Project (NEP) <http://rea.gov.ng/nigeria-electrification-project-nep/>
15. Federal Capital Territory (FCT) Primary Health Care Development Board (July 17, 2018): 50 PHCs to run 24-hour services in Abuja – Official. <https://www.premiumtimesng.com/health/health-news/276781-50-PHCs-to-run-24-hour-services-in-abuja-official.html>

However, this is solely dependent on the availability of steady power supply. With only about 20% of the 30,000 PHC facilities across Nigeria fully functional¹⁶, and the Ministry's intention to "make functional" 10,000 PHCs in two years, there is a need to review the budgetary allocations to the sector to remodel existing PHCs with standard off-grid clean energy solutions rather than building new ones. Such a provision must be guided and justified with strict budgetary oversight, considering that over ₦2 billion was recorded as having been expended on the construction of PHCs across the country with low patronage, lack of working equipment or skilled staff¹⁷.

This study therefore seeks to present a situational analysis of the energy experiences of PHCs in Nigeria; showing how the scarcity of electricity negatively impacts on the service delivery of PHCs; its financial and social costs; as well as the shared benefits and how the use of solar energy for powering PHCs has had a positive impact and improved service delivery. The study will use 60 PHCs in the FCT, Abuja, Nigeria and their experience with energy supply as a case study.



The National Primary Health Care Development Board (NPHCDB) under the Federal Ministry of Health and other sub-national primary health care development board have declared the desire to have PHCs operating for 24 hours daily

16. Adewole I. Thirty Six States and the FCT are to Share \$1.5m FG Fund for Primary Health Care. (2016). Available from:

<https://www.informationng.com/2016/07/36-states-and-the-fct-to-share-1-5m-fg-fund-for-primary-healthcare.html>

17. International Centre for Investigative Reporting (October 2016): N2 Billion Primary Health Centres Waste Away Across Nigeria.

<https://www.icirnigeria.org/n2-billion-primary-health-centres-waste-away-across-nigeria/#>

Objective of the study

A

Aim to explore the potentials of using off-grid clean energy in key sector areas like the health sector.



B

To gather data on the various sources of and energy cost of Primary Health Care Centres (PHCs) in Nigeria.



C

To review how the budgetary allocation to the sector can be stretched to model existing PHCs with standard off-grid electricity solutions.



D

To proffer recommendations for the adoption of sustainable off-grid solar solution for PHCs across Nigeria.



Research Methodology

The survey¹⁸ was carried out on Primary Health Care Centres (PHCs) in the Federal Capital Territory (FCT), Abuja, Nigeria. Abuja has a landmass of about 7,754 square kilometres with an estimated population of 2,918,518 people. It has Six Area Councils (ACs), namely, Abaji, Abuja Municipal (AMAC), Bwari, Gwagwalada, Kuje and Kwali area councils. There are 248 PHCs across the Six Area Councils in Abuja. The Area Councils are divided into 62 wards (with each area council having 10 wards, except for AMAC with 12 wards).

The study is an exploratory research. Using both qualitative and quantitative data approach, the study collected both primary and secondary data for analysis. For the primary data, random sampling method was employed to select 10 PHCs from each ward in each of the six Area Councils, bringing the total number of PHCs surveyed to 60; this is approximately 25% of total number of PHCs in Abuja. From each of the PHCs surveyed, a minimum of 2 medical staff (with one being a high-level officer) and 2 patients were interviewed in the course of the research; bringing a total of at least 240 opinions on the energy situation in their PHCs.

18. Survey was carried out July 2018 to September 2018; after a one-day training of 12 field researchers and freelance journalists. The freelance journalists conducted independent investigations and published three feature articles from their investigations in national dailies. See appendix for list of published articles.

List of the 60 PHCs from Six Area Council of FCT, Surveyed in the Study

No	Abaji	AMAC	Bwari	Gwagwalada	Kuje	Kwali
1	Aguana PHC	Galadimawa PHC, Kabusa	Barangoni PHC	Agwandodo PHC	Abuja @30 Clinic,	Dabi Bako PHC
2	Anawa PHC	Garki PHC, Garki 2	Bwari Town PHC	Dobi PHC	Chibiri PHC	Dafa PHC
3	Angwa Manko PHC	Gbagalape PHC, Nyanya	Dutse Makaranta PHC	Gwagwalada PHC	Chukuku PHC	Ijah Sark PHC
4	Angwa Nugwa PHC	Gidan Mangoro PHC, Orozo	Igu PHC	Gwako PHC	Dafara PHC	Kilankla 1 PHC
5	Kpachi PHC	Gosa PHC, GUI-Gosa	Jigo PHC	Ibwa PHC	Gaube PHC	Kilankla 2 PHC
6	Low Cost Barak PHC	Idu Karmo PHC, Waru	Kuchiko PHC	Leni PHC	Kiyi PHC	Leleyi Gwari PHC
7	Naharati PHC	Jikwoyi PHC, Jikwoyi	Kuduru PHC	Paiko PHC	Kuchiyako PHC	Pai PHC
8	Nuku PHC	Karshi PHC, Karshi	Lower Usman Dam PHC	Yimi PHC	Kuje Town PHC	Petti PHC
9	Nuku Saban Gari PHC	Kuchingoro PHC, Gwarinpa	Mpape PHC	Zuba PHC	Lanto PHC	Sheda PHC
10	Yaba PHC	Saburi PHC, Dei Dei	Ushafa PHC		Pegi PHC & Tukpechi PHC	Yangoji PHC

Source: Selected from the FCT Primary Health Care Development Board (FCT- PHCDB) spread sheet for PHCs.

A well-structured questionnaire¹⁹ with a total of 60 multi-variable closed and open-ended questions, was designed to collect data on the energy situation of the selected PHCs (around issues of lighting, heating, access to clean water, available electric appliances and working conditions). This was complemented by in-depth interviews undertaken by independent freelance journalists that visited at least 3 PHC per Area Council.

Secondary data was sourced from the budgetary allocation (from 2016 to 2017²⁰) to and for PHCs, as well as the number and locations of PHCs in Abuja. This data was provided by the FCT Primary Health Care Development Board (FCT- PHCDB), the National budget for the health sector, as well as other existing literature as cited.

Data were analysed using simple descriptive and inferential statistical methods like graphs, charts, tables, averages, simple percentages, average and range.

19. See questionnaire in appendix section

20. As at the time of visiting the FCT-PHCDB to get the budget figures, the data for 2018 was not available at that time, as expenses were still on-going. The officers in-charge promised to make same available for the research when ready.

PART TWO:

The Marriage

Improve Access to Electricity = Improved Health Care Delivery

A 2018 study, “A High Impact Opportunity on Energy for Women’s and Children’s Health”, led by WHO, UN Women and the UN Foundation²¹ aims to improve energy access and energy resilience of health facilities in low-income countries, and stimulate more optimized use of modern energy technologies and renewable power sources.

According to the report, the quality of energy access in health facilities may have crosscutting impacts on other aspects of health services. These may include, for example, hours of operation, retention of health workers who often live close to the health clinic. In addition, inefficient use of energy technologies, (for instance powering small medical devices with oversized generators), contributes significantly to fuel waste and high costs. Improved design of power systems, including careful sizing, timing and appropriate integration of renewable energy sources can reduce costs.

A study of 11 major sub-Saharan African countries found that roughly 1 in 4 health facilities had no access to electricity, and only about one-third of hospitals had access to reliable electricity (Adair-Rohani et al, 2013)²². Even the lowest health facility, at the level of a health post or dispensary, requires connection to on-grid or off-grid electricity [or a combination of both] to function efficiently.

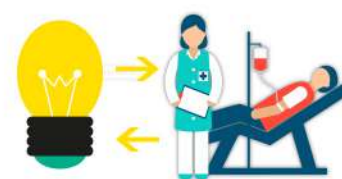
The table below shows the different nomenclature used for physical infrastructure at the level of a primary health centre in line with the minimum standards for PHCs in Nigeria.

Minimum PHC Infrastructure: Facilities and Equipment

No	Health Facility Nomenclature	Level of Management	Expected Numbers	Operating Hours
1	Primary Health Centres (formerly known as Comprehensive Health Centre, Model PHC Centre)	Local Government	1 per political ward; with an average 10 wards per LGA, a total of 7,740 will be expected	24 Hours
2	Primary Health Clinic (formerly Maternity Centre, Basic Health Centre)	Local Government & Ward Development Committee (WDC)	1 per group of villages or neighborhoods with about 2000 – 5000 persons	24 Hours
3	Health Posts (formerly dispensary)	Village Development Committee (VDC) or Community Development Committee (CDC)	1 per village or neighborhood of about 500 persons As many as the number of villages	8.00am – 4.00pm

Source: National Primary Health Care Development Agency (NPHCDA, undated)²³.

The table above shows that to actualize 24 hours operating time in Primary Health Care Centres and Primary Health Clinics, reliable electricity supply must be provided.



The quality of energy access in health facilities may have crosscutting impacts on other aspects of health services.

21. WHO (2018): Health and sustainable Development: Energy Access and Resilience. A Case Study: A New High Impact Opportunity on Energy for Women and Children’s Health. <http://www.who.int/sustainable-development/health-sector/health-risks/energy-access/en/>

22. Adair-Rohani, H, Karen Zukor, Sophie Bonjour, Susan Wilburn, Annette C Kuesel, Ryan Hebert, Elaine R Fletcher (2013): Limited electricity access in health facilities of sub-Saharan Africa: a systematic review of data on electricity access, sources, and reliability. Global Health: Science and Practice Aug 2013, 1 (2) 249-261

23. See, Minimum Standards for PHCs in Nigeria Document; available online.

Decentralized, renewable energy solutions, coupled with energy efficiency measures, have great potential to expand health facility access to cost-effective, reliable electricity in many low-income settings where the grid is unreliable or non-existent.

Small photovoltaic (PV) solar systems are being widely used now in Africa and elsewhere, to help health workers in remote areas carry out night-time diagnosis to take better care of mothers before, during and after childbirth; charge cell phones for communications; and navigate communities after sunset. PV solar-powered refrigerators are increasingly being purchased by major UN-affiliated agencies, for more robust cold-chain preservation. In countries with plenty of sunlight, larger PV (with battery storage) are used either alone or in tandem with fuel-based generator to power a range of low and medium-power devices, including refrigerators, small laboratory devices, water pumps, lights, phones and small medical devices. Where water is abundant, some hospitals have also developed hydroelectric power systems, serving both health functions and the wider community.

For example, a study in Sarguja, a district in India's central state of Chhattisgarh, finds that "on average, health facilities with solar [powered systems] treated 50% more out-patients each month, conducted 50% higher institutional deliveries, admitted a higher number of in-patients as well as provided round the clock services".²⁴ Thus, health facilities with solar power performed significantly better than those without; thereby establishing a connection between access to reliable electricity by health facilities and better health outcome in rural communities.

Recently, Solar PV is being used to power some cold-boxes and refrigerators in most PHCs. However, a few other PHCs have been lucky to have their entire hospital powered by well-meaning renewable energy companies. The next section will be sharing the experience of the Solar powered PHCs in Dakwa, Abuja and Karu in Nasarawa State.



Small photovoltaic (PV) solar systems are being widely used now in Africa and elsewhere to help health workers in remote areas carry out night-time diagnosis to take better care of mothers before, during and after childbirth, charge cell phones for communications, and navigate communities after sunset.



24. See, <https://www.weforum.org/agenda/2017/10/solar-power-can-reshape-our-health-future> Over 93% of people interviewed also believed that improved electricity supply will increase the number of patients visiting the hospitals (Field Survey, 2018).



IT WORKS!

OFF-GRID SOLAR FOR PRIMARY
HEALTH CARE CENTRES:

The Success Story of Dakwa and Karu PHCs



Dakwa Primary Health Care Centre²⁶, located in an off-grid community in Abuja. Their only source of lighting at night was kerosene lamps. The midwives and clinic personnel conducted childbirth services with torchlights in the night time and attended to the sick under similar conditions.

