Comparative Analysis of Facility Present Condition of Selected Schools and Hospitals in Rivers State, Nigeria

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Abstract

This article investigates the comparative analysis of the facility present condition (FPC) of selected health and educational buildings in Rivers State. State funded hospitals and schools (14 functional out of 23 general hospitals and 2 out of 3 tertiary schools) were selected for the study. The general hospital is a secondary health facility designed to bring health care services close to citizens especially those in rural communities. These facilities were inherited from the colonial masters in 1960. An assessment visit in2016 found the 23 general hospitals completely dilapidated and abandoned. However, rehabilitation intervention was carried out by the government in 2020. This scenario was quite different with the schools. Thus, this study is to increase the awareness of facility operators on building maintenance. A purposive sampling technique was used in selecting the hospitals and schools, while simple random sampling was adopted for questionnaire distribution to 300 respondents. The instrument reliability and validity were ascertained using Cronbach Alpha and face validity. The instrument obtained information about the status of the facility present condition. SPSS and Microsoft Xlstat were used to obtain the mean and frequency distribution of the responses. Comparative analysis was conducted to understand the FPC of the schools and hospitals. Z-test was deployed to ascertain if there was a significant difference in the FPC between the two institutions. Checklist was adopted to confirm the findings. The result from the survey showed that schools have better FPC than hospitals.

Keywords

Facility Present Condition, Schools, Hospitals, Comparative Analysis,

Z-Test and Checklist

1. Introduction

The average age of state funded school facilities was 40 years in 1999 [1]; While in Rivers State, the average age of the general hospitals was 60 in the year 2020. However, it is suggested that age defined by the year a building is built is a poor indicator of its condition, as initial design, quality of construction, and maintenance practices contribute much more to the facility's condition [2]. When the organization knows the condition of the facility, the need for maintenance or repair becomes much clearer. Like the general hospitals, they are secondary health facilities adequately designed in concept and function to deliver health care services to citizens especially those in rural communities. These facilities were inherited from the colonial masters in year 1960. However, an assessment visit in the year 2016 found the 23 general hospitals as abandoned and completely dilapidated. This 2016 facility audit made the need for maintenance or repair of the general hospitals much clearer. This research aimed at comparing the difference in the maintenance practice of the two institutions to motivate operators and regulators on the need to do more in the maintenance of the facilities.

The best way to protect any organization from future liability is to implement an effective facility auditing program [3], as facility information is necessary for planning. Facility condition assessments should utilize proper methodology, and institutional practices should be able to predict deferred maintenance needs [4]. The 2016 assessment visit result tells clearly the absence of routine facility auditing in the hospitals. However, the case was different with the schools as the quality of the buildings appeared well. The quality of facilities' decisions is only as good as the information on which they are based. Poor building performance and low efficiency can have a major impact on a school's bottom line. Not only do they cause utility costs to significantly increase, but they may lead to occupant discomfort, health problems, and lower productivity [5]. The information generated is valuable and provides excellent building data for facility planning. Any organization's facility presents a moving target, in terms of maintenance; hence, periodic updates of building conditions and consciously recording projections are vital [6]. On the other hand, a total view of maintenance management is canvassed to comprehensively preserve the facility at any given time. Maintenance management encompasses many operations and functions and can be described as the effective and efficient use of resources to make sure that the process and its facilities are kept to comply with standards and requirements assigned by the users [7]. Maintenance management in the public sector in Nigeria has suffered from a lack of funds and prioritization of maintenance and its management as the factor for production as evident in the general hospital scenario in Rivers State. Factors affecting maintenance cost of public and private hospitals' facilities are grouped into seven; factors pertaining to the: statutory

requirements, design phase, construction phase, management of the maintenance department, budgetary estimates for maintenance activities, operations conducted by the maintenance group, and community perception about the maintenance industry [8].

Building maintenance is gaining a central place in the construction activity worldwide. Building maintenance management is defined as a practical technique that is fragmentary and uncoordinated, reflecting the range of contractors which are involved in maintenance works [9]. It also asserted that educational curriculum cannot be sound and well operated with poor and badly managed facilities [10]. From all indication, good facilities are physical resources that facilitate wellness, effective teaching and learning. They include blocks of classrooms, laboratories, theatres, workshops, libraries, equipment, consumables, electricity, water, visual and audio-visual aids, tables, desks, chairs, playground, storage space and toilets. Plethora research reports have revealed that a significant relationship existed between school environment and students' attitude to schooling [11] [12] [13]. Hospital buildings are not also left out.

