



Original Article:

Infrastructure and Health Care Services in the Niger Delta Region of Nigeria: A Case Study of Physical Amenities in the Primary Health Care System in Delta State

Author

Gideon E D Omuta, Professor, Chairman, Board of Trustees, Centre for Population and Environmental Development (CPED), Benin City.

Address for Correspondence

Gideon E.D. Omuta,

Centre for Population and Environmental Development (CPED),

BS-1 and SM-2 Ugbowo Shopping Complex,

Ugbowo Housing Estate,

P.O. Box 10085, Ugbowo Post Office,

Benin City, Nigeria.

E-mail: gedomuta@yahoo.com

Citation

Omuta GED. Infrastructure and Health Care Services in the Niger Delta Region of Nigeria: A Case Study of Physical Amenities in the Primary Health Care System in Delta State. *Online J Health Allied Scs.* 2015;14(4):2. Available at URL:<http://www.ojhas.org/issue56/2015-4-2.html>

Open Access Archives

<http://cogprints.org/view/subjects/OJHAS.html>

<http://openmed.nic.in/view/subjects/ojhas.html>

Submitted: Dec 2, 2015; Accepted: Dec 27, 2015; Published: Jan 30, 2016

Abstract: Background: One of the spin-off effects of the urban-based medical services established by the colonial administration was the total neglect of rural communities. Those that existed lacked infrastructure. Even fifty years after independence, this dichotomy has persisted and become more pronounced. The objective of this study is to examine the state of infrastructure in the primary health care centres in Delta State, Nigeria. Methodology: The study was a survey of the infrastructure of all the PHC centres in nine local government areas; three from each of the three senatorial districts. The facilities covered were sources of water supply, sources of electricity, number of functional beds and type of communication facilities. The field data were cleaned up, processed and analysed using SPSS 10.0. Focus group discussions and key informant interviews were also conducted. In order to make the findings policy-relevant, a project steering committee made of researchers and decision makers and a project management committee made of representatives of decision makers, care providers, care seekers and other stakeholders were set up and integrated into the study. Results: There were varying degrees of infrastructural deficiencies. 34.22 per cent of the PHCs had no access to safe water; 51.33 per cent were not connected to the national electricity grid; and 34.22 per cent of the available beds and 40.89 per cent no means of communication whatsoever. Conclusion: Field data and perspectives of stakeholders revealed that the major cause of infrastructural deficiencies was insufficient funding, lopsided allocation of resources and official corruption. Correspondingly, increased and sustained funding; prioritized allocation of resources and targeted upgrading of facilities, were recommended.

Key Words: Primary health care, Health infrastructure, Increased and sustained funding, Corruption.

Introduction:

The first medical services in Nigeria were mobile, rural-based and provided by Christian missionaries.(1,2) However, the British Colonial rule in the early 1900s provided hospital-based services, established to take care of epidemics such as sleeping sickness, small pox malaria.(3,4)

However, because the colonial administration was urban-based, the hospital-based medical services were only in such urban areas as Lagos, Ibadan, Kaduna, Jos, Enugu, Benin City, among others.(5,6) Three spin-off effects have been identified from this arrangement: the total neglect of rural communities in health care matters; the inequality within urban centres; and the almost total emphasis on orthodox health care services, to the corresponding total neglect of traditional practices; with their indigenous knowledge systems and appropriate technology.(2) One implication of these dichotomies was the copious infrastructural deficiencies in health care facilities in the rural areas; even after fifty-five years of independence.

It was the attempt to address such challenges, at the global level, that led to the convening of the International Conference on Primary Health Care, in Alma Ata, Kazakhstan in September, 1978. The conference endorsed the 'health for all' programme through the Alma Ata Declaration; to be driven by the Primary Health Care (PHC) system. The PHC programme stands on five principles, namely: accessibility (equal distribution); health promotion; appropriate technology; inter-sectoral collaboration and community participation. They were designed to work together and be implemented simultaneously to bring about better outcomes for the entire population.