As part of its Corporate Social Responsibility, Vaya Energy conceived, designed and financed a 3kWp off-grid solar project to power the PHC. Completed in March 2016, the off-grid solution entailed 12 Solar Photovoltaic (PV) panels and Balance of System equipment, including sealed storage batteries which ensure round the clock electricity at the PHC. The Dakwa Health Care Centre Solar PV system has the capacity to generate about 12 kWh of electricity each day, which far exceeds the Health Care Centre's current electric power demand. This gives the PHC a number of options to utilize the additional electricity potential for security lighting, heating, powering water boreholes, etc. The estimated cost of the off-grid solar installation is between ₦2.5 million-₦3 million.



The midwives and clinic personnel conducted childbirth services with
Touchlights
in the night time and attended to the sick under similar conditions.



Before



After

“For two years, we ran this PHC without light. We used to go to a nearby community called Juwah, to store our vaccines. Then we would close the PHC even before 4 p.m. because people were not coming at all even though we tried and even carried out ‘health evangelisms’ to homes in the community”.

“The PHC which is responsible for four communities including Gofina, Kokoife, Dakwa and Sarki, had no energy source for water and had to depend on the use of lamps during deliveries, while buying water from mai-ruwa who in turn bought from boreholes.”

“Within two years of the solar installation, the PHC has experienced no single power outage, and the patronage has increased from zero to an average of 100 patients a month.

-

Testimony of Mrs Martha Dikko, Community Health Extension Worker-CHEW



The Dakwa Healthcare Centre Solar PV system has the capacity to generate about
12 kWh
of electricity each day

25. More stores on Solar in Dakwa PHC: See Appendix

The Success Story of Karu PHCs

The Karu Primary Health Care Centre is located in Nasarawa State in Central Nigeria. Completed in 1992 as part of the Millennium Development Goals (now Sustainable Development Goals), the Centre receives dozens of patients each day and is equipped with facilities for admitting patients, conducting laboratory tests and conducting deliveries.



However, the centre had been plagued with never-ending blackouts, making it impossible to run effectively. Health Care workers depended on kerosene lamps at night, and refrigeration for the storage of vaccines and medicines was also impossible.



The centre had been plagued with unending **blackouts**, making it impossible to run effectively.



The Karu Solar Project was completed in July 2017 through a crowd-funding initiative to design and install a 4kWp Solar Photovoltaic solution.

The Karu Health Care Centre Solar PV system has the capacity to generate up to 18 kWh of electricity each day; which will have a significant impact on health care delivery. Options for monetising excess electricity across the fence are being



With solar now installed, Options for monetising excess electricity across the fence are being explored with the local community.



explored with the local community. The positive impact on the clinic's operations and its host community has been immediate; vaccines and medication are now properly refrigerated and basic laboratory equipment are now operational.

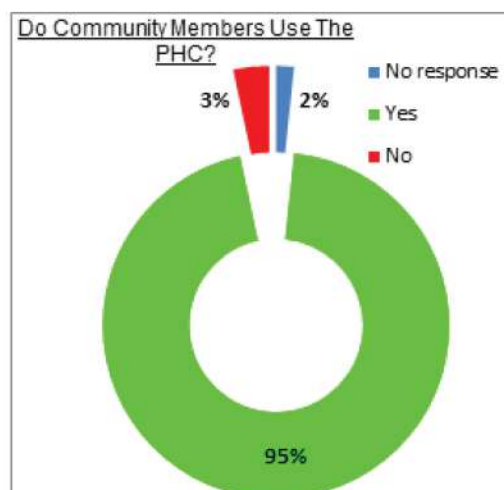
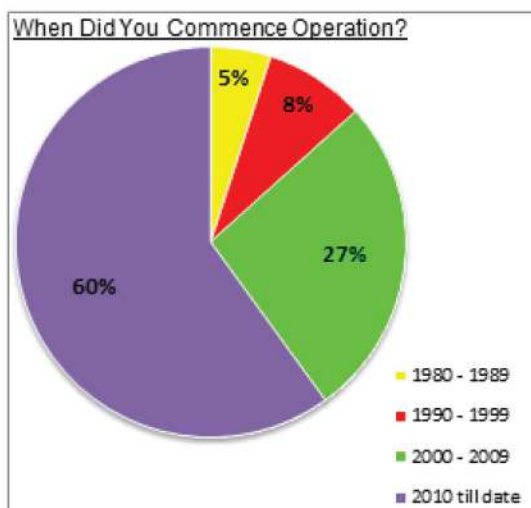
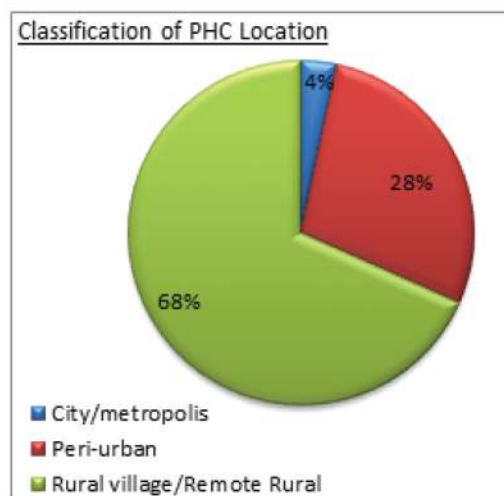
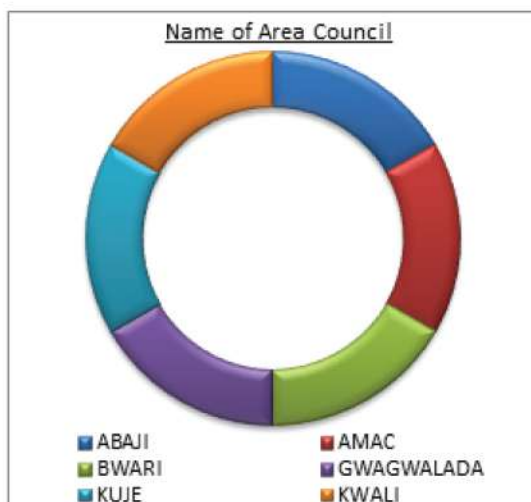
PART THREE:

Lagging Behind

Evidence from the Field: Data Presentation and Analysis

60 PHCs were randomly selected from the 10 wards, from each of the 6 Area Councils. 68% of the PHCs are in remote rural areas, 28% are in the peri-urban area, while 4% are in the urban metropolitan city of Abuja. 5% of the surveyed PHCs have been in operation since 1980, 8% of the PHCs commenced operation between 1990 to 1999, 27% commenced operation between 2000 and 2009, while the majority (60%) of the surveyed PHCs commenced from 2010.

95% of the PHCs are in use by community members. The average daily attendance per PHC in an area council are Kwali (10), Kuje (19), Gwagwalada (15), Bwari (15), AMAC (30) and Abaji (13).



The Energy Audit on the Surveyed Primary Health Care centres (PHCs)

53.3% of the PHCs surveyed say they work for 24 hours, while 46.7% say they do not operate round the clock; they close between 5 p.m. and 9 p.m. daily. One of the major reasons reported by the PHCs why they do not operate 24-hour services is the shortage of power supply at night. Other reasons are shortage of man-power [i.e. absence of assigned doctors to manage night shifts] coupled with that fact that the few personnel on ground are either Community Health Extension Worker (CHEWs) or volunteers with little experience. In emergency situations, patients are referred to other hospitals. 50% do not offer overnight admission of patients, while 45% do.

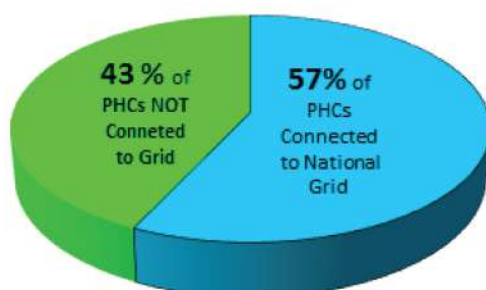


One of the major reasons reported by the PHCs why they do not operate for 24 hours is the shortage of power.

Does the PHC run for 24 hours?			Closure Times Of PHCs When There Is No Night Shift		Percentage %
			2 - 5 PM	6 - 9 PM	
YES	YES	32	14	18	53.3%
	NO	28	18	10	46.7%
		60	32	28	60

Source: Field Survey 2018

57% of the Primary Health Care Centres surveyed (that is, 34 of the 60 PHCs) are connected to the national electricity grid; thus, depending on the regional electricity distribution company for part of their electricity supply. 43% of the Primary Health Care Centres on the other hand (that is, 26 PHCs), are not connected to the national grid, and thus, they either depend on an alternative energy source of power or remain without electricity.

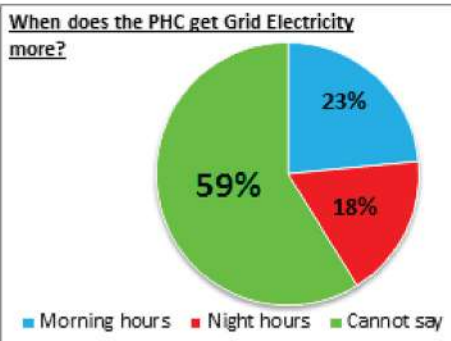


Number of Hours Electricity Received from the National Grid Daily		
	Frequency	Per cent
1 - 5 hrs/day	19	55.9
6 - 10 hrs/day	7	20.6
11 - 15hrs/day	1	2.9
16 - 20 hrs/day	2	5.9
21 - 24hrs/day	5	14.7
Total	34	100

Of the 57% of the PHCs connected to the national grid (34 PHCs sampled), 19 of them say they only get electricity for less than 5 hours a day; and have to source for electricity from other alternatives for the remaining 19 hours. 20% (or 7 of the PHCs) have power supplied for up to an aggregate of between 6 to 10 hours a day. 5 PHCs of the 60 surveyed have close to 21 to 24 hours cumulatively.

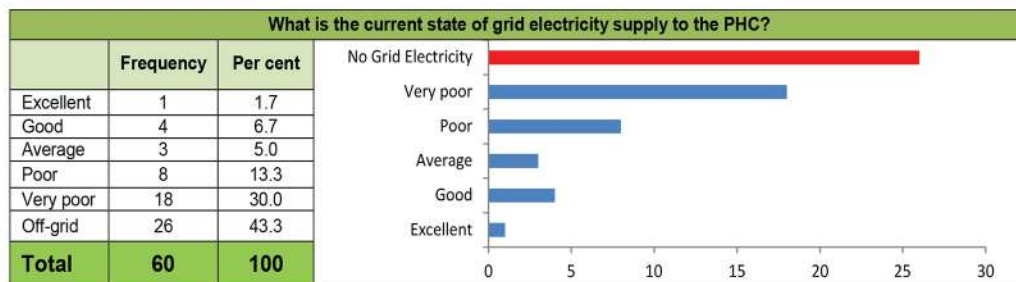


19 of them say they only get electricity for less than 5 hours a day



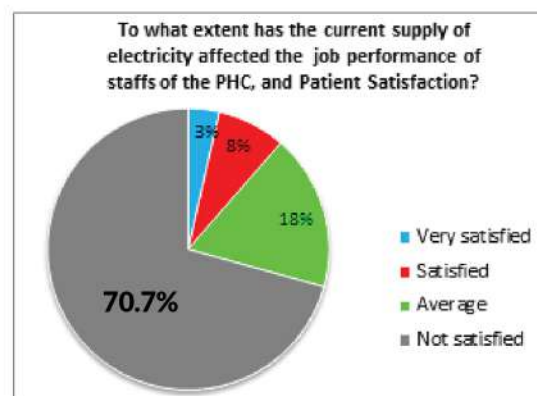
Electricity from the grid is unreliable to the point that 59% of the PHCs that depend on the grid for electricity cannot tell when electricity will be available. 23% of those connected to the grid electricity say electricity supply is often available in the morning hours, while only 18% say electricity is

available more at night hours. Matching 55.9% of PHCs that say they get grid electricity for only 1-5 hours a day, against the 59% that say electricity supply is unpredictable (cannot say), suggest that grid electricity is not only scarce in supply but also unpredictable to allow for planning. PHCs cannot plan their energy usage when they depend on grid electricity. Rating the current state of grid electricity supply, 43.3% rate the grid supply to be poor, 6.7% rate their grid electricity supply to be relatively good, while 1% rated their grid power supply to be excellent.



