

1 Mapping the Spatial Distribution of Health Care Facilities of the
2 Millennium Development Goals (MDGs) in Kaduna North and
3 South Local Governments, Kaduna State, Nigeria

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6 *Received: 10 December 2013 Accepted: 2 January 2014 Published: 15 January 2014*

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8 **Abstract**

9 This research focused on the identification and mapping of the spatial distribution of health
10 care facilities of the Millennium Development Goals (MDGs) projects in Kaduna North and
11 South Local Governments, Kaduna State, Nigeria. The research utilized the technology of
12 Geographic Information Systems to add value to information for public health facilities
13 mapping, planning and decision making. In this research work, the primary data was the
14 geographical data of the MDGs health care facilities sourced through GPS from the field. The
15 secondary data was the topological map of Kaduna North and South Local Governments,
16 sourced from the archive of the GIS

17

18 **Index terms**— health care, facilities, mapping, GIS, MDG.

19 **1 Introduction**

20 Mapping enables professionals to understand complex spatial relationships visually so as to plan effectively and
21 efficiently. Similarly, Hirschfield et al ??1995) estimated that nearly 80% of the information need of local
22 health system decision and policy makers involves geographical positioning. Health mapping utilizes the
23 technology of Geographic Information Systems to add value to information for public health planning and decision
24 making. Geographical Information Systems (GIS) provides useful techniques regarding capturing, maintaining
25 and analyzing of spatial data.

26 The role of monitoring and evaluation is that of coordinating all activities in order to create an efficient and
27 aesthetically pleasing physical environment for all forms of human activities in order to create an environment
28 which has quality of acceptable standards for health and efficiency, and which enable individuals, families and
29 communities to live and work in a satisfactory manner (Vagale, 1971).

30 Attention is focused here on the spatial distribution of health care facilities of Millennium Development Goal
31 Projects, which are Boreholes, Primary Health Centers (PHCs) and Ventilated Improved Pit (VIP) latrines in
32 Kaduna North and South local government areas of Kaduna state, Nigeria. This is viewed with keen interest
33 because it pertains to one of MDGs goals, which has been the development of the rural and urban areas under the
34 Direct Relief Grant (DRG) Scheme Program aimed at providing sustainable water and hygiene to the public. As
35 a result, there is the need for accurate mapping and monitoring of the spatial distribution of health care facilities
36 of the Millennium Development Goals (MDGs) projects in Kaduna North and South Local Governments.

37 In Kaduna North and South Local Governments, few health care facilities were located very far away in the
38 headquarters of the Local Governments with few rural areas that having Primary Health Centers that were ill-
39 equipped and under staffed. Some communities covered long distance to seek medical services ??MDG Report
40 Card, 2008). Therefore, the mapping and monitoring of the health care facilities will provide an opportunity
41 for maintenance and effective distribution and re-distribution of the health care facilities, so as to create a new
42 landscape that will bring about lasting solution to the problem of health care delivery in the study area. In the

43 light of the above, one expects that the health care facilities under the MDGs project would be made available
44 to an extent, especially the basic amenities of life such as safe drinking water and hygienic environment.

45 In view of the above, the study therefore identified and mapped health care facilities of the MDG available in
46 Kaduna North and South Local Government Areas with the view to monitor health care delivery in the study
47 area. National Planning Commission (2006) stated that the rural populace in developing countries has been
48 suffering from different kinds of deprivation yet; they constitute the bulk of the population, which is about 75%
49 in Nigeria. For effective and functional health care delivery, spatial data is required on location and changes
50 taking place within and around the communities to be able to carry out planning. Hence, there is a need to
51 introduce scientific mapping technique that would reveal the impact and essence of mapping and monitoring the
52 health care facilities. And this scientific technique is Geographic Information System (GIS).

53 Conditional Grant Scheme (CGS) is a federal government of Nigeria support from the Debt Relief Gains to
54 the lesser tiers of governments to scale up and assist in improving Primary Health Centers (PHC), Water and
55 Sanitation among others to meet up with the MDG goal number one (MDGs Report Card, 2008).