2. Materials and Method

2.1. Study Area

The study area used for this research was Rivers State which is located in the Niger Delta region of Nigeria (See **Figure 1**). The Niger Delta is the delta of the Niger River sitting directly on the Gulf of Guinea on the Atlantic Ocean. The Niger Delta region is located in the South-Central geopolitical zone of Nigeria that is made up of nine states; namely Rivers, Delta, Edo, Ondo, Akwa Ibom, Abia, Imo, and Cross River [14]. Most of the oil fields in Nigeria are mostly
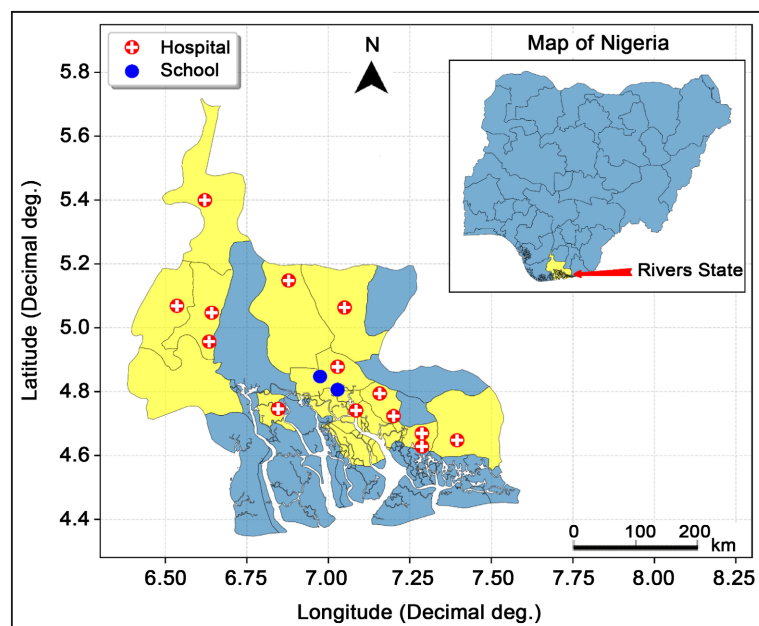
Figure 1. Map of study area showing the location for the hospitals and schools.

found in this region and is the heart of oil exploration in Nigeria. The region is known to be the oil producing region in the country as numerous oil wells are drilled in this region. River's state is one of the nine Niger Delta state. It is bounded to the North by Imo state, to the East by Abia and Akwa Ibom, to the South by the Atlantic Ocean, and to the West by Bayelsa. The geographical coordinate of Rivers state lies between longitude 6˚22'58.88"E and latitude 7˚35'6"E and latitude 4˚21'N and 5˚43'12"N. Port Harcourt is the capital of the state and it is considered to be the commercial center of the Nigeria oil industry. The colonial administration of Nigeria created the port to export coal from the collieries of Enugu to which it was linked by a railway called the Eastern Line, also built by the British [15].

2.2. Research Design

The study adopted a descriptive research design method which is a quantitative research design. Purposive sampling technique was used in selecting the hospitals and schools to be used in the study while simple random sampling was used in selecting the respondents. The instrument used in obtaining the primary data was a questionnaire survey of workers mainly in the maintenance unit of the selected hospitals and schools. Questionnaires were physically distributed to the respondents and the instrument was collected by the researcher. The data collected were analyzed using Both SPSS version 26 and Microsoft Xlstat to obtaining the mean response and the frequency distribution of the responses. The instrument reliability was ascertained using Cronbach Alpha while the validity of the instrument was done using face validity. The mean and standard deviation were computed in other to understand respondents' view on the facility present condition of the school and hospital buildings. Z-test was used in ascertaining if there was significant difference in respondent's view of FPC in their place of work.

2.3. Population of the Study

The population of the study for this research was State-funded hospitals and schools located within the state and the buildings would have been in existence for nothing less than 20 years. The hospital for the study should fall under the category of secondary health facility *i.e.* general hospital. While the schools are to be in the category of tertiary institution located within the state capital, Port Harcourt. 3 schools fell within this category. The schools were administered questionnaires out of which only 2 schools responded. The general hospital is located in each local government of Rivers state making a total of 23 general hospitals, 23 being the number of local governments in River's state. Maintenance of the general hospitals has been long neglected. A renovation and rehabilitation exercise are been undertaken by the present government to resuscitate the hospital. As at today, 14 of the 23 hospitals are functional.