The emphasis of this paper is on the principle of accessibility. Accessibility emphasises that health care services must be equally shared by all the people of the community irrespective of their race, creed or economic status. It shifts the accessibility of healthcare from the cities to the rural areas, where the most needy and vulnerable groups of the population live. Inaccessibility is, therefore a disadvantage. In this study the object of distribution are primary health care facilities between and among rural communities, in Delta State. While accessibility implies locational proximity, this study also makes a distinction in the quality of what is distributed. Thus, there could be the disadvantage of physical inaccessibility, when there the health seekers does not get enough where they are located. There could also be the disadvantage of 'infrastructural' inaccessibility, when what gets to the seekers is of poor quality because of the facilities available. There could also be an accentuated disadvantage of 'double inaccessibility', where what seekers get is of insufficient quantity and poor quality. Thus, infrastructure of a health centre is a surrogate indicator of the quality of the health care services can be geographically accessed.

The objective of this paper is to explore the state of infrastructure available in the primary health care centres in the Niger Delta region of Nigeria, using Delta State as a case study.

Conceptual Context

The main pillar on which the paper stands is *health care infrastructure*. Infrastructure is, collectively, the underlying foundation that supports a larger structure; the intrinsic framework of a system or organization and the 'substructure' that underpins the 'superstructure'. They determine the capacity and capability of the system to carry out its core functions and deliver on their core mandates (7) and the corresponding quality of the care and accessibility to health care delivery in a society.(2) Health care infrastructure in sub-Saharan Africa, in general, and Nigeria, in particular, are of different types and practices.(8) They have been characterised into 'hard infrastructure' (things that support the economy) and 'soft infrastructure (things that support the system's social response and capability).(7) They determine the outcomes of the system.(9)

Infrastructure may also be categorised into the physical (such as pipe-borne water, beds, electricity, among others); technological (the equipment that facilitate the efficient and effective delivery of health care such as syringes and needles, microscopes, stethoscopes, blood pressure machines, among others; and human (the health professionals, including doctors, nurses, pharmacists, midwives, community health workers), among others resources available to render expected services by a given system, to a given set of people and at a given point in time.(8)

Logically, therefore, strong infrastructure creates the platform for high performance systems, while weak infrastructure impedes the systems' capacity for growth, development and service delivery. Consequently, inadequate investment in infrastructure affects 'production' and 'consumption' directly and will result in poor or less than optimal outcomes.

To ensure quality service delivery, the World Health Organization (WHO) has recommended that health care infrastructure should be 'formal and enduring' (10), requiring a mandated strategic focus that is maintained over time on a sustainable basis. The expectation of formal and enduring infrastructure is that their sustenance and maintenance should be endorsed as the statutory and systematic responsibility of government (7); rather than being *ad hoc* or disjointed.

This paper considers four (4) physical amenities, namely: sources of water supply, sources of electricity, number of functional hospital beds and type of communication facilities. In the rural communities of Delta State, as elsewhere, these

infrastructure are critical, because where they are absent, inadequate or destroyed, service delivery could be disrupted or otherwise severely compromised (11) because they underpin service delivery.(10) Indeed, it has been concluded that major differences in the quality of social life, in general, and health care services, in particular, are attributable to uneven distribution of infrastructural facilities.(12) Among other things, this survey seeks to provide empirical and policy-relevant evidence for evaluating the veracity of this conclusion, as it applies to Delta State.

Methodology

This paper presents the results of an aspect of the larger research project titled: "Strengthening the health care system in Nigeria through improved equitable access to Primary Health Care (PHC): The case of Delta State, Niger Delta region", funded by the International Development Research Centre (IDRC) and the West African Health Organisation (WAHO).

Information gathering adopted the multi-stage sampling procedure. Accordingly, nine local government areas were selected; three each from the three senatorial districts, as follows: Ndokwa East, Aniocha North and Ika South from Delta North senatorial district; Ughelli South, Udu and Okpe from Delta Central; and Isoko North, Bomadi and Warri North from Delta South. Since the emphasis of the study was on the challenges of equitable access to primary health care delivery, the selection of local government areas was purposive and designed to capture rural, isolated and wetland communities that are characteristically inaccessible and usually underserved. The choice of communities is further justified by the fact that more than 90 per cent of the region is rural, with 94 per cent of the 13,329 settlements having a population of less than 5,000 people.(13)

The platform adopted by the study for integrating research and policy was to set up two strategic, policy-facilitating committees, namely: the State Steering Committee (SSC) constituted of key policymakers that are statutorily linked with the implementation of primary health care delivery, and the Project Management Committee (PMC) composed of representatives of the research team; representatives of policymakers; representatives of care providers; representatives of health care seekers/users; advocacy experts; activists; and accredited representatives of such vulnerable groups as the poor, the women. The thrust of the study was a primary health care facilities' survey; essentially an inventory of selected physical amenities and equipment available in PHC centres, to determine their ability and capacity to deliver on their mandates.