43.3% said they have no connection to the grid and they resort to self-generation of electricity.

Of the 140 staff and patients that responded to questions to measure how electricity supply to their PHCs affected their level of satisfaction and job performance; 70.7% of patients and staff were dissatisfied with the level of electricity supply, while 18% claimed to be averagely satisfied with the level of power supplied and 11% said they were satisfied with the power supplied.



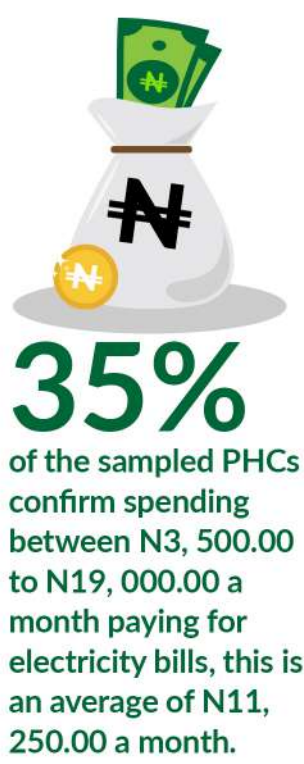
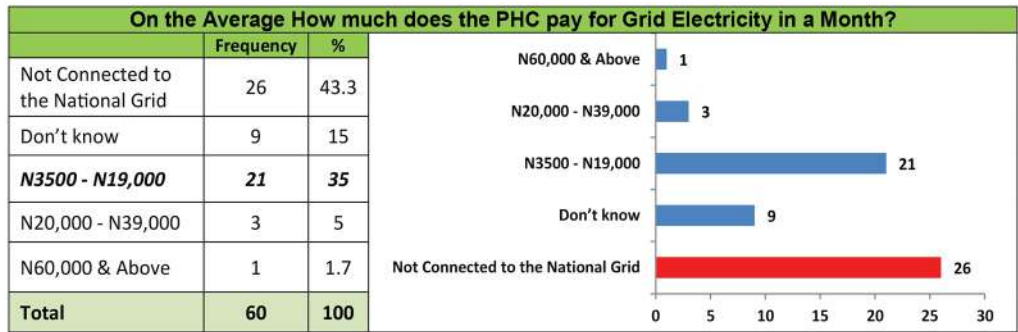
Electricity from the grid is unreliable to the point that **59%** of the PHCs that depend on the grid for electricity cannot tell when electricity will be available.

70.7% of patients and staff were dissatisfied with the level of electricity supply.

The study analysis reveals that 71% of the PHCs (i.e. 24 PHCs) connected to the national electricity grid DO NOT have meter installed for accurate electricity billing; and that they depend on estimated billing charges from the electricity distribution company, while only 29% (i.e. 10 PHCs connected to the grid) have pre-paid meters. 26 PHCs have no access to grid electricity.



Cost of Grid Electricity to PHCs: Despite getting less than 6 hours of unpredictable power supply a day, 35% of the sampled PHCs confirm spending between ₦3,500.00 to ₦19,000.00 a month paying for electricity bills; this is an average of ₦11,250.00 a month. 15% of the interviewed health workers stated they were unable to place an exact figure on the amount paid to the distribution company for the electricity supplied. 5% say they pay between ₦20,000 to ₦59,000 on electricity a month; and 1 PHC stated that they had paid up to ₦60,000.00 at one instance [in a month] for grid electricity. This is possible in situations of accumulated estimated bills.



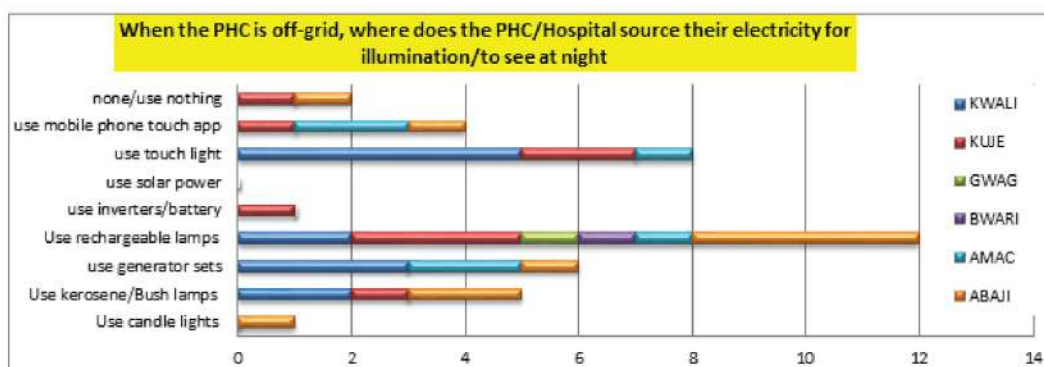
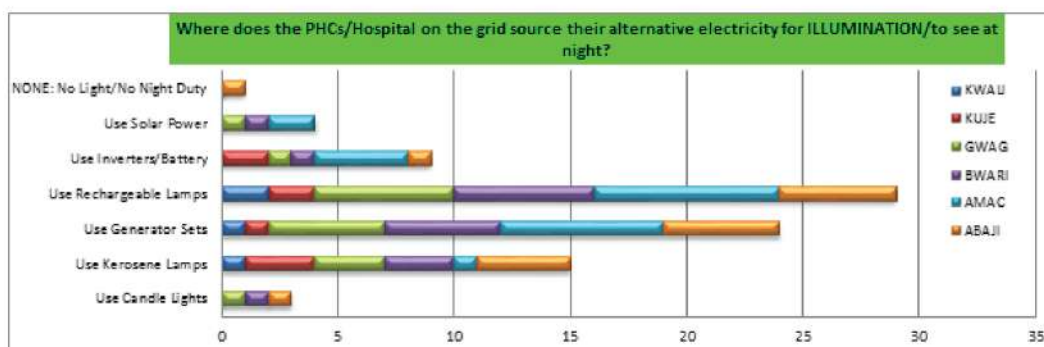
PHCs Seeking Dirty Energy Alternatives:

68.3% of the PHCs say they have equipment and facilities that need electricity to function effectively. 28.3% say they are ill-equipped but some equipment they have can be handled manually, not requiring electricity.

Given the poor state of the grid electricity supply, PHCs source energy for lighting during the night-time predominantly from petrol or diesel powered generator sets, rechargeable lamps (charged by generator sets or grid power when available) and kerosene lanterns. Most off-grid PHCs, also use torchlights, mobile phones and candles for lighting. Reports from the key informant interviews and investigations confirmed that midwives conducted childbirth services using kerosene lanterns and torchlights.



One of the field monitors reported meeting a midwife who had to deliver a baby in the dark because the battery to the torchlight went dead in the middle of delivery. Ironically, PHCs that are supposed to provide clean, healthy and conducive environment are exposed to acute respiratory illnesses that come from air pollutions given the frequent use of fossil generator sets and kerosene lamps.



Source: Field Survey 2018

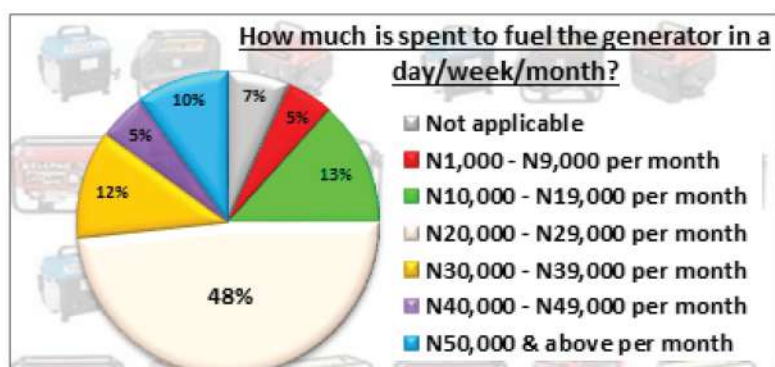
PHCs that are supposed to provide clean, healthy and conducive environment are exposed to acute respiratory illnesses that come from air pollutions given the frequent use of fossil generator sets and kerosene lamps.

Size of Generators Used by PHC		
	Frequency	%
No response	4	6.7
1kva - 2kva	8	13.3
2.8kva - 3.5kva	25	41.7
3.8kva - 4.8kva	14	23.3
5kva - above	5	8.3
Not Applicable	4	6.7
Total	60	100

How many hours a day does the PHC run the generator on the average?		
	Frequency	%
NA	4	6.7
1 - 4 hrs	9	15.0
5 - 8 hrs	34	56.7
Varies (no specific length of time)	13	21.7
Total	60	100

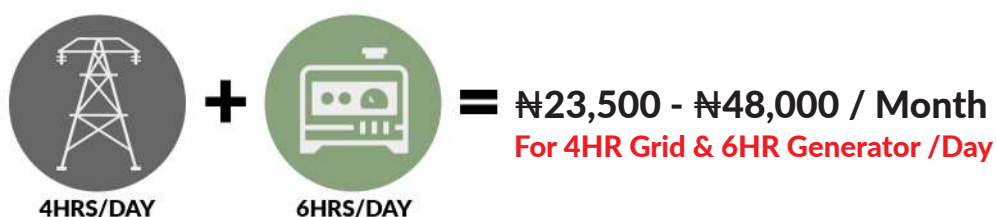
26. Independent Journalist - Ayodamola Owoseye and Nike Adebawale (October 13, 2018): Published in Premium Times – SPECIAL REPORT: How poor electricity supply, inadequate facilities affect storage of vaccines, immunisation in Nigerian capital <https://www.premiumtimesng.com/news/headlines/290065-special-report-how-poor-electricity-supply-inadequate-facilities-affect-storage-of-vaccines-immunisation-in-nigerian-capital.html> (See more testimonies from Annex)

65% of the PHCs surveyed own generator sets with capacities ranging from 2.8kva to 4.8kva. More than half of those PHCs (56.7%) run the generators for average of 5 to 8 hours daily.



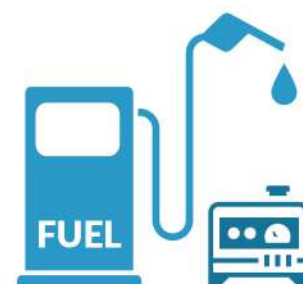
48% of the PHCs which use generator sets spend between ₦20,000 and ₦29,000 a month on fuelling of generators ; 13% spend between ₦10,000 to ₦19,000 a month, while 12% spend between ₦30,000 to ₦39,000. Only 5% of those PHCs spend a maximum of ₦9, 000 a month to fuel their generators and the remaining 22% spend a minimum of ₦40,000 buying fuel alone. These costs do not include the purchase cost of the generator set nor the costs for maintenance and repairs of the generators.

Of the 34 PHCs connected to the grid, 62% (21 PHCs) spend between ₦3,500 to ₦19,000 on the payment of electricity bills monthly for an average of 4 hours or less of electricity a day. In addition, 48% of all the PHCs (owning generator sets) also spend between ₦20,000 to ₦29,000 on fuelling of generators monthly. This means that these PHCs spend between ₦23,500 and ₦48,000 a month for 10 hours of grid electricity and powering generator sets daily.



That equals to between ₦282,000 and ₦576,000 a year for 10 hours of electricity from the national grid and power generating sets. They will therefore need to spend twice that amount yearly if they want 20 hours of electricity daily.