2.4. Sampling Techniques and Sample Size

The number of respondents that participated in the survey was obtained through sample size calculation. Cochran (1975) sample size for proportion was used in obtaining the adequate sample size that would be representative. Cochran equation for sample size calculation is presented in Equation (1)

$$n_o = \frac{Z^2 pq}{e^2} \tag{1}$$

where n_o = sample size, e = margin of error, p = estimated proportion of an attribute that is present in the population, $q = 1-p$ and Z = abscissa of the normal curve that cuts off an area α at the tails (1 - α equals the desired confidence level, e.g., 95%).

Due to the fact that just a finite number of respondents would have a sense of the maintenance management practices in the building Cochran sample size equation was modified to accommodate for smaller population. The equation for the finite population correction for proportion (modified Cochran) is presented in Equation (2)

$$n = \frac{n_o}{1 + \frac{n_o - 1}{N}} \tag{2}$$

where n = sample size, N = population size, n_o = Cochran sample size.

The calculated sample size n, gave 208 questionnaires. While 44.23% applied attrition rate gave 300 questionnaires, as to account for questionnaires that would be wrongly filled or not returned.

2.5. Method of Data Collection

The two principal method of data collection were administering of questionnaires to workers that work in the maintenance department or work with a good sense of how the maintenance is been carried out for the building. The questionnaire survey was conducted for duration of five months beginning from November 2021 to March 2022. Also, checklist was used to obtain information about FPC of the schools and hospitals. Obtaining the data through the checklist was carried out by the researcher. Each facility was visited and the FPC were evaluated by the researcher.

2.6. Validation and Reliability of Instrument

The validation of the instrument was done by face validation. The project supervisor who is considered an expert in the area of civil engineering, environmental engineering and management ensured that each of the items in the various constructs actually measure the characteristic or trait of interest. Only after validation of the instrument where the instrument distributed to respondents.

The reliability of the questionnaire was done using Cronbach Alpha which measures the internal consistency of the questionnaires. The internal consistency

concerns the extents to which the items in a construct are actually measuring the same thing. Internal consistency is also the extent to which the individual items that constitute a test correlate with one another or with the test total. Cronbach Alpha reliability was adopted as it does not require testing the instrument in different time frame like test and re-test reliability method. Cronbach Alpha was calculated using Equation (3) by Allen and Yen 1979 [16].

$$a = \left[\frac{n}{n-1}\right]\left[1 - \frac{Sum\,Var(Y_i)}{Var(X_i)}\right] \tag{3}$$

where a = Cronbach alpha, n = number of items, $Sum\,Var(Y_i)$ = sum of items variance, and $Var(X_i)$ = Composite variance.

2.7. Method of Data Analysis

Both SPSS version 26 and Microsoft Xlstat were used to obtain the mean response and the frequency distribution of the responses. Comparative analysis was also conducted to understand the maintenance management practice between the schools and hospital. Z-test was used to ascertain if there is significant difference in the FPC between the two institutions. The checklist was used to confirm the maintenance management practice observed in the questionnaire and also reinforced finding or disproved finding found in the questionnaires.

3. Results and Discussion

3.1. Results

3.1.1. Questionnaires Response Rate

The summary of the schools and hospitals distribution in Rivers State with respect to Name, Location and Co-Ordinate are as presented in Table 1. Questionnaires were distributed to both workers that work in colleges and hospitals within River's state in other to compare the FPC of health and school buildings. A total of 150 questionnaires were distributed to workers that engage in maintaining the school building and the result from the survey response are presented in Table 2. Out of the 150 distributed to workers in the schools, 111 were deemed eligible to be used for analysis which corresponds to a response rate of 74%. The same number of questionnaires distributed to workers in school was also distributed to workers in the 14 selected hospitals. A total of 36 questionnaires were not retrieved while 12 questionnaires were not properly filled which accounts for 32%.

3.1.2. Demography of Respondents

The result from the demographics survey of the respondents presented in Figure 2 showed that a total of 171 (90.99%) male respondents took part in the survey as opposed to 42 (31.37%) female respondents, majority of the workers were between the ages of 41 to 50 years old, there were more permanent workers for both the school and hospital and that most of the respondents have obtained a higher education degree.