In addition to the quantitative data, there was also a qualitative component; implemented through focus group discussions (FGDs) and key informant interviews (KIIs). The participants in the qualitative survey were PHC staff, and randomly selected key stakeholders in the localities, such as community opinion leaders, users of primary health services, women and youths. FGDs and KIIs were conducted in all the nine local government areas. The objective of the qualitative survey was to determine the veracity and integrity of the quantitative data, from the perspective of primary health care users so that their opinion could be integrated into the solutions to the perceived problems.

Results

This section discusses the four selected physical amenities. The premise of the discussion is that physical amenities affect the productivity of the work environment, which in turn influence the perception of the users of their services. This is because the availability or otherwise of these infrastructure determine the work output of care providers, their efficiency and ability to deliver expected quality service to health care seekers. For instance, a poorly enabled primary

health care centre tends to dampen the zeal of workers. Contrastingly, a good work environment, enabled with basic infrastructure in the right quantity and quality will facilitate better health care service delivery by the health care team. Infrastructure are considered adequate when they are able to cope with the present and anticipated volume of care seekers that desire to utilize the health care facility, without compromising the quality of service.

Sources of Water Supply in PHC Centres

Water is a key element and determinant of the quality of service rendered in PHCs. It is required to meet essential needs in the health care centre. It should be ensured, therefore, that the water used in the facility is safe and potable, and has not been contaminated at its source. Furthermore, it must also be protected from contamination inside the health care centre. It must not present any risk to health, sine most health care seekers are already vulnerable and highly susceptible to water-related infections.

For the purpose of this study, safe water is defined as that from a protected groundwater source, such as spring, bore hole or a treated supply. It must be protected from contamination inside the health centre until it is drunk or used. Unsafe water (below drinking-water quality) from untreated and unprotected sources may, however, be made safer by such simple means as boiling, filtering, chlorination and disinfection. Otherwise, use of unsafe water should be limited to cleaning, laundry and sanitation.(14) The percentage distribution water in the PHCs in Delta State, according to its sources, is presented in Table 1. The survey showed that less than two-thirds (65.78 per cent) of all the PHC centres surveyed in the target LGAs had safe and drinkable water. Of these, 22.89 per cent of the facilities were supplied with pipe-borne water, while 42.89 per cent got their water from covered wells or bore holes. Therefore, more than one-third (34.22 per cent) of the centres got their water from unprotected and unsafe sources, such as open wells (18.22 per cent), rain water (7.11 per cent), surface water (6.44 per cent) and tanker truck supply (2.44 per cent). There were variations in the distribution of both safe and unsafe sources of water supply among the centres. Even with respect to safe water sources there were remarkable differences between piped water and water from covered wells or bore holes. Thus, regarding piped water, the survey shows that while none (0.0 per cent) of the centres in Bomadi and Ika North got their water from this source, as much as 88 per cent of the facilities in Aniocha North did. This is to be compared with the average of 22.89 per cent. On the other hand, with respect to covered wells or bore holes, Table 1 shows that compared to the average of 42.89 per cent, more than 50 per cent of the PHCs in Udu (76 per cent), Bomadi (67 per cent) and Okpe (64 per cent) got their water from this source). At the other extreme, none (0.0 per cent) of the facilities in Aniocha got water from bore holes. Furthermore, when the two sources of safe water are combined, the survey showed that compared to the average of 65.78 per cent, Udu had the highest percentage of PHCs with safe water (95 per cent), Ndokwa East (31 per cent) had the lowest.

With respect to unsafe sources of water supply, there were also clear differences among the various subtypes. Thus, compared to the average of 18.22 per cent, 48 per cent of the facilities in Ika South got water from open wells, while none (0.0 per cent) of the PHCs in Aniocha North and Bomadi did. Furthermore, Table 1 also shows that in comparison with the average of 7.11 per cent, as much as 35 per cent of the PHCs in Ndokwa East had access to only rain water, while none (0.0 per cent) of the facilities in Bomadi, Isoko North, Okpe and Udu used rain water. The Table also shows that 33 per cent of the facilities in Bomadi had access to only rain water, compared to the average of 6.44 per cent, while none (0.0 per cent) of the facilities in Ika South Isoko North, Okpe, Udu,

Ughelli South and Warri North used rain water. Overall, more than one-third (34.22 per cent) of the PHCs in the target LGAs required improved water supply, with the need being most critical in Ika South.