56 Several studies were conducted in which GIS was used to identify environmental indicators and spatial location
57 of health facilities such as the GIS-based application shown in a study of access to health care facilities when
58 geographic information was used to link data from a population-based survey with an independently sampled
59 health facility survey ??Hong, 2006). Onsi, (2004) also used remote sensing and GIS technology to identify health
60 facilities and delineate associated health risks, demonstrated the practical and successful application of remote
61 sensing and GIS in assisting decision-making for health and development and the effectiveness of map making.

62 2 II.

63 The Study Area

64 3 Materials and Methods

65 The data types used in this study are topological base map of Kaduna North and South Local Governments
66 sourced from the archive of the Department of Geography, Ahmadu Bello University, Zaria. The coordinate
67 information of the health care facilities was sourced using the GPS on the field. Apart from the coordinate data,
68 the researcher also assessed the conditions of the health care facilities. This was important in complementing the
69 data collected from MDGs Office (names and addresses of the health care facilities). There were twenty three
70 (23) health care facilities in the study area out of which sixteen (16) were boreholes, four (4) were Primary Health
71 Centers (PHC) and three (3) were Ventilated Improved Public Toilets (VIPs).

72 The health care facilities coordinate data collected from the field using GPS were plotted on the base map
73 that has been scanned, geo-referenced and layers extracted. All data gathered were analyzed using Ilwiss 3.2a
74 GIS Software. The analyzed data are presented using tables and maps.

75 IV.

76 4 Results and Discussion

77 The health care facilities identified in the study area are in three categories. They are the Primary Health Centers
78 (PHC), the Boreholes and the Ventilated Improved Pit (VIP). This is shown in Table 1. Table 1 shows that the
79 number of boreholes identified were sixteen (69.56%), Primary Health Centers (PHC) were four (17.39%) and
80 Ventilated Improved Toilets (VIP) were three (13.04%). The total numbers of the healthcare facilities of the
81 MDGs were twenty three (23).

82 From the observation of the researcher, the PHC were all constructed by the MDG and were in good status.
83 They were beneficial to the host community. The PHCs were located at Kabala Doki and Badarawa all in
84 Kaduna North L.G.A. The Ventilated Improved Toilet (VIP) of the Health care facilities of the MDGs were
85 also in good working condition and located in Kaduna North L.G.A. It is evident that most of the Health Care
86 facilities of the MDGs were located at the North-Western section (Kaduna North LG.A) The databases, which
87 were created in tabular formats, are presented in Tables 2, 3 and 4. The database carries basic information
88 about the attribute data of the Health Care facilities ranging from their local government location, stations,
89 coordinates, and status (working condition). Table 2 shows the total number of boreholes of MDGs, addresses
90 and their respective geographical locations. Out of the sixteen (16) boreholes, seven (7) were not rehabilitated
91 and not in good working condition. Most of the boreholes were located in Kaduna South L.G.A.

92 The Primary Health Centres and VIP toilets were very few in number as seen in tables 3 and 4 compared
93 to the number of boreholes. The PHC were four (4) and the VIP toilets were just three (3). The VIP toilets
94 were entirely located in Kaduna North local government area while the PHCs were equally located in both local
95 government areas. They were also in good working condition and beneficial to the host community. Source: GIS
96 Analysis.

97 5 (B)

98 Year 2014

99 The spatial locations of the Health Care Facilities of the MDGs were plotted on the base map of the study
100 area to produce the map (figure 2). The map shows the extent of the distribution of the Health Care Facilities

101 of the MDGs within the study area. Most of the Health Care Facilities of the MDGs were spatially located at
102 the North-Western section of the study area.

103 V.

104 **6 Conclusion**

105 GIS provides a reliable base for mapping health care facilities with regular information updating. Distribution of
106 Health Care Facilities remains a problem in Nigeria particularly in rural areas. There were no detailed working
107 plans and criteria for the provision of healthcare facilities at the local level peculiar to the need of the generality of
108 the people in the past. The challenge of health care delivery at the local level is how to get physical planners and
109 communities involvement in decision regarding the location and distribution of health care facilities. This will
110 enhance the provision of health care facilities in locations which are accessible to the generality of the populace.
111 GIS however, will solve the problem of adequate spatial distribution of Health Care Facilities.