72% (or 43 of the surveyed PHCs) source for monies to fuel their generators from the sales of drugs, charging patients for registration, laboratory fees as well as from out-of-pockets of hospital personnel. This runs the risks for exorbitant charges, thus depriving low-income patients access to basic health care services which should have ordinarily been offered for free.



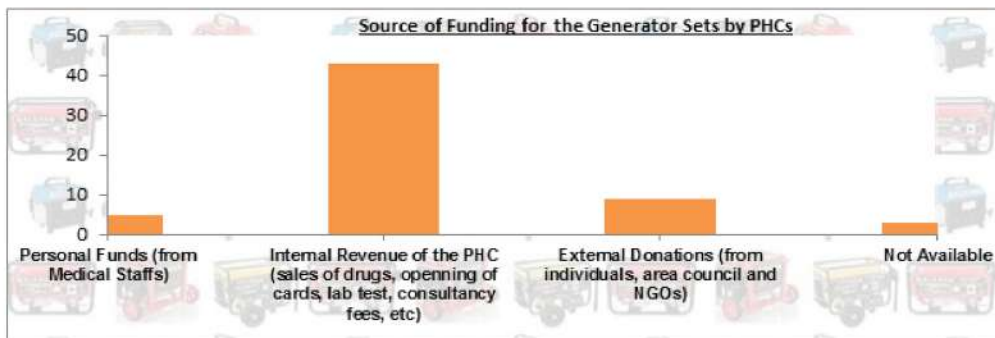
48% of the PHCs which use generator sets spend between **₦20,000 & ₦29,000** monthly on generator fuelling



62% of the PHCs surveyed (21 of the 34 PHCs connected to grid electricity) spend between ₦3500 - ₦19,000 on the payment of electricity bills monthly



72% source for monies to fuel their generators from the sales of drugs.

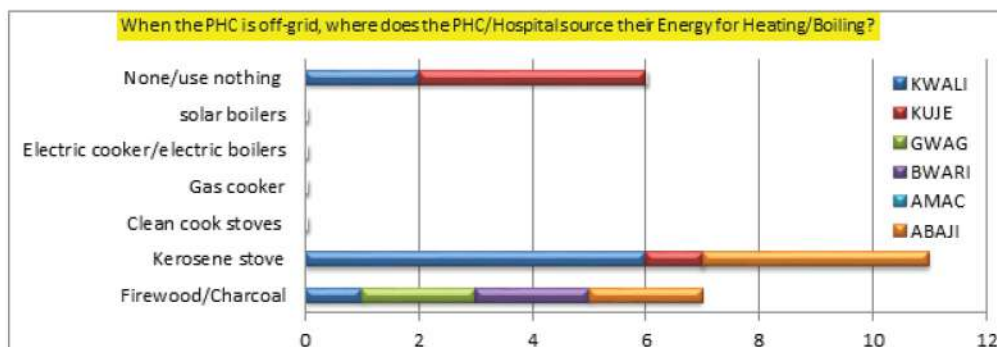
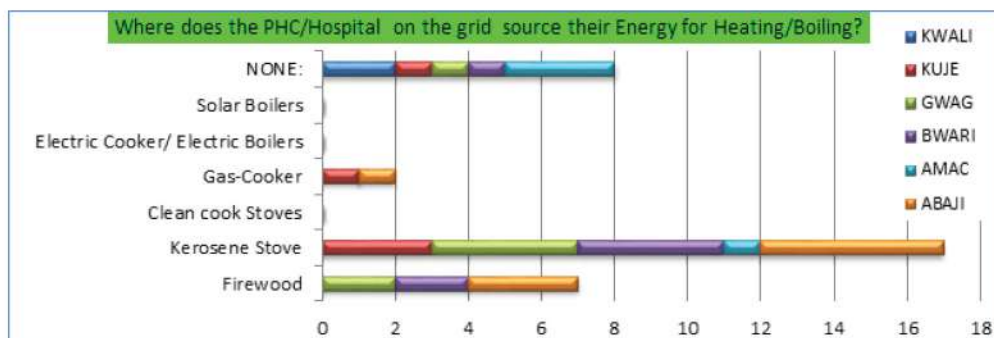


Heating for PHCs:

On or off-grid PHCs depend more on kerosene stoves, charcoal and firewood for heating. Some of the surveyed PHCs have no source of energy for heating purposes. Furthermore, none of the PHCs surveyed use solar water heater, electric boilers, gas cookers or affordable clean stoves for heating.



PHCs depend more on kerosene stoves, charcoal and firewood for heating.

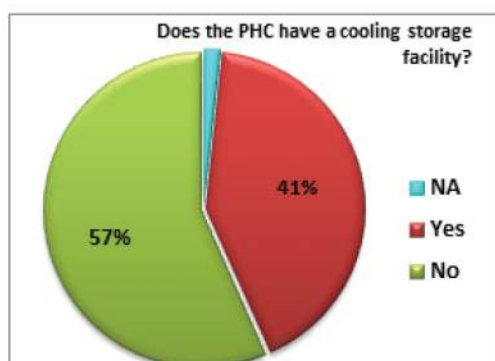


Source: Field Survey 2018

Cooling for PHCs:

Child killer diseases such as pneumonia, polio, neonatal tetanus, measles, mumps, rubella, whooping cough, chicken pox, tuberculosis are vaccine-preventable. Cooling facilities are part of the medical cold chain, which needs to be powered by steady electricity to ensure that vaccines are in the proper temperature from the time of manufacturing to vaccination. With the rising cost of vaccines and requirement for increased storage capacity, access to reliable electricity becomes a necessity.

57% (or 34) PHCs surveyed do not have cooling storage facilities. 7 of them previously had cooling storage facilities, but at the time of the survey, none are functional. There were so many factors affecting the use of solar panels in the PHCs. Some of the solar panels for the cooling storage were reportedly broken in less than a year after installation, and medical staffs on ground lacked the technical skills to maintain the solar power systems, especially cleaning the panels. Security was also a huge issue, as some PHCs reported cases of stolen solar panels and even the cooling storage.



Access to Clean Water:

Of the 60 PHCs surveyed, 47% have access to clean safe water within their premises. 52% of them do not have access to clean water; they source their water from water vendors (aka Mai-ruwa), streams, rain-fall (in the rainy season) and from their host community. A few others buy water from tankers for ₦2000 a week.

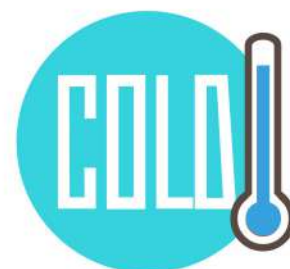
With solar power in the facilities, these PHCs can have access to clean water supply for Staff and patients.



All of these PHCs have to source their vaccines from other PHCs within or outside their area council.

41% [or 25] PHCs have cooling storage facilities to store vaccines. Some of them are stretched for storage capacity because they also store vaccines for other PHCs which do not have these facilities. 17 of the 25 PHCs have their cooling storage powered by Solar, which are most often supplied by NGOs, CSOs or International Donor Agencies. 3 of the 25 PHCs have their cooling facilities powered by both solar and grid electricity. 4 of the 25 PHCs have theirs powered by grid electricity.

Only 1 out of the 25 PHCs have their cooling facilities powered by inverters and the National grid.



57% or 34 PHCs surveyed do not have cooling storage facilities.



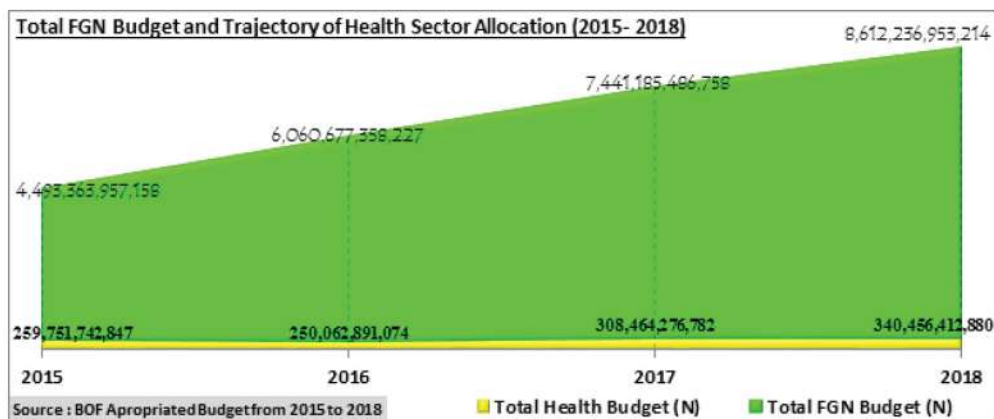
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PART FOUR:

Budgeting for Sustainable Energy in PHCs

Inadequate Health Allocation & Rethinking Budget Spending in Nigeria

Public funding of health care delivery systems in Nigeria is generally poor. In the last two decades, annual budgetary allocations to the health sector as a share of the total government expenditure either at national or sub-national have historically remained low and characterized by poor disbursement and low utilization rates. For example, in the last three years, the Federal Government's spending on health care stood at 4.23% only in 2016 and slightly dropped to 4.16% in 2017. "For the 2018 fiscal year, the sum of ₦340.46 billion appropriated for the sector represented approximately 3.95% (of the total national budget), making it the lowest in recent times." The meagre Federal Government's spending on health care also reflects the general patterns at the sub-national levels.



Aside from the poor budget financing for the health sector, the sector's capital budget utilization rate, considering the country's threatening health indices, is abysmally low, with an average rate of 61.7%.

Total FGN Health Sector Budget and Utilized Health Sector budget 2013 - 2017

Year	Health Capital Budget (N)	Utilized Sum of the Health Capital Budget (N)	Rate of Capital Budget Utilization (%)
2013	60,047,000,000	19,109,000,000	31.8
2014	49,517,000,000	18,688,000,000	37.7
2015	22,676,000,000	12,214,000,000	53.9
2016	28,650,342,987	27,809,904,863	97.1
2017	55,609,880,120	48,849,038,548	87.8
AVERAGE			61.7

Source: BOF BIR from 2013 to 2017

Within the inadequate capital budget utilization rate, a lot of fiscal wastages and lack of disclosure still thrive within the FGN health sector. For instance, according to data obtained from Budeshi, an open contracting platform, the National Primary Health Care Development Agency (NPHCDA), awarded 91 contracts for the construction of PHCs in 2014 and 2015 at a uniform sum of ₦21,986.893.00 per PHC to various contractors.

According to the source, dozens of Primary Health Care Centres built within this period across the country by the Federal Government at a cost of over ₦2 billion have remained unused; in spite of the desperate need for such health facilities²⁸. Many of these abandoned PHCs lack access to reliable clean energy to power them; as well as to create a pleasant working environment.

The ₦2 billion spent in the construction of these new PHCs that remain non-functional can provide off-grid solar installation to 667 PHCs across the country in less than 4 months at a cost of ₦3 million each (i.e. the case of Dakwa and Karu PHCs).

Budgetary Allocation to PHCs in Abuja

The table below shows the sub-national budgetary allocations for the health sector in the Federal Capital Territory, benchmarked against the overall statutory as well as the Health & Human Services Secretariat (HHSS) allocation from 2015 to 2017. The numbers show the apparent poor funding of the sector even at sub-national level.