LGAs	Piped Water	Open Well	Covered Well or Borehole	Surface Water	Rain Water	Tanker Truck Supply	Total
Aniocha North	88	0	0	4	4	4	100
Bomadi	0	0	67	33	0	0	100
Ika South	0	48	35	0	9	8	100
Isoko North	32	21	47	0	0	0	100
Ndokwa East	7	10	24	21	35	3	100
Okpe	18	18	64	0	0	0	100
Udu	19	5	76	0	0	0	100
Ughelli South	17	24	48	0	4	7	100
Warri North	25	38	25	0	12	0	100
Average	22.89	18.22	42.89	6.44	7.11	2.44	100

Source: Fieldwork, 2014

Sources of Power Supply in PHC Centres

PHC centres need electricity to function optimally. While ambient light could suffice for most tasks during the day, electricity is absolutely necessary to carry out certain procedures at night, to enable PHCs function maximally for 24 hours and without jeopardising the lives of night-time users. Electricity is needed to perform critical tests such as malaria or sputum microscopy and preserve certain drugs and vaccines.

Power could be supplied from a number of sources, including: the national grid, back-up generators, particularly in rural communities, solar panels and others, such as rechargeable lamps. In the absence of these, particularly in isolated communities, light could and has been provided by torch lights and such hazardous sources as lanterns and candles. The distribution of the sources of power supply in the PHC facilities in Delta State is presented in Table 2.

The survey showed that the national grid was the most common source of power, averaging 48.67 per cent of the PHC facilities. The second commonest source of power was the back-up generator, which accounted for an average of 29.33 per cent. 'Other sources' which included rechargeable lamps, torch lights, candles and lantern, accounted for 20.78 per cent, while the remaining 1.22 per cent got their power from solar panels.

For each source, the details showed remarkable variations among the LGAs. Thus, compared to the average of 48.67 per cent, none (0.0 per cent) of the facilities in Bomadi was connected to the national grid, while as high as 94 per cent of the PHCs in Okpe were connected. Table 2 shows that on the average, almost one-third (29.33 per cent) of the facilities depended on back-up generators for power. Again, the survey revealed great variations among the LGAs. For instance, while in Bomadi 89 per cent of the PHCs depended on generators, only six per cent of those in Okpe did. The next most common source of power supply is a combination of non-electricity (supplied through cables and wires) modes. They include rechargeable lamps, torch lights, candles and lanterns. Together, an average of 20.78 per cent of all the facilities surveyed in the entire target LGAs depended on these sources.

Table 2: Percentage Distribution of Main Sources of Power Supply in PHC Facilities					
LGAs	National Grid	Back-up Generators	Solar Panels	Others: Rechargeable Light, Torch, Candle, Lantern	Total
Aniocha North	33	67	0	0	100
Bomadi	0	89	0	11	100
Ika South	66	22	4	8	100
Isoko North	79	11	0	10	100
Ndokwa East	17	7	4	72	100
Okpe	94	6	0	0	100
Udu	62	29	0	9	100
Ughelli South	62	21	3	14	100
Warri North	25	12	0	63	100
Average	48.67	29.33	1.22	20.78	100
Source: Fieldwork, 2014					

The details show that while as high as 72 per cent of the facilities in Ndokwa East depended on these 'other' sources, none (0.0 per cent) of the PHCs in Aniocha and Okpe did. Finally, the survey showed that, on the average, only an insignificant 1.22 per cent of the facilities depended on solar panels as the source of their power. The details showed that apart from Ika South (three (3) per cent), and Ika South and Ndokwa East, each with four (4) per cent, none (0.0 per cent) of the facilities in the other LGAs depended on solar panels for their power supply. This is, therefore, an area of great potential, considering that it is a renewable source.

Number and Percentage Distribution of Functional and Non-Functional Beds in PHCs

Although PHCs are not designed for long term admissions, they must have the facilities for short term observation and admission as the need arises. One of such facilities is the hospital bed. The number of functional beds is an indicator of the capacity of a facility to take on health care seekers who require only short term observation. The survey sought to establish the functionality of the beds in the PHCs in the target LGAs. Table 3 summarises the total number of beds in the PHC centres in the target LGAs, and the percentages that are functional and non-functional.