Table 1. Schools and hospital employed in the study.

| Name of Institution	Type	Longitude	Latitude	LGA
Rivers State University, Port Harcourt	School	6.9746	4.8472	Port Harcourt
Zonal Hospital Okrika	Hospital	7.0848	4.7406	Okrika
General Hospital Ogu-Bolo	Hospital	7.1999	4.7231	Ogu-Bolo
General Hospital Eleme	Hospital	7.1575	4.7939	Eleme
Zonal Hospital Isiokpo Ikwerre	Hospital	6.878	5.1478	Ikwere
Zonal Hospital Bori Khana	Hopsital	7.3949	4.6476	Khana
General Hospital Okomoko Etche	Hospital	7.0498	5.0632	Etche
Neuropsychatric Hospital Rumuigbo Obio Akpor	Hospital	7.0283	4.8776	Obio Akpor
College of Health Science and Management Obio Akpor	School	7.0283	4.806	Obio Akpor
General Hospital Abua	Hospital	6.6344	4.9564	Abua
Rivers State Hospital Management Board Ahoada East	Hospital	6.6424	5.0468	Ahoada East
General Hospital Bodo City Gokana	Hospital	7.2869	4.6692	Gokana
General Hospital Join Krama Ahoada West	Hospital	6.5356	5.0685	Ahoada West
General Hospital Asari-Toru	Hospital	6.8458	4.7456	Asari-Toru
General Hospital Gokana	Hospital	7.2869	4.628	Gokana
General Hospital Ogba Egbema Ndoni	Hospital	6.6211	5.3998	Ogba/Egbema/Ndoni

Table 2. Survey response rate.

Survey Parameters	Workers at the Schools		Workers at the Hospitals	
	No. of Questionnaires	Percentage	No. of Questionnaires	Percentage
Total copies of questionnaires distributed	150	100%	150	100%
Unreturned copies of questionnaires	20	13.33%	36	24.00%
Incomplete copies of questionnaires	19	12.67%	12	8.00%
Completed and usable questionnaires	111	74.00%	102	68.00%

3.1.3. Result of Cronbach Alpha Reliability Test

The Cronbach Alpha values were computed with the aid of SPSS version 26 software (See Table 3). Cronbach alpha ranges from 0 to 1, the higher the Cronbach alpha the more reliable the instrument or construct. Cronbach alpha that is greater than 0.7 should be aimed at [17] (See Table 3).

3.1.4. Facility Present Conditions, FPC

The results of the present facility condition are presented in Tables 4-7. The results from Table 4 showed that most of the school and hospital buildings present conditions was just slightly below good condition as the mean value scored 2.99 which is below 3, the agreed minimum score. However, some elements of the buildings were in an acceptable condition as most respondents agreed to the fact
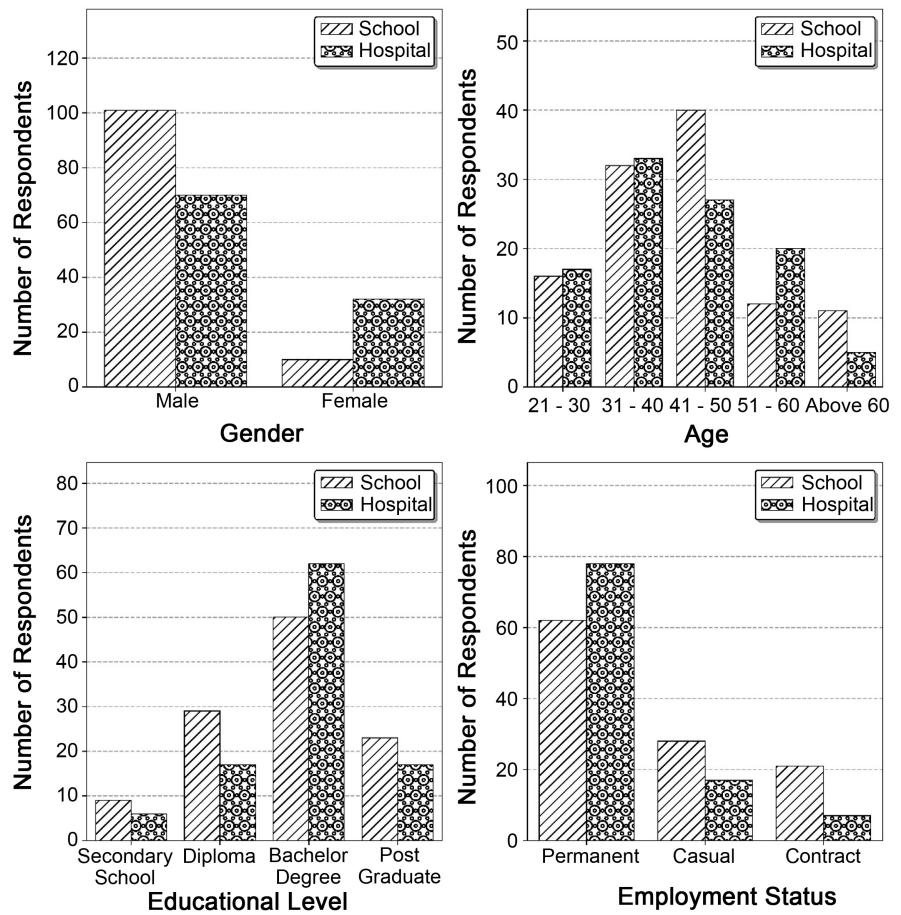
Figure 2. Demographic criteria of respondents in schools and hospitals in river states.