FCT Statutory Allocations, Health & Human Services Secretariat Budgets vs Primary Health Care Development Board Allocations (2017 – 2015)

Year	FCT Statutory Allocation*	Health & Human (HHS) Services Budget	As % of FCT Statutory Allocation	PHCDB Allocation	As % of HHS Budget
2017	222,360,551,512	22,215,911,169	10	1,694,377,330	7.6
2016	241,467,231,031	19,935,648,357	8.3	2,387,985,564	12
2015	174,068,999,970	11,969,590,875	6.9	693,958,373	5.8
Average					8.4%

Sources: Health and Human Services Secretariat [HHSS] and FCT- PHCDB, Budget Estimates Printouts, September 2018. * Note: FCT Statutory Allocations (2017 – 2015) are extracted from multiple credible media reports

Even at the sub-national level, funding for PHCs has always been disadvantaged in resource allocations within the health sector, despite the relevance of PHCs in the delivery of cost-effective, efficient, quality, accessible and affordable health services to a wider section of the population; an average of 8.4% percentage was budgeted for the FCT PHCDB between the 2015 and 2017 fiscal years.

The PHC Support Systems Standard states that the responsibility for funding the PHC system lies with the Local Governments with support from the State. The Federal Government will provide further support in the form of technical support and capacity building. However, it is argued that the responsibility and financing of PHCs should not be solely on the Local Government but on all the tiers of government. In any case, the WHO suggests that developing countries should have a mechanism to bring both the health and fiscal authorities together under what it called macroeconomic commission on health for sustainable public health financing.



**N2billion
wasted**
in construction
of new PHC that
would be
nonfunctional
can provide solar
energy for an
entire 668phcs
across nigeria in
less than 4
months

28. ICIR Nigeria (October 28, 2016): ₦2 Billion Primary Health Centres Waste Away Across Nigeria <https://www.icirigeria.org/n2-billion-primary-health-centres-waste-away-across-nigeria/#> (Also visit Budeshi - <http://www.budeshi.org/#menu>)
29. See, Minimum Standards for PHCs in Nigeria Document; available Online: <https://www.medbox.org/minimum-standards-for-primary-health-care-in-nigeria/download.pdf>

It is therefore instructive to note that if the Ward Health System (WHS) is to represent the thrust or the basis of the national strategy for the delivery of PHC services using the political ward as the basic operational unit for the delivery of effective services, then there is an urgent need to pass into law the FCT PHCDB Bill to make FCT eligible to access the one per cent Consolidated Fund for Basic Health. According to FCT-PHCDB Executive Secretary, "The absence of a law establishing the FCT-PHCDB is hampering its ability to access the vital one per cent of the Consolidated Fund for Basic Health established under the National Health Act 2014 which would lead to improvement in the delivery of health services at the grassroots level³⁰."

Meanwhile, there is an argument on whether it makes sense to build new PHC structures when the existing ones have not been put into efficient use because PHCs lack adequate funding, among other challenges, to fulfil the purposes for which they were set up. Typically, the cost of building a model PHC ranges from ₦10 million to ₦40 million according to some estimates. In 2011, the total number of public PHCs in the FCT was put at 179. Currently, there are 248 PHCs in the FCT. 69 additional PHCs have been constructed between 2011 and 2018, representing an average number of 8 new PHCs per year. Evidently, majority of the PHCs are in deplorable conditions; requiring urgent attention to put them to proper use.

According to a finding from a monitoring exercise (CSJ, 2018: pxvi)³¹, it costs between ₦16 million-₦45 million to construct new PHCs even when the construction of PHCs did not take into consideration the deployment of staff that would manage the facilities. Are these allocations driven by the need to award contracts or are they driven by the need for improvement and expansion of the health service delivery?

The allocations for most of the PHCs have not been fully utilized, even where construction has taken place; facilities and equipment have either not been provided or where they have been provided are not functional. The report also alluded to the fact that the decision to build more PHCs was based on politics rather than on the assessed needs of the communities. The report went on to state that the need to rehabilitate and upgrade existing PHCs was paramount to that of building new ones. Ensuring access to clean reliable energy should be prioritised when rehabilitation and upgrades of PHCs is being considered.



The cost of building a model PHC ranges from
10 - 40
Million
Naira



The report also alluded to the fact that decision to build more PHCs was based on politics rather than on the needs of the communities.

30. See, Durumbah, Felix and Aminu, Salamat, "Primary Health care Boss doffs hat for FCT Minister, Perm Sec"; July 2018. <http://www.abujadigest.info/PHCdbBoss.PHC>

31. See, Monitoring Maternal, Newborn and Child Health Projects (Federal, Katsina and Kaduna States), Centre for Social Justice (CSJ, 2018).

Budgetary Allocation to power PHCs in the FCT

As reflected in the expenditure profile printout obtained from the FCT Primary Health Care Board, the three budget sub-headings with implication for access to electricity or energy for the PHCs under the PHCDB budget include the following: electricity charges (Code No. 22020201), maintenance of plants and generators (Code No. 22020411), fuels and lubricants of generators (Code No. 2220805). As the table below shows, the budgetary provisions for electricity charges, maintenance of plants and generators as well as fuels and lubricants of generators in the 2016 fiscal year for all the PHCs in the FCT stood at ₦2.5 million, ₦3.5 million and ₦9.45 million respectively. The corresponding allocations in 2017 fiscal year were ₦3 million, ₦4 million and ₦9.45 million respectively.

Budgetary Allocations to Power PHCs in FCT through various Sources of Energy

Year	Budgetary Allocations to Power PHCs in FCT (N'naira)				
	Fuels & Lubricants of Generators	Maintenance of Plants & Generators	Total (Generator Fuels & Maintenance)	Electricity Charge	Overall total
2016	9,450,000	3,500,000	12,950,000	2,500,000	15,450,000
2017	9,450,000	4,000,000	13,450,000	3,000,000	16,450,000

Source: Computed Expenditure Profile Printout obtained from FCT-PHCDB in September, 2018

The total budgetary allocations under the PHCDB's budget estimate for powering all PHC facilities (generators and electricity charges from the grid) across the six area councils of the territory for 2016 and 2017 fiscal years amounted to ₦15,450,000 and ₦16,450,000 respectively; that is ₦66,025 per PHC in 2016 and ₦66,330 per PHC in 2017.

Further disaggregation reveals that the PHCDB set aside about ₦890 and ₦1,008 monthly to pay for electricity bills per PHC (in their 2016 and 2017 electricity charges provisions).

Grid Electricity Charges Costs from 2016-2017 (₦)

Year	Electricity Charges Allocation		Number of PHCs	Per PHC Allocation		Per PHC Disbursement	
	Allocation	Disbursement		Annually	Monthly	Annually	Monthly
2016	2,500,000	400,000	234	10,684	890	1,709	142.45
2017	3,000,000	1,199,500	248	12,096	1,008	4,837	403

Source: Computed from Expenditure Profile Printout obtained from FCT-PHCDB, September 2018

Using the actual disbursement figure of ₦400,000 and ₦1,199,500 respectively, the actual monthly allocation per PHC for the payment of electricity bills on the average is a paltry sum of ₦142.45 and ₦403 in 2016 and 2017. This amount is wholly insufficient considering the fact that the average monthly electricity bills incurred by the PHCs is most often a lot more than the allocation provided in the budget. From our findings, an average PHC pays between ₦3,500 to ₦19,000 on electricity bill a month. It is no wonder several PHCs have been permanently disconnected by the utility company, Abuja Electricity Distribution Company (AEDC).



The total budgetary allocations under the PHCDB's budgets estimates for powering all PHC facilities (generators and electricity charges from the grid) across the six area councils of the territory for 2016 and 2017 fiscal years amounted to ₦15,450,000 and ₦16,450,000 respectively

Making budgetary provisions for defraying electricity tariffs and other utility charges does not mean the money is being released or available at the facility level.

The table below shows a budgetary allocation of ₦9.45 million for fuel and lubrication of all generators in PHCs in the FCT in 2017. Of this amount, only 10% was actually disbursed for spending. With 248 PHCs in the FCT,

Expenditure Profile: Fuelling and Lubricant Costs of Generators (2017)

Year	Fuels & Lubricants of Generators Allocation	Total Nos. of PHCs	Per PHC Annual Allocation		Actual Disbursement	Per PHC Annual Allocation	
			Annually	Monthly		Annually	Monthly
2017	9,450,000	248	38,105	3,175	947,000	3,819	318.25

Source: Computed from Expenditure Profile Printout obtained from FCT-PHCDB, September 2018

we can assume an average PHC is disbursed ₦318.25 a month from the budget to fund fuel and purchase for their generators. This is way less than what is actually spent by PHCs to fuel their generators (Field Survey, 2018).

This explains why some medical staff either spend out of their pockets to fuel generators or (and) charge patients extra fees to raise the funds to support these expenses. A similar trend of under budgeting also goes for the maintenance cost of the generators, at ₦285/month.

Expenditure Profile: Maintenance Costs of Generator and Plants (2016)

Year	Maintenance of Plants & Generators		Number of PHCs	Per PHC Allocation		Per PHC Disbursement	
	Allocation	Disbursement		Annually	Monthly	Annually	Monthly
2016	3,500,000	800,000	234	14,957	1,246	3,419	285

Source: Computed from Expenditure Profile Printout obtained from FCT-PHCDB, September 2018

Public funding for powering the PHCs in the FCT is very low. While access to reliable energy has been positively linked to the efficient functioning of health facilities especially at night, budgetary provisions to support the availability of uninterrupted electricity supply to PHCs is almost non-existent.

The budget line items in the health sector both at national and sub-national levels, clearly show that the Ministry of Health is not considering reliable electricity as central to improving the health delivery services of public health facilities and PHCs all together; else actionable steps should have been mapped out and action taken to re-energise primary health centres across Nigeria in collaboration with other key ministries and international agencies. Over ₦3.8 billion was allocated to counterpart funding of various health interventions, whereas no funds are tied to improving access to reliable energy for PHCs where a majority of Nigerians seek treatment.



A budgetary allocation of ₦9.45million for fuel and lubrication of all generators in PHCs in the FCT in 2017. Of this amount only 10% was actually disbursed for spending.



An average PHC is disbursed ₦318.28 a month from the budget to fuel and lubrication their generator.

Conclusion

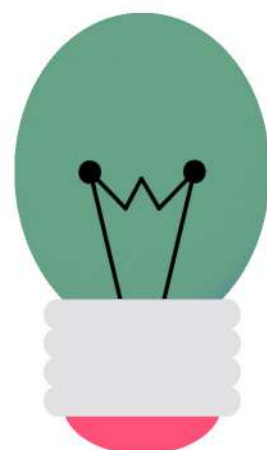
The study explores the energy situation in Primary Health Care Centres (PHCs) in Nigeria, using 60 PHCs in the Federal Capital Territory, Abuja as a case study. The central finding of the study is that access to reliable energy is critical for the optimal functioning of Primary Health Centres (PHCs) and this can promptly be delivered to PHCs through the provision of off-grid Solar PV.

The study confirms the deplorable conditions of many PHCs facilities in Nigeria and notes the general lack of regular and reliable energy to power these PHC facilities. As noted, availability of reliable energy to run 24-hour health services at the PHCs is critical if health services are to be rendered around the clock. Intrinsically, there is need to prioritize the energy needs of the PHCs in order to run the 24-hour services, especially when Nigeria's electricity grid remains unreliable and limited. Off-grid renewable energy both for lighting, heating and cooling, should be mainstreamed into PHC facilities and design programs.

Findings

I. Optimum functionality of health centres and hospitals is tied to their access to steady affordable energy. Without access to energy, health centres cannot deliver timely and quality health care services to the population. Thus, access to reliable energy has a direct effect on the quality of health of the citizens.

II. Public funding of health care delivery systems in Nigeria is generally poor. Historically, especially in the last two decades, annual budgetary allocations to the health sector as a share of the total government expenditure either at national or sub-national levels have remained low, been characterized by poor disbursement and low utilization rates. In any case, if governments in Nigeria have never complained of lack of funding for elections and in fact always raise money to conduct increasingly expensive elections, there is no probable reason why the same governments cannot find money to provide affordable and quality health care for the people. Perhaps, it is another confirmation that governments consider Nigerians' health as a non-issue.