The survey revealed that there was an average of about 203 beds in the facilities covered, varying from as low as 85 beds in Bomadi to as high as 445 beds in Ughelli South. Out of this average, about 128 beds were functional. Among the LGAs, the number of functional beds varied from as high as 259 in Ughelli South to as low as 54 in Bomadi. With regards to their distribution, the survey showed that on the average, three-quarters (75.11) of the beds were non-functional. Among the target LGAs, the survey showed that three had more than the overall average as follows: Ughelli South: 186; Ndokwa East: 174, and Udu: 88. On the other hand, Table 3 shows that four LGAs had less than 50 non-functional beds as follows: Ika South: 43; Aniocha North: 42; Bomadi: 31 and Warri North: 11.

Table 3: Number and Percentage Distribution of Functional and Non-Functional Beds in PHCs								
LGAs	Population (Projected from 2006 Censuses)	Total Number of Beds	Number of Functional Beds	Number of non-functional Beds	Percentage of Functional Beds	Percentage of non-functional Beds	Number of Functional Beds per population	Total (%)
Aniocha North	114,989	228	186	42	82	18	1:618	100
Bomadi	89,023	85	54	31	64	36	1:1,648	100
Ika South	110,807	154	111	43	72	28	1:998	100
Isoko North	148,584	128	77	51	60	40	1:1,930	100
Ndokwa East	100,837	279	105	174	38	62	1:960	100
Okpe	132,892	153	103	50	67	33	1:1,290	100
Udu	147,469	213	125	88	59	41	1:1,180	100
Ughelli South	220,080	445	259	186	58	42	1:850	100
Warri North	140,914	140	129	11	92	8	1:1,092	100
Total/Average	1,205,595	202.78	1,149/127.67	75.11	65.78	34.22	1:1,049	100
Source: Fieldwork, 2014								

In terms of percentages, the survey revealed that on the average, about two-thirds (65.78 per cent) of the beds in all the PHCs covered were functional. Only four LGAs had more than the overall average as follows: Warri North: 92 per cent; Aniocha North: 82 per cent; Ika South: 72 per cent; and Okpe: 67 per cent. The LGA with the lowest percentage of functional beds was Ndokwa East (38 per cent). The implication of the percentage of functional beds is that more than one-third (34.22 per cent) of all the beds in the surveyed PHC facilities were non-functional. Remarkable variations were, however, observed among the LGAs. For instance, while 62 per cent of the beds in Ndokwa East were non-functional, only eight per cent of those in Warri North were in that category.

The survey sought to establish the adequacy of the number of functional beds by relating their quantity to the total (potential) population to be served. For this purpose estimates of the current population were projected from the 2006 census population of the target LGAs.(15) Against this background, the survey observed that given an estimated total population of 1,205,595 for the target LGAs and a total of 1,149 functional beds, the average ratio of beds to population was 1:1,049. Table 4, however, shows that only four LGAs had better ratios than the average, as follows: Aniocha North: 1:618; Ughelli South: 1:850; Ndokwa East: 1:960; and Ika South: 1:998. On the other hand, Isoko North had the poorest ratio of 1:1,930, followed by Bomadi (1:1,648). There is, therefore, the need to: (1) increase the absolute number of beds in the five (5) LGAs that have the fewest beds per population and or (2) fix the non-functional ones in all the LGAs.

Percentage Distribution of Communication Facilities in PHC Centres

Distance communication facilitates the transmission of management information. It is essential that PHC staff have physical means of horizontal communicating with each other and to consult on issues like side-effects and complications. There should also be reliable means of long distance vertical communication between the centre and the next level of

referral: the secondary health centre, just as lower level health workers should be able to have access to senior colleagues for advice and counsel.

Effective distance communication could be achieved through various means, such as the telephone and the internet. Telephone facilities are mostly used for verbal communication through fixed (land) lines and or the 'global system for mobile communication' (GSM). Cell telephone facilities are also used for sending 'written' information, asking questions and receiving answers, through the 'short message system' (SMS), particularly when resource limitations, and inability to recharge make it necessary to conserve air time. With the increasing ubiquity of the computer and internet services, one other way of communication could be through e-mails, given the requisite skills. The survey considered the distribution of the following means of communication in the PHC centres: landline phone, cellular (GSM) phone, short-wave radio calls, computers and the internet. The findings are presented in Table 4.