Table 3. Cronbach alpha reliability of maintenance management constructs.

Reliability Statistics		
Maintenance Management Construct	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items
Facility Present Conditions	0.773	0.789

that "the buildings appear in good shape". This statement scored a mean of 3.24, implying that the walls were well rendered and the surface coat is still acceptable. Despite the external of the buildings appearing in good condition, respondents opined that the schools and hospitals environment were filled with lots of broken-down equipment not repaired or properly disposed. This is made evident as the statement "there were lots of inoperable equipment in work my place" had a mean score of 2.51. The result from Table 5 showed that the facility present condition for the school was in better shape than the hospital. Most of the respondents in the school stated that the facility present state was in good conditions, as the mean response value scored 3.2. They were of the opinion that the building appeared in good shape, the electrical system works, the water system

Table 4. Mean responses by participants on the facility present conditions (4-point Likert Scale).

	Mean	Std. Deviation	Analysis N
The building appears in good shape	3.24	0.83	213
Workplace grounds and environment is clean and free of litter	3.16	0.70	213
There is not a lot of inoperable equipment in my workplace	2.51	0.97	213
Equipment deemed irreparable has been removed from the buildings and is not disposed of on the facility grounds	2.63	0.93	213
Electrical system works	3.25	0.61	213
Water system works	3.22	0.67	213
Waste system works	3.09	0.71	213
Provision made for handicapped persons are ramp	2.71	0.93	213
Toilet blocks are clean and plumbing is in order	3.14	0.84	213
Renovations are performed when required on the external and internal of the building	3.00	0.86	213
Required renovations on the outside and inside of the building have been performed recently and appear sound when inspected	2.94	0.92	213
Grand Mean for Facility present conditions	2.99		

SD = 1, D = 2, A = 3 and SD = 4.

Table 5. Mean responses by participants on the facility present conditions.

	Statistics			
Variable	Workplace	Total Count	Mean	StDev
FCP	Hospital	102	2.7647	0.4648
	School	111	3.1966	0.3343

works, the waste system works, toilet blocks were clean, renovation are performed when required, the required renovation on the outside and inside of the buildings were performed recently and appeared satisfactory when inspected, etc. The mean response from respondents in the hospital was 2.76 indicating that most of the respondents were not agreeing to the hospital present condition been in good condition. Result of Z-test of significance is presented in Table 6.

It showed that there was significant difference between the facility present condition of the school and hospital (p-value < 0.0001). The result from the Z-test provided sufficient evidence in stating that the facility present condition for school is better than that of hospital found within River's state. In other to validate the result of the questionnaires, checklist evaluation the facility present condition (FPC) was done. The result from Table 7 showed that the mean score for facility present condition for school was greater than what was obtained for the hospital. The mean score for school was 3.00 as opposed to 2.49 obtained for the hospital. The results obtained for FPC from the questionnaires and checklist gave similar results (See Figure 3). The findings from the result shows that the schools tend to have a better FPC than the hospitals.

Table 6. Z-test of significance for difference in facility present conditions.

Difference	0.4319
z (Observed value)	7.7253
|z| (Critical value)	1.9600
p-value (Two-tailed)	<0.0001
alpha	0.05

Table 7. Availability of facility present condition from checklist.