112 Due to the ever increasing number of population, more health care facilities need to be provided. In terms of
113 "status", there were problems of malfunctioning of some of the Health Care facilities most especially the boreholes.
114 Some of them were not well maintained and some not working at all. There are three important factors that
115 affected the level of accessibility of the facilities. These were the capacity of the facilities, the demand for
116 the facilities and the transportation network that communicated such demand to the relevant capacity. A good
117 network of transportation provided easy access to these Health Care facilities. The study area had a good network
118 of transportation with most of the Health Care Facilities spatially located in proximity to roads, railways and
119 even part of the River Kaduna course.

120 Based on the strength of this study, it is recommended that 5km should be the service radius through which a
121 Primary Health Centre (PHC), VIP Toilet and borehole should be provided. Based on the above service radius,
122 one PHC will be provided in every community of every ward in the study area; one VIP toilet will be provided
123 in every community of every ward in the study area; one borehole will be provided in every community of every
124 ward in the study area. And this will help in meeting the MDG that is targeted with the provision of the health
care facilities in the first place.

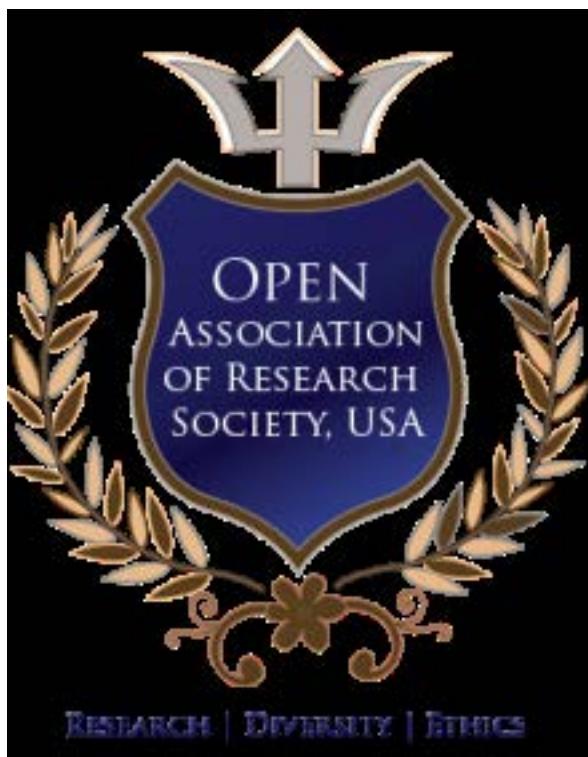
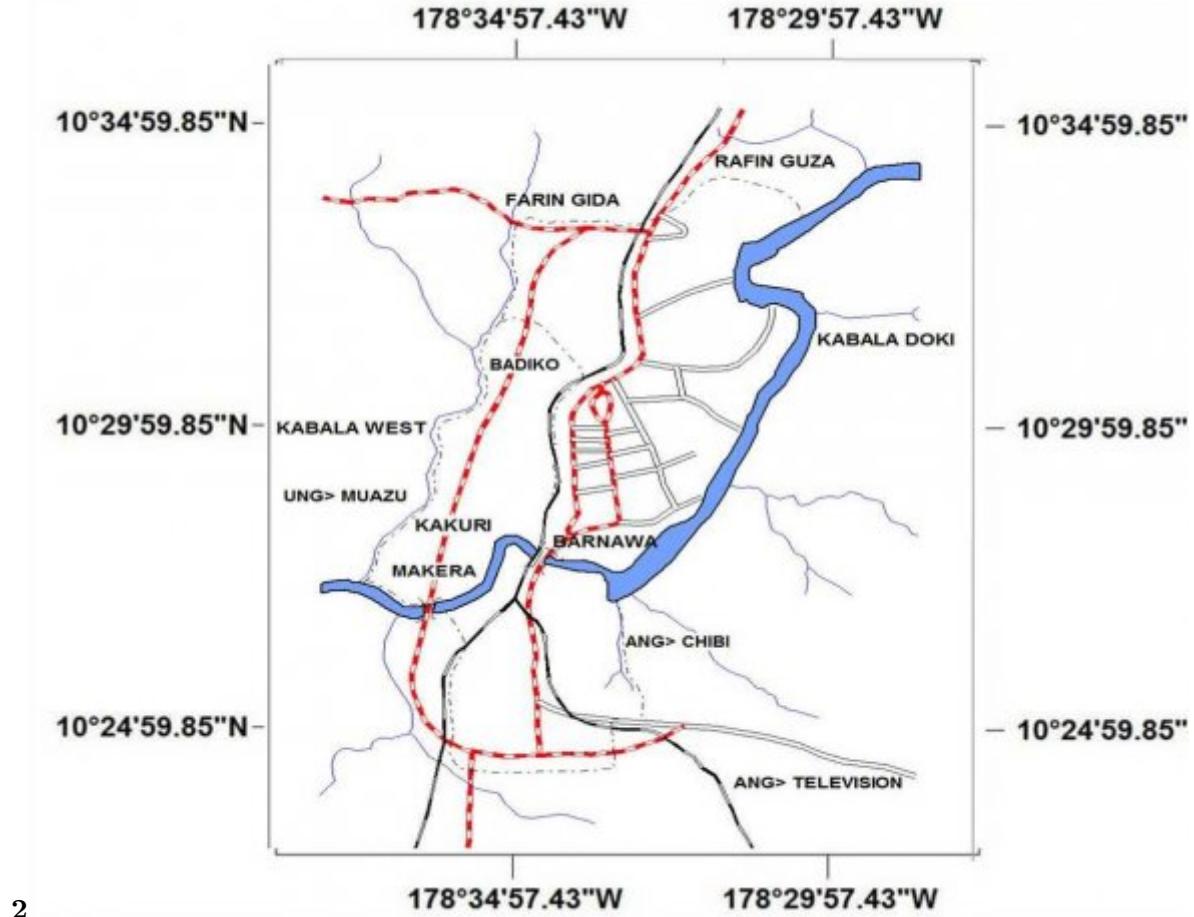