The survey showed that the most common mode of communication was the cellular (GSM, mobile) phone, which was available in an average of 24.33 per cent of the PHC centres. This was followed by internet facilities (6.78 per cent); computer facilities (5.67 per cent); landline (fixed) phone (2.22 per cent) and short-wave radio (1.89 per cent). Within each mode, there were remarkable variations. Thus, while 83 per cent of the facilities in Ika South used cellular phones, none (0.0 per cent) of the facilities in Ndokwa East and Warri North did. On the other hand, while none (0.0 per cent) of the PHCs in Aniocha North, Ika South, Ndokwa East, Ughelli South and Warri North had internet facilities, 24 per cent of those in Okpe had.

LGAs	None	Landline Phone	Cellular Phone (GSM)	Short-wave Radio	Computer Facilities	Internet Facilities	Total
Aniocha North	92	0	8	0	0	0	100
Bomadi	56	0	22	0	11	11	100
Ika South	17	0	83	0	0	0	100
Isoko North	36	5	21	11	11	16	100
Ndokwa East	100	0	0	0	0	0	100
Okpe	11	12	35	6	12	24	100
Udu	47	0	29	0	14	10	100
Ughelli South	73	3	21	0	3	0	100
Warri North	100	0	0	0	0	0	100
Average	59.11	2.22	24.33	1.89	5.67	6.78	100

Source: Fieldwork, 2014

Furthermore, the survey showed that more than ten per cent of the facilities in four LGAs had computer facilities, as follows: Udu: 14 per cent; Okpe: 12 per cent; and 11 per cent in each of Bomadi and Isoko North. Landlines were available in only three LGAs, namely; Okpe (12 per cent), Isoko North (5 per cent) and Ughelli South (3 per cent). Noteworthy is the observation that in Isoko North and Okpe each of the five modes of communication was available in some percentage. At the other extreme, the most 'isolated' and disadvantaged LGAs were Ndokwa East and Warri North, in which none (0.0 per cent) of the PHCs surveyed, had any means of communication.

Policy Implications

In consonance with the participatory methodology of the study, the policy implications of the distribution of facilities and amenities in the PHCs in Delta State were derived by supplementing the inventory with the qualitative outcomes of focus group discussions and key informant interviews. During these discussions and interviews, the broad picture that emerged from the quantitative findings was subjected to community scrutiny and evaluation. Through this process, the policy implications of the study were jointly formulated by integrating stakeholders' feedbacks and perspectives, making them more responsive and implementable.

International best practices for the optimal operation of PHC centres, require that adequate provision be made for safe water, constant power supply and effective communication. However, the survey showed that the situation on ground was different, in various combinations, from centre to centre. This was reflected in the various ways health care seekers, communities and stakeholders expressed their concerns. For instance, some were concerned about situations where babies were sometimes delivered in the night with candles lights and kerosene lanterns, because of lack of power. Similarly, others were worried about the inconveniences to new mothers who have had to wait for family members to bring water from home before they could clean up and take a bath, after child delivery.

Furthermore, stakeholders in focus group discussions and key informant interviews noted that communities, in general, and health care seekers, in particular, underutilized PHC facilities partly because they perceived their environments to be uncomfortable and uninviting, as a result of various combinations of infrastructural deficits. Correspondingly, they were of the opinion that many of the centres needed infrastructural upgrading, by providing new floors, comfortable seats for waiting patients, and window shutters with mosquito nets (particularly for the protection of newborns), among others, as may be needed in specific centres. Based on this background, the following major policy implications flow from the quantitative and qualitative findings of the study.

Increased and sustained funding of the health care system

From the field data and the perspectives of stakeholders, the main reason adduced for the perceived deficits in the amenities and the resultant inadequate capacity of PHCs to promptly and satisfactorily respond to the primary health care needs of the people, is insufficient funding. There is a disproportionate and inadequate allocation of resources to the health sector as a whole. For instance, compared to the 18 per cent of the national budget that ought to be dedicated to the sector, in accordance with the Abuja Declaration of 2001 (16), the total health expenditure in Nigeria was 3.88 per cent in 2013. Its highest value over the past 20 years was 4.47 per cent in 2007, while its lowest value was 2.43 per cent in 2002.(17) These figures represent the sum of public and private health expenditure, covering the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but excluding provision of water and sanitation.

The policy implication here, is that there is the urgent need for a significant and sustained increase in the level of funding of the health care system, in general, and the primary health care subsector, in particular. Equally important is the need for a more efficient and effective management of whatever is received by the primary health care subsector and allocated to the various facilities.