Without access to electricity, health centres cannot deliver timely and quality health care services to the population

III. PHCs funding has always been disadvantaged in resource allocations within the health sector. In spite of the fact that the PHCs have been identified as the best way for delivering cost-effective, efficient, quality, accessible and affordable health services to a wider proportion of the population, only about 8.4% of the budget was allocated for the FCT-PHCDB between 2015 and 2017 fiscal years.

IV. It is also apparent that public funding for powering the PHCs in the FCT is very low. The amount budgeted at the policy level is always inadequate and at variance with the resources needed at facility level. For example, the average monthly electricity bills incurred is always triple the budgetary provision.

V. Distribution Companies continually disconnect many PHCs for none payment of electricity bills; sometimes for as long as a year or more. It is, however, important to appeal to electricity distribution companies not to treat public PHCs as normal businesses which can be disconnected permanently for none payment of electricity bills.

VI. PHCs, particularly those located in remote places, should be treated as social enterprises by distribution companies and state governments. PHCs should benefit from subsidies that are available under the Power Consumer Assistance Fund as encapsulated in part VIII of Electric Power Sector Reform Act of 2005. The Act made provisions for the Power Consumer Assistance Fund to be used to subsidize underprivileged power consumers as specified by the Minister [of Power] as stipulated by S. 83 (1 and 4). As such, PHCs, particularly those located in the remote locations, are justifiable candidates to access the Power Consumer Assistance Fund.

VII. The introduction of solar power has the ability to significantly improve health care delivery to poor and rural communities. This is because, health facilities with solar power performed significantly better than those without; thereby establishing a connection between access to reliable energy by health facilities and better health services delivery in rural communities.



PHC has always been disadvantaged in resources allocations within the health sector.

VIII. The use of solar powered refrigeration has enabled national immunization programmes to expand their coverage to remote populations and to ensure quality vaccines were delivered to children and their mothers. Renewable energy system has made it possible to provide vaccines and other basic health services in remote areas. Renewable energy technology would thus better serve the needs of rural health centres and the community at large. However, issues of standards, security and maintenance of solar cooling systems and PVs, as well as their maintenance, need to be reviewed for more lasting guarantees and warranty.

Recommendations

1. Though there is a need to increase the budget allocation to the health sector, specifically to Primary Health Care Development, there is also the very urgent need to push for and inculcate the practice of transparency, accountability, better planning and better management of resources in the entire process. Also, care must be taken when building new PHCs such that proper provisions are made to ensure they are functional. And central to their functionality should be adequate provision for clean reliable energy to power the facility and equipment in the PHCs.
2. If designated authorities can provide basic infrastructure and amenities at the PHCs, health care service delivery will be exceptional in Nigeria. This can begin with the provision of steady water supply through the installation of boreholes or connection with relevant water corporation bodies. Additionally, steady clean energy can be provided via solar power systems. The solar power systems can also be used to power water pumping machines to provide running water throughout the PHCs.
3. Existing security gaps should be plugged and infrastructure improved before installing new equipment and solar power systems, otherwise, efforts made to improve health facilities and health service delivery will be futile.



**There is need
for
transparency,
accountability
and better
planning.**

4. There is need to pass the FCT PHCDB Bill to make FCT eligible to access the one per cent Consolidated Fund for Basic Health. The absence of a law establishing the FCT-PHCDB is hampering its access to the vital one per cent of the Consolidated Fund for Basic Health established under the National Health Act 2014. This would have the effect of strengthening and improvement the delivery of health services at the grassroots level.

5. All PHCs connected to distribution networks of electricity distribution companies should immediately be metered. PHCs disconnected from the distribution networks of electricity distribution companies should be reconnected. All PHCs facilities should also be connected to energy supply either on-grid or off-grid with adequate overhead costs set aside for regular payment of electricity bills.

6. Deploying renewable energy systems to underserved and unserved areas should be seen as a national priority. It is important to communicate the appropriate role of renewable energy in providing rural health care services as a serious option for electrifying rural health clinics.

7. The legislative framework provided under parts IX of the Nigeria's Electric Power Sector Reform [EPSR] Act of 2005 can be explored to create macro level fiscal space to accommodate PHCs, particularly those located in remote locations in national rural electrification programme. To this end, the Rural Electrification Agency (REA) in collaboration with National Primary Health Care Development Agency (NPHCDA) can provide 2kWh off grid solar PV systems with battery backup to thousands of PHCs across the country.

8. To address the poor and inadequate refrigeration facilities in the FCT and the country at large, Medical association boards, CSOs, and other eligible representatives of the citizens should collaboratively work hard to appeal to and demand from Local government councils, state governments and politicians at federal levels to support, and provide a cold chain storage system for effective and efficient health care delivery as well as working solar PVs.



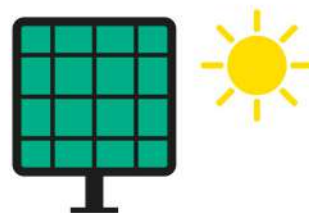
There is need to pass the FCT PHCDB Bill to make FCT eligible to access the one per cent Consolidated Fund for Basic Health.

9. Local, State and National Primary Health Care Boards, through the Ministry and Commissions of Health should fund allocations for counterpart funding to ensure the deployment and installation of renewable energy in PHCs with capacity large enough to power water boreholes. This can also feed communities with light and water. While driving their international goals, international donor organisations should also realise that access to reliable energy supply is key for developing Nigeria's health sector space. While driving millions of dollars into vaccines and enlightenment programmes, provisional grant support should also go into powering PHCs with reliable clean energy.

10. Renewable Energy Developers in Nigeria should be able to stand the true test of global standards. Solar PV deployed in PHCs must have warranties of at least 4 years. Standard Organisation of Nigeria (SON) needs to also raise to the task of curbing fake solar products coming into Nigeria.

11. Also medical staffs in the PHCs need to be trained on proper maintenance of the solar systems.

12. The Rural Electrification Agency (REA), while driving rural electrification and off-grid renewable energy projects in rural areas, should also factor in electrifying PHCs into their projects. There is need to also explore possible bankable business models around powering PHCs, especially where they have excess clean off-grid power.



**Solar PV
deployed in
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years.**

APPENDIX

Published Articles on the Surveyed Primary Health Care Centres:

- Gozie Bridge (September 28, 2018) Dagri : The Price of Power By Shine Igoh <https://thegoziebridge.wordpress.com/2018/09/27/dagri-the-price-of-power/>
- Gozie Bridge (September 28, 2018) Challenges of health care in Abuja community By Shine Igoh <https://thegoziebridge.wordpress.com/2018/09/15/challenges-of-health-care-in-abuja-community/>
- Kapital Fm, 15 August 2018 - Dakwa PHC Celebrates 2 years Uninterrupted Power Supply . <https://kapital929.fm/dakwa-PHC-celebrates-2-years-uninterrupted-power-supply/>
- Kapital Fm, 30 September 2018 - The Curious Case of The Nigerian PHC <https://kapital929.fm/the-curious-case-of-the-nigerian-PHC/>
- Kapital Fm, 4 September 2018 - A Nearly Perfect Centre of Wasted Treasures-Tukpechi PHC <https://kapital929.fm/a-nearly-perfect-centre-of-wasted-treasures-tukpechi-PHC/>
- Leadership Newspaper, 24 August 2018: Poor Energy Limits Efficiency of Dutse Health Facility. By Ruth Tene Natsa <https://leadership.ng/2018/08/24/poor-energy-limits-efficiency-of-dutse-health-facility/>
- Leadership Newspaper, August 10, 2018. Solar Energy Boosts Access To PHCs In Dakwa Community By Ruth Tene Natsa . <https://leadership.ng/2018/08/10/solar-energy-boosts-access-to-PHCs-in-dakwa-community/>
- Leadership Newspaper, September 7, 2018. Bridging Power Challenges Through Energy Audit. By Ruth Tene Natsa <https://leadership.ng/2018/09/07/bridging-power-challenges-through-energy-audit/>
- NaijaCynthia Blog, August 22, 2018. How Constant Power Supply Can Transform Healthcare In Galadimawa Community by Cynthia Anaele <https://www.naijacynth.com/2018/08/how-constant-power-supply-can-transform.html>
- NaijaCynthia Blog, September 06, 2018 - 2 Years of Constant Power Supply, Dakwa PHC Rejoices by Cynthia Anaele <https://www.naijacynth.com/2018/09/2-years-of-constant-power-supply-dakwa.html>
- NaijaCynthia Blog, September 20, 2018 Conscious Look At The Deplorable State Of Kuchiko Primary Health Center by Cynthia Anaele <https://www.naijacynth.com/2018/09/a-conscious-look-at-deplorable-state-of.html>
- Premium Times, 13 October 2018: SPECIAL REPORT: How poor electricity supply, inadequate facilities affect storage of vaccines, immunisation in Nigerian capital. by Ayodamola Owoseye and Nike Adebawale <https://www.premiumtimesng.com/news/headlines/290065-special-report-how-poor-electricity-supply-inadequate-facilities-affect-storage-of-vaccines-immunisation-in-nigerian-capital.html>
- Premium Times, 6 September 2018 - How poor power supply cripples Abuja primary healthcare centres By Ayodamola Owoseye <https://www.premiumtimesng.com/health/health-features/282700-how-poor-power-supply-cripples-abuja-primary-healthcare-centres.html>
- The Cable, 25 August 2018. From kerosene lamp to solar power: How Abuja health centre got past its worst nightmare by Chinedu Asadu. <https://www.thecable.ng/kerosene-solar-abuja-healthcare-centre-got-rid-worse-nightmare>
- The Cable, September 16, 2018 Inside Abuja PHCs where babies are born with the aid of kerosene lamp, torchlight- by Chinedu Asadu <https://www.thecable.ng/child-delivered-torchlight-sad-tales-abandoned-phcs-abuja>
- The Cable, September 29, 2018 - Saving Nigeria's primary health care centres from ruin by Chinedu Asadu <https://www.thecable.ng/saving-nigerias-primary-healthcare-centres-ruin>



SITUATIONAL REPORT FROM THE FIELD

1. Gwagwalada Area Council

The solar power systems for the storage of vaccines were observed at the PHCs in this Area Council, however, the bulk of them were non-functional. The staff of the PHCs were not given the technical know-how, neither were they taught proper maintenance. This exacerbates already existing energy problems brought about by the non-connection to the National Grid or epileptic power supply. Health workers interviewed by our observers believe that improved access to energy will contribute to health service delivery efficiency. Patients on admission in some of the PHCs complained of heat and decried the lack of electricity. They complained that there was nothing to control mosquitoes and also stated that the availability of functional fans, at the very least, would prevent the multiple mosquito bites they suffer. Our officers visited other PHCs with functional solar refrigerators but health workers present complained that some of the solar installation were of poor standard and was insufficient to power the solar refrigerators.

The women in some of the communities visited raised concerns about the delivery conditions in the PHCs and how it affected them. They stated that they often refused to be placed on admission at the PHCs, even preferring to receive post-natal care in their homes because of how unbearable the heat got sometimes. We also learned from health service workers and patients present at the PHCs that the use of battery operated torchlights, rechargeable lanterns and lighting from mobile phones were normal for deliveries at night time. When asked how they charged their mobile phones and rechargeable lanterns, some of the health workers present stated that they used generator-powered commercial charging points in the community. Others stated that they had back up fuel operated generators which they only used in emergency situations. Funding for the running of the generators is provided from out-of-pocket by hospital staff or from revenue generated from the sale of drugs, medical supplies and from charges for hospital services. Some PHCs visited have no access to clean water and have to get water from local water salesmen (mai-ruwa). Payment for water was also covered from out-of-pocket by hospital staff or from revenue generated from the sale of drugs, medical supplies and from charges for

hospital services. Some community members stated that the women preferred patronizing the township clinic because the local PHCs lacked equipment and amenities for attending to patients. There was a common thread of complaints in the communities visited and it centered on access to energy and water. The people prayed for off-grid sustainable energy solutions; with solar energy being their preferred choice. Also, security was a huge challenge and some PHCs have no access to water to the extent that they have to fetch water from wells in the village or nearby streams. Some PHCs visited had laboratories which were donated by international donor organisations, NGOs and other civil society organisations.