Figure 1:

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Figure 2: Figure 1 :

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Figure 3: Figure 2 :

1

Projects in the study area.

	Absolute No	Percentage
S/N Health Care Facility	4	17.39
1 Primary Health Centers	16	69.56
2 Boreholes	3	13.04
TOTAL	23	100.00

Source: MDGs report card, 2008

Figure 4: Table 1 :

2

S/No	L.G	Station	Coordinates (E)	Gps Lat.	Coordinates (N)	Gps Long.(N)
1	Kaduna North	Farin Gida	10 34' 46.4"	10 o 34'	07 o 26' 39.1"	07 o 25'
2	Kaduna North	Hayin Banki	40.8" o		05.6"	
3	Kaduna North	Angwan Yero	10 o 33' 22.9"		07 o 26' 16.8"	
4	Kaduna North	Kwaru	10 o 33' 58.3"		07 o 27' 41.0"	
5	Kaduna North	Rafin Guza	10 o 35' 17.4"		07 o 28' 06.5"	
6	Kaduna North	Ungwan	10 o 34' 13.0"	10 o 29'	07 o 27' 40.0"	07 o 24'
7	Kaduna South	Dosa Down Quarters	05.7"		52.6"	
8	Kaduna South	Makera	10 o 28' 21.2"		07 o 24' 34.2"	
9	Kaduna South	Kinkinau Ka- bala West	10 0 29' 07.8"	10 o 30'	07 o 24' 12.0"	07 o 23'
10	Kaduna South		14 0"		39.0"	
11	Kaduna South	Ungwan	10 o 31' 42.9"	10 o 31'	07 o 24' 34.0"	07 o 24'
12	Kaduna South	Sanusi Kasuwar- Barchi	0.9"		40.2"	
13	Kaduna South	Tudun Ilu	10 o 30' 39.5"	10 o 32'	07 o 25' 02.8"	07 o 24'
14	Kaduna South	Badiko	04.2"		38.0"	

Figure 5: Table 2 :

3

in 2008.

Figure 6: Table 3 :

4

LGAs in 2008

Figure 7: Table 4 :

6 CONCLUSION

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