However, increased funding in itself does not guarantee better outcomes in the PHC subsector, unless and until official corruption, at all levels, is transparently and courageously tackled. The impunity with which public resources are embezzled and misappropriated must be

effectively checked; and culprits duly and appropriately sanctioned.

Properly managed funds are needed to sink boreholes, where none exist, and service those that have broken down; provide transformers to step down electricity or install solar panels in rural areas; evacuate wastes; and provide reliable means for both horizontal and vertical communication, particularly in emergencies and referrals, which are inadequate to varying degrees in all the PHC centres.

Prioritization allocation of resources among the tiers of health care providers

The receipt of the miserably inadequate funds allocated to the system is often characterised by partial release, lateness, uncertainty and more importantly lopsided distribution between and among the three tiers of health care delivery. Presently, the primary health care subsector (the third tier) is consistently the most disadvantaged and marginalised. This is considered anomalous, considering that that this is the tier at which most seekers enter the health care system. In deed the 'health for all' programme of the *Alma Ata Declaration* was designed to be driven by the PHC tier. There is, therefore, the urgent need to significantly adjust the formula for the distribution of the budget for the health sector in favour of the primary health care subsector. Further complicating the inadequate allocation to the PHC subsector is its disproportionate distribution among the facilities, such that many primary health care centres are unable to provide for some essential facilities. Policy should, therefore, ensure that clear guidelines are provided in the budgeting framework to capture the unique facility needs of each primary health care centre, rather than the leaving allocation to the discretion of the managers of the budget and funds. Monies should be tied to specific needs of specific PHC centres. This will reduce cases of arbitrary distribution, often characterised by over providing for some facilities and amenities in certain places, while they are underprovided in some other centres.

We reiterate that policy is also needed to deal with the general perception that in spite of its inadequacy, quite a significant proportion of the resources allocated to the sector are corruptly misappropriated. What is needed here is the political will to sincerely deal with the impunity with which public funds are embezzled by public officials without appropriate sanctions.

Targeted upgrading of facilities

Flowing from the above, is the need for a policy to target closing existing infrastructural gaps and unacceptable deficiencies, empirically established by the survey. Specifically, among other issues, therefore, policy must address the situation where as much as 34.22 per cent of the PHCs surveyed had no access to safe water sources (Table 1) and where more than half (51.33 per cent) of the centres were not connected to the national electricity grid as the source of power (Table 2). Other issues that policy must address are: the unacceptable situation where more than one-third (34.22 per cent) of the available beds in the PHCs were non-functional; where the PHCs in five (5) LGAs (or 55 per cent of those surveyed) had only one bed to more than 1000 potential patients (Table 3); and where 40.89 per cent of the PHCs had no means of communication whatsoever (Table 4), considering the need for speedy transfer of information, especially in emergencies and referrals and to other stakeholders. A facility-specific funding policy should be guided by verified and verifiable areas of obvious deficits for upgrading, as appropriate.

Provision of 'surge capacity' for emergencies and future growth

Sustainable quality service delivery requires that the recommended increased level of funding should take into consideration not only today's health care needs and anticipate tomorrow's challenges, but should also have the

'surge capacity' to respond to emergencies (7: 5). Consequently, the level of funding should guarantee health care infrastructure security and stability which are determined by the margin of *spare capacity to ensure the sustainability of supply and delivery*. Instead of operating at the precarious 'efficiency frontier', policy should ensure that infrastructure projects are able to operate with enough spare capacity to absorb future growth by ensuring reliable service provision (18:8). Indeed, considering their importance to the performance and ultimately the quality of health care outcomes, policy on health care delivery infrastructure should be driven by a long term vision to be implemented over decades. Similarly, in order to support present infrastructure, policy should ensure the prompt servicing, maintenance and replacement of facilities and equipment, as they become unserviceable or obsolete. In this way, there will be a guaranteed capacity for the present and future.

These are considered the irreducible minimum requirements, if the quantity and quality of health infrastructure in the primary health care centres in Delta State are to be improved on a sustainable basis. Government should be held accountable, and accept full responsibility for the appropriate investment in formal and enduring primary health care infrastructure.