Another common complaint was what staff of the PHCs connected to the grid considered to be outrageous bills brought by the distribution companies using estimated billing. A certain PHC could no longer afford to pay the estimated bills and following their refusal to pay bills, AEDC officials disconnected the PHC and went away with their electricity cables. The PHC never bothered to retrieve the cables because according to the staff, they never had electricity anyway (so there was no point).

It was noted that fuel powered generators are not common place in PHCs, especially the ones located in remote communities, while the PHCs which had generators struggled with raising funds to power them.

Health care workers provide best services with minimum resources, and this was observed on a visit to a PHC where a pregnant woman in labour had to be delivered of her baby in a car outside the clinic. Water was not available to clean her up following the delivery. The attending staff had to buy water from a local water sales man (mai-ruwa) to resolve the issue.

Our field officer also observed while on a visit to a PHC on a designated immunisation day, that the PHC was crowded with women and their new born babies waiting to get vaccinated. There was growing discomfort of the children, their mothers and even the working staff because power was out and the waiting room was hot and crowded.

During interviews with the indigenes, a lot of the women stated that they avoided visits to this PHC at night because there was no electricity. In a particular instance a patient paid for water from mai-ruwa because the PHC had no money to pay because of lack of funding. The situation was so bad that they could not afford to pay for waste disposal, and were subject to the charity of the local councilor.

On our field officer's visit to another PHC, another child birth was witnessed and it was interesting to note that this PHC had no water. The midwife had to get water from the melted ice in the solar fridge. Another woman in labour had been sent back home the previous night because there was no electricity to deliver her child safely even though she was 6 cm dilated. Residents in remote areas believe that the lack of electricity and facilities contribute to PHCs being unable to operate daily. They have however, become accustomed to it and in situations of emergency they are forced to travel a distance to access better health care services. In other PHCs immunization exercises are conducted once a month.

Aspirations

1. The provision of constant electricity preferably through a solar power system because of the abundant sunshine that is more than enough to power whatever solar installation they are given.

2. Security of the PHCs poses a huge challenge. They are often burgled and vandalized. The lives of staff and patients are constantly at risk. Indigenes believe that steady supply of electricity to the PHCs can be used to illuminate the clinics and surroundings at night, thus improving security, as well as contributing to efficient health service delivery.

3. The provision of solar-powered boreholes to ensure the flow of clean water through-out the PHCs will also lead to improved health service delivery. This will also be helpful to residents.

4. Residents also want improved health services at the PHCs.

5. The dearth of health workers in remote rural communities is also a big problem and the provision of additional man-power will help.

6. The PHCs are largely dependent on the Area Council and funding is a problem. Constant electricity supply could lead to increase in revenue generation which can be used to augment existing running costs and for self-sufficiency of the PHCs.

7. Provision of good and hygienic toilets.

8. Provision of infrastructure such as good roads to improve access to the PHCs





2. Kuje Area Council

PHCs in this Area Council suffer from lack of electricity that also affects health service delivery. Medical equipment which require electricity to operate are not used to their optimum capacity and in order to be fully functional, revenue to run generators constantly will be required. Inadequate electricity supply prevents pregnant women in labour from visiting PHCs at night for the delivery of their babies.

Aside from electricity, other challenges to PHCs in this Area Council are the lack of access to potable water and security. Workers believe that if these problems are resolved, their services will improve considerably. PHCs connected to the National Grid observed that there was a general sense of satisfaction by the community and that they functioned better when electricity was supplied. They went further to state that laboratory tests and nighttime services are provided without needing to refer patients to other clinics.

It was also observed that some of the PHCs were either built or renovated by the residents of local communities.

Some health workers interviewed at PHCs

disconnected from the grid stated that they were cut off because they had refused to pay the excessive estimated billing charges. Such PHCs have had to rely on generators for the supply of electricity. However, having the generators also come with their own challenges as funding for fueling the generators is not available.

Our field officer also observed that solar power systems installed to power the vaccine storage fridges were not working because staff are not taught proper maintenance of equipment and cannot afford to repair them when they break down. Currently, people do not trust the solar power systems because they break down soon after their installation and once that happens, the systems are ignored and packed away.

The prevalent lack of electricity and manpower affect health service delivery. Staff at the PHCs complained that residents did not utilize their services because they scarcely had electricity and water. Some patients and their families are sometimes asked to go home to fetch water for their use when receiving treatments. This also brings to light the water scarcity several PHCs have to deal with.

Staff shortage, lack of security, a dearth of laboratory technicians, no water supply and inadequate electricity are problems faced across board in PHCs located in rural communities.

Midwives also averred to the fact that some of them have had to use the torchlights on their mobile phones to conduct deliveries at night. Where complications occur during childbirth, the patients are referred to bigger hospitals; placing the mothers and their unborn babies at greater risk.

Aspirations

1. Reduction of maternal mortality can be achieved when women can be assisted to deliver their babies safely at night;
2. Provision of constant electricity and running water in the PHCs in order to offer improved services;
3. Improved drug availability and better health worker-patient relationships;
4. Installation of quality and robust solar power system which do not break down soon after installation, as well as the provision of proper training to staff on proper maintenance. Support from stakeholders is also desirable and welcome;
5. Installation of pre-paid electricity meters.
6. Increased and properly trained manpower

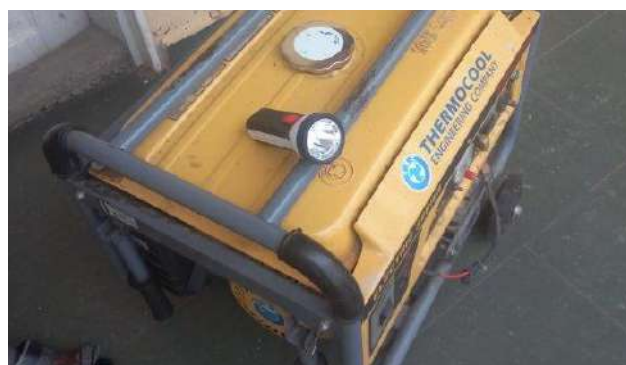


3. Kwali Area Council

PHCs connected to the National Grid are not provided with pre-paid meters, thus, having to struggle to pay estimated billing charges which they consider outrageous. Staff went on to state that they preferred being without power supply to dealing with estimated billing charges because electricity was out most of the time. Other PHCs stored water in containers, did not offer overnight admission services and lack of electricity stopped several of them from running night shifts. Some of the PHCs our field officer visited needed renovations because their structures were dilapidated. Security lapses also exposed PHCs to thefts and vandalism. Though several of the PHCs had solar refrigerator installed, it was observed that they did not work, thus, leaving communities without access to vaccines and storage facilities.

Aspirations

1. Area Council authorities are enjoined to support the PHCs in the provision of constant electricity to improve service delivery;
2. The provision of solar power systems and generator sets, coupled with capacity building on the repairs and maintenance of electrical equipment and solar power systems.
3. PHCs facilities should be upgraded to proper operating standards.
4. Attention should be paid to properly securing PHCs;
5. Renovation of the PHCs and the provision of properly trained manpower.





4. **Abuja Municipal Area Council (AMAC)**

AMAC predominantly covers the urban parts and a few other semi-urban parts of the FCT. The PHCs visited mostly enjoyed steady power supply. Security was however a problem. Skilled and trained manpower, volunteer health workers were also not consistent.

Women in some of the communities stated that they were afraid of visiting PHCs at night for security reasons. Staff believed that increased electricity supply will allow for provision of better security which will encourage patients to visit the PHCs at night. Additionally, laboratories will be more functional and access to clean water will be guaranteed. Solar power systems were donated to a few PHCs to provide constant electricity to power the vaccine storage fridges. Some of the PHCs had more than one power generating set.

The comprehensive PHC in Gidan-Mangoro, Orozo had two generators as back up due to excessive power cuts. PHCs situated in rural parts of AMAC suffered from poor power supply and they received vaccines from other PHCs because they had no storage facilities, PHCs that run night shifts in rural communities rely on rechargeable and kerosene lanterns for illumination when the grid fails. Generators are only used in emergency situations and for laboratory services.

Though compared to other area councils, PHCs in AMAC enjoy better electricity supply, yet inconsistent electricity supply still persists. Our field officers also observed that Health Centres with boreholes rely on fossil fuel powered generators to pump water. Other PHCs depend on their host communities for water.

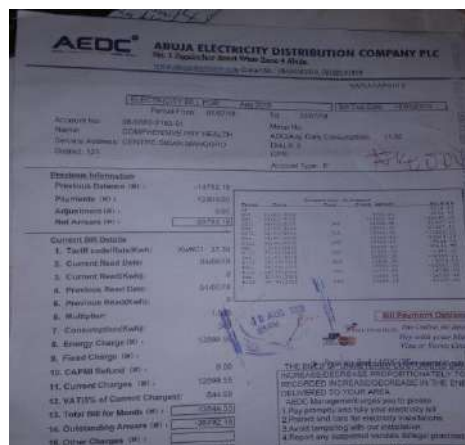
The field officer also observed that there were lots of broken appliances due to lack of

maintenance of equipment. Thereby, faulty solar power systems are ignored until they stop functioning completely.

Women in rural communities decry the security situation around some PHCs at night due to lack of illumination. The PHC in Galadimawa is unable to use their laboratory equipment because they are not connected to the National Grid and lack of security has prevented them from acquiring a generator. Kuchingoro PHC can be considered as one of the few privileged PHCs because it has 8 solar panels to power its vaccine storage equipment and a 5kva generator to power the entire facility when the power supply is out. Other PHCs do not enjoy these electricity privileges as some of them do not have generators neither do they have solar backup systems. There have been situations where patients have been sent home and asked to return later for laboratory test results because electricity was out. The cost of estimated billing charges from the electricity distribution companies was a major complaint for clinics without pre-paid meters.

Aspirations:

1. Provision of steady power to encourage increased patronage.
2. Access to steady and clean water supply.
3. Increased and improved security.
4. Connection to the National Grid for PHCs that have no access to electricity and are not connected.
5. Installation of pre-paid meters



5 Bwari Area Council

Inadequate power supply is a major problem and some of the PHCs hoped that they can be provided with generators. Sometimes, patients are forced to seek health care services in private clinics or the closest general hospital because health care services were negatively affected by the lack of electricity to the extent that they are unable to run night shifts or conduct laboratory tests.

Upon visiting different PHCs, solar panels are sighted on the roofs for the powering of solar fridges used to store vaccines. However, some of the fridges require urgent maintenance and upgrades.

Several of the PHCs decried the lack of patronage by residents which they attributed to the lack of steady electricity supply. Barangoni community indigenes barely visited the clinic and chose to patronise local pharmacies

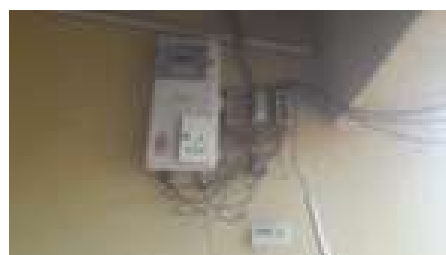
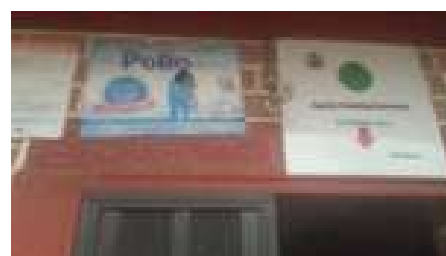
Usman Dam PHC enjoys constant water and electricity supply which may be attributed to its proximity to the Lower Usman Dam. Kuchiko community PHC was built by a National Youth Service Corp Member, which is a commendable effort. The PHC is however not connected to the National Grid and sterilization of hospital equipment is done by boiling water in pots heated with kerosene stoves.

Aspirations:

1. Provision of constant electricity supply will lead to improved services as well as the implementation of night-time care. Furthermore, ability to conduct more laboratory tests will be greatly improved, thereby aiding revenue generation and reduction of the PHCs' dependence on government funding as the

stipends PHCs receive [from the government] are meagre and insufficient.

2. Improved and uninterrupted electricity supply and access to clean water.
3. Alternative energy sources and off-grid solutions due to inconsistent electricity supply.
4. Reduction of running costs and the ability to generate revenue to augment expenses.



6 Abaji Area Council

Abaji Area Council hosts several PHCs with large structures but lacking manpower, adequate equipment, medical supplies, and furniture.

PHCs in the communities condemned the lack of adequate provision given to their community PHC. Community leaders have tried to reach out to the Area Council authorities but there has been no response.

We learned that the Area Council contributes to the payment of salaries however, electricity bills and running costs of the PHCs were covered by the clinics. Other PHCs are dependent on the charity of NGOs for the provision of drugs, family planning, contraception, antiretroviral treatments etc.

The vaccine storage fridges are powered by solar system. However, some of the PHCs could not store vaccines because the systems had stopped working and their appeals to the Area Council for repairs have not been acknowledged.

Health workers here stated that they believed a steady supply of electricity will improve their delivery of health services. Ayawa Community PHC offers night time services with a Resident Doctor who also resides in the community. This has encouraged patronage from community members because several locals expressed their satisfaction with the care they received. Some PHCs had boreholes but they had no electricity to power the boreholes. Others buy water from the local water salesmen (mai-ruwa) and water tankers.

Another interesting observation was the presence of a Mikano generator at the New Township Clinic in Niken, Sabon Gari where the medical team was attending to patients at night with battery operated torchlights and lights from their phones. However, they have a solar powered system (which was recently

donated by the EU) installed to store vaccines. This helps the PHC provide vaccines to the community and nearby facilities lacking vaccine storage. Patients are only referred to the general hospital where health workers are unable to address their complaints.

Nurses and midwives do most of the work because there are no permanent doctors assigned to the PHC. We observed that several clinics were provided with equipment ranging from inverters, to solar fridges and generators. However, we find that within a short time these gadgets develop faults that are never repaired and consequently abandoned. At other times, requests are made to donors for repairs. Security continues to present challenges and inadequate electricity supply exacerbates the risks.

Aspirations:

1. Steady water and electricity supply to encourage 24-hour service and increased community patronage.
2. Increased Manpower and funding to pay staff salaries.
3. Renovation of dilapidated buildings and refurbishing of hospital equipment and furniture.
4. Maintenance of hospital facilities.
5. The provision of funding to offer subsidised ante-natal services.
6. Increased security around the PHCs.
7. Improved infrastructure and access roads.
8. Ability to generate revenue to augment running costs.
9. More attention from government



Template to Monitor the Energy Audit/Experience for Primary Health Care (PHC) Centres																					
Date of Tracking:		Name of Tracking Officer:		Name/ Address/ Location of the PHC:																	
Name of Area Council:		Classification of PHC location:		Name of Medical Staff In-Charge:																	
1) When did the PHC commence Operation?		2) Do community members use the PHC or do they travel a distance for health care? Yes ☐ No ☐		3) On the average, how many persons are attended to daily by the PHC?		4) Number of Workers in the PHC Note: this is the total number of staff in the PHC (both shifts) Doctors ☐ Nurses/Midwives: ☐ Laboratory Technician ☐ Accountant/Cashier ☐ Pharmacist ☐ Health Assistant ☐ Store Keeper ☐ Sanitary/Cleaners: ☐ Security: ☐ Others: ☐ Total =		5) Is the PHC Connected to the National Grid (Access To Grid Electricity, i.e. electricity from the distribution companies like AEDC/PHCN/NEPA) Yes ☐ No ☐		6) If YES, How many hours of electricity does the PHC have in a day? 1 - 5hrs/day ☐ 6 - 10hrs/day ☐ 11 - 15hrs/day ☐ 16 - 20hrs/day ☐ 21 - 24hrs/day ☐ NOTE: if the answer to question 5 is YES, please do not respond to question number 11, 12 and 13		7) When Does the PHC get electricity more? Morning hours ☐ Afternoon Hours ☐ Night Hours ☐ Note: Any Information i.e. full or low electric current, fluctuating currents, etc:		8) Where the PHC is connected to national grid, how does the PHC get and pay the electricity bill? 8a) Does the PHC use an installed Prepaid Meter provided by the distribution company to pay its electricity bills? YES ☐ NO ☐ 8b) Does the PHC gets its electricity bill, from estimated bills that comes from the distribution company or community (shared electricity bill) YES ☐ NO ☐ 8c) On the Average How much does the PHC pay for Electricity in a Month? Between And		9) Where the PHC is connected to Grid electricity (PHCN/NEPA), where does the PHC/Hospital source their Electricity for illumination/To See at Night? Note: Can fill number/tick in more than one space Use Candle Lights ☐ Use Kerosene/Bush Lamps ☐ Use Generator Sets ☐ Use Rechargeable Lamps ☐ Use Inverters/Battery ☐ Use Solar Power ☐ Use Battery Touch Light ☐ Use Mobile Phone Touch app ☐ NONE/use Nothing ☐		10) When the PHC is connected to Grid electricity (PHCN/NEPA), where does the PHC/Hospital source their Energy for Heating/Boiling? Note: Can fill number/tick in more than one space Firewood /Charcoal ☐ Kerosene Stove ☐ Clean cook Stoves ☐ Gas-Cooker ☐ Electric Cooker/ Electric Boilers ☐ Solar Boilers ☐ NONE/use Nothing ☐		11) If the PHC IS NOT CONNECTED TO THE GRID, For How long has the PHC operated without connection to the National Grid? (For how long have the PHC not being connected to the distribution companies like AEDC/PHCN/NEPA – meaning the PHC is off-grid?) How many: Days: Weeks: Months: Years: Note: Any reason why they were not connected to the national grid?	

12) When there is NO grid electricity (PHCN/NEPA), where does the PHC/Hospital source their Electricity for illumination/To See at Night? Note: Can fill number/tick in more than one space Use Candle Lights ☐ Use Kerosene/Bush Lamps ☐ Use Generator Sets ☐ Use Rechargeable Lamps ☐ Use Inverters/Battery ☐ Use Solar Power ☐ Use Battery Touch Light ☐ Use Mobile Phone Touch app ☐ None/use Nothing ☒	13) When there is NO grid electricity (PHCN/NEPA), where does the PHC/Hospital source their Energy for Heating/Boiling? Note: Can fill number/tick in more than one space Firewood /Charcoal ☐ Kerosene Stove ☐ Clean cook Stoves ☐ Gas-Cooker ☐ Electric Cooker/ Electric Boilers ☐ Solar Boilers ☐ NONE/use Nothing ☒	14) Does the PHC have a storage facility to store vaccines, IV fluid (drips) /blood bank and drugs in a Cool Dry Place (i.e. like a fridge) ☐ Yes ☐ No 14a) If Yes, how is it powered? ☐ Yes ☐ No 14b) If NO: how does the PHC save the Vaccines or have access to Vaccines?	15) Does the PHC run for 24 hours? ☐ Yes ☐ No 15a) If Yes, when does the PHC begin the Night Shift? ☐ Yes ☐ No 15b) If No Night Shift, when does the PHC close and Why is there No Night shift?	16) Do the assigned Doctor Work during the Night Shift Often? ☐ Yes ☐ No 16a) If No Why?	17) Does the PHC conduct child delivery operations at Night, when there is NO Grid Electricity (light from AEDC/PHCN/NEPA)? ☐ Yes ☐ No 17a) If Yes, How?	18) Does the PHC admit patient for overnight admission for treatment? ☐ Yes ☐ No 18a) If NO: Why?
19) Do You Have Access to Water in the PHC ☐ Yes ☐ No	20) If YES? Where does the PHC get water from? Go to Bore Hole ☐ Water Hawkers/Mairuwa ☐ Buy Pure Water ☐ Use Well Water ☐ From Stream/River ☐ Use Rain Water ☐ People in Community Give PHC Water/Water from Patient ☐ No Water At All ☐	21) Where/when there is NO Access to Clean water in the PHC, how do the medical staffs wash their hands after administering treatment to a patient and operations?	22) Does the PHC have a laboratory testing room/equipment ts that depend on Electricity? ☐ Yes ☐ No	22a) If YES: To what Extent does the current electricity situation affect the laboratory service i.e time of getting a test result, or the lab functionality?	22b) If NO, why does the PHC not have a laboratory?	

INSTRUCTION: PLEASE TICK JUST A BOX

23. How would you rate the current state of Electricity Supply to the PHC?

Excellent ☐ Good ☐ Average ☐ Poor ☐ Very Poor ☐ No Electricity/Not Connected ☐

24. To what extent has the current state of electricity supply affected the health service delivery to the community in the following regards:

	Positive (Good) Impact		Negative (Bad) Impact	
	Very High	Very Low	Very High	Very Low
Powering Telephone	☐	☐	☐	☐
Lighting for the patients and medical staffs	☐	☐	☐	☐
Water for the PHC and community	☐	☐	☐	☐
Security Lighting	☐	☐	☐	☐
Responding to Night Emergencies	☐	☐	☐	☐

25. To what extent has the current supply of electricity affected your job performance as a staff of the PHC? (NOTE TO 3 STAFF ONLY)

Designation	Very Satisfied (Happy)	Satisfied	Average	Not Satisfied
1.				
2.				
3.				

26. To what extent has the current supply of electricity affected your level of satisfaction as a patient? (NOTE TO 3 PATIENTS ONLY)

Patient	Very Satisfied (Happy)	Satisfied	Average	Not Satisfied
1.				
2.				
3.				

27. To what extent has the level of electricity supply to the PHC affected your satisfaction as a community person? (NOTE TO 3 COMMUNITY REPRESENTATIVES ONLY)

Name of the 5 Community Representative	Very Satisfied (Happy)	Satisfied	Average	Not Satisfied
1.				
2.				
3.				
4.				
5.				

28. What is the size of the Generator Set (if the PHC used generator set)?

 	1kva – 2kva	☐
 	2.8kva – 3.5kva	☐
 	3.8kva – 4.8kva	☐
 	5kva – Above	☐

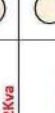
29. How many hours a day does the generator run on the average?

30. How much is spent to fuel the generator in a day/week/month?

31. Where does the fund for running the generator come from (source of funding for the generator)?

32. Will improved water supply increase the number of patients visiting the hospital?

33. Will improved electricity supply increase the number of patients visiting the hospital?



[illegible]

Other Remarks/Additional Information (if any):

- *Advice from the medical staffs on what they would like the stakeholders and government to do about the power condition of the PHC?*
- *What are the thoughts of the community members with regards to service delivery at the PHC and electricity supply to the PHC and the community?*
- *What potential do the community people, especially the women see in the PHCs, if reliable electricity can be provided?*
- *What potential do the medical staffs see in the PHCs, if reliable electricity can be provided; what other health services would steady electricity supply attract to the PHC ?*

Evidence/Mean of Verification: Snapped Photos, Scanned Copies of Docs (if any), Interview recordings, etc.

- Photo of electricity sources i.e. generator, lamb stoves, etc*
- Photo of the PHC, the name or signboard,*
- Photo of some medical staffs interviewed*
- Photo of the field officers that visited the PHC*
- Photo of patients interviewed (at least 2)*
- Audio recording of interviews (can be done with phone)*
- Scanned of snap copy of electricity bill/pre-paid meter cards or records*

Author**Published by**

The Heinrich Boell Stiftung Nigeria

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