Conclusion

Infrastructure constitutes the back bone of the primary health care system, like any other. However, it is one thing for the primary health care centre to be physically present in a community, but quite another for it to rest on a solid foundation. PHC centres must have the requisite facilities for the delivery of quality service and timely interventions. Some of these facilities determine the conduciveness of the physical environment within which health care workers operate, while others determine how equipped the workers are, and the type and quality of the services they can render. Health care centres cannot and will not be responsive to the health care needs of the local community when their foundations are weak, and the staff work under stressful conditions as result of inadequate facilities.

The quantitative and qualitative data from the survey of the infrastructure of primary health care centres in Delta State indicated that there were varying degrees of deficiencies in their physical amenities. Consequently, the centres were unable to render some essential but basic services, such as the proper examining of pregnant women. As a result users were frustrated and discouraged from utilizing their services.

The explanation for the weak infrastructural base of the facilities was inadequate funding. The logical policy implication that flows from the study, therefore, is the urgent need to increase the level of funding of the primary health care system in the state. Improved funding would enable the centres to have equipment and facilities that are currently inadequate, such as: supply of safe water and constant power and hospital beds which will widen the scope of health care services that they can offer.

References

1. Onokerhoraye AG. Public Services in Nigeria Urban Areas: A Case Study of Ilorin, Nigerian Institute of Social and Economic Research (NISER), Ibadan Nigeria. 1982
2. Ademiluyi IAA, Aluko-Arowolo SO. Infrastructural Distribution of Health Care Services in Nigeria: An Overview. *Journal of Geography and Regional Planning*. 2009;2(5):105-106.
3. Onibonjo GO. Africa in the Modern World: The Last One Hundred Years. Onibonjo Press, Ibadan. 1975
4. Aluko-Arowolo SO. The Medico-Spiritual and Historical Origin of Malaria Disease. In Falola, T. and Heaton, M.M. (eds.) *The Traditional and Modern*

- Health System in Nigeria. African World Press, Trenton and Asmara, 2006. pp. 247-256.
5. Home RK. Town Planning, Segregation and Indirect Rule in Colonial Nigeria. *Third World Planning Review*. 1983;5(2):165-176.
 6. Akin-Aina T. Health Habitat and Underdevelopment in Nigeria. International Institute for Environmental Development, London.1990
 7. Stephenson P. Health Promotion Infrastructure: A Thinkpiece, An Occasional Paper, Commissioned by the Health Promotion Forum (HPF) of New Zealand.
 8. Erinoshio OA. Health Sociology for Universities, Colleges and Health-Related Institutions. Bulwark Consult, Abuja.2006
 9. National Association of County and City Health Officials (NACCHO). Public Health Infrastructure and Systems. Available at <http://www.naccho.org/topics/infrastructure/> Accessed 23/09/2015.
 10. Powles J, Comim F. Public Health Infrastructure and Knowledge. In WHO, Trade, foreign policy, diplomacy and health (Chapter 6). Available at http://www.who.int/trade/distance_learning/gpgh/gpgh6.en.index1.html. Accessed 23/09/2015.
 11. Wikipedia. Infrastructure. Available at <http://en.wikipedia.org/wiki/Infrastruture>. Accessed 23/09/2015.
 12. Onokerhoraye AG. Social Services in Nigeria: An Introduction. Kegan Paul International, London. 1984. p. 184.
 13. Centre for Population and Environmental Development (CPED). Demographic and Baseline Studies for the Niger Delta Regional Master Plan, Benin City. 2003. p. 236
 14. World Health Organization (WHO). Infrastructure. In WHO. Operations Manual for Staff at Primary Health Care Centres (Chapter 5, p. 71). Available at www.who.int/hiv/pub/ima/om_5_infrastructure.pdf Accessed 16/09/2015.
 15. Federal Republic of Nigeria (FRN). Population and Housing Census: Population Distribution by Sex, State, LGA and Senatorial District; Priority Table, Volume III, National Population Commission (NPC), Abuja, Nigeria. 2006, April.
 16. Okonofua F, Omo-Aghoja L. Perspectives on Maternal and Child Health Care. In Omuta GED (ed.), Perspectives on Social Services in Nigeria, Ibadan. HEBN Publishers Plc. 2014. Chapter 25; p. 569.
 17. World Health Organization (WHO). Global Health Expenditure Database. Available at <http://apps.who.int/nha/database>. Accessed on 07/11/2015.
 18. Bottini N, Coelho M, Kao J. Infrastructure and Growth. Prepared for the Growth Commission, Institute for Government, Centre for Economic Performance, London School of Economics (LSE).