Variable	Type	Mean	St. Dev
Score	Hospital	2.49	0.91
	School	3.00	0.00
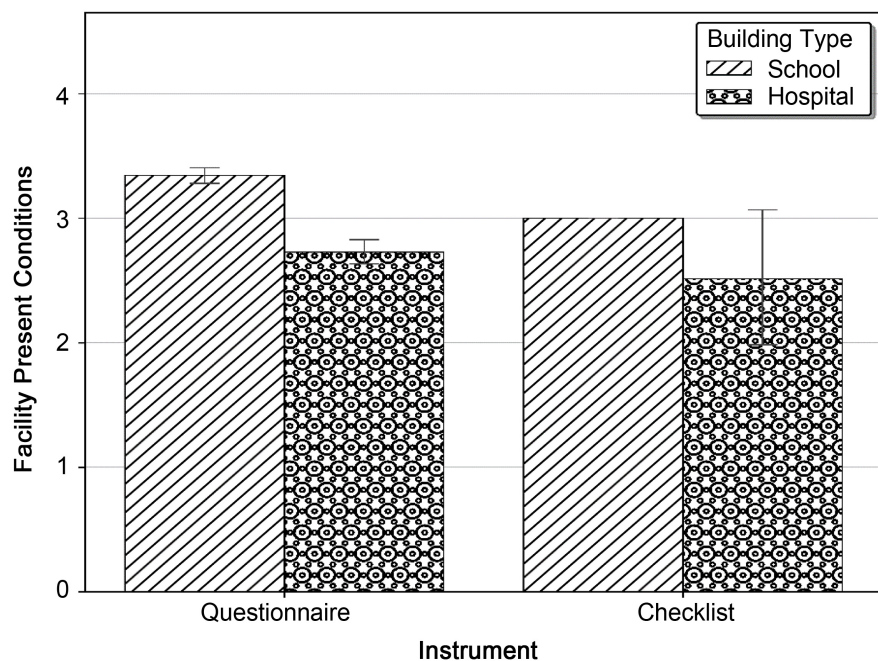
Figure 3. Facility present condition in schools and hospitals.

3.2. Discussion

Some schools of thought hold the view that there is a correlation between a facility's condition and optimal result achievement for service-oriented organization. The result from the study on facility present condition showed that schools had better facility conditions than hospitals and therefore, are expected to operate close to an optimal service level. Empirical studies have proven that good facility condition is key to optimal service delivery. Corroborative to this study, it was found that school facilities are the physical and spatial enablers of teaching and learning which will increase the production of result [18] [19]. It was also alluded that conducive school environment could enhance student's school attendance, involvement in academic activities and academic performance positive [11]. Furthermore, opinions still had it that schools that planned and maintained their facilities had higher student's retention and is more effective than the others [20]. The situation of Schools in Delta State, Nigeria is dilapidated due to inadequate funding and timeliness at approving maintenance budget [11]. The significance of this finding is that maintenance and keeping of a facility in a good working condition has a lot with timeliness. For the hospitals that failed the assessment test for a good facility working condition as at the time of the assessment might be that the budget for the maintenance may have been awaiting approval. Another significance of the finding is the correlation of timeliness in maintenance and cost. Timely maintenance saves cost. The more delayed a maintenance need is kept, the more that building element needing maintenance degenerates and even leads to the damage of other previously good elements that are connected to it. This finding is corroborated by the research in Kuala Lumpur, Malaysia undertaken to access the condition of buildings, it was found that many buildings faced maintenance problem that need urgent attention in order to preserve them from further deterioration and decay [21]. If the school and hospital in Rivers State must boost service delivery, then the facility present condition must be kept at an optimal working condition.

4. Conclusion

The study revealed the present state of the buildings and the entire facility of the 14 functional general hospitals and 2 tertiary institutions in Rivers State. The result showed that the FPC condition of the school and hospital buildings combined was just slightly below good condition as it scored a mean value of 2.99 which is slightly below 3.00 the generally accepted score. The result also showed that the FPC for the schools was in better condition than the hospitals. The schools had a mean score of 3.2 and hospitals 2.76. The result from the Z-test of significance showed a significant difference between the facility's present condition of the schools and hospitals (p-value < 0.0001). The result from the Z-test provided sufficient evidence in stating that the facility's present condition for schools is better than that of hospitals in Rivers State. Checklist validation had a

mean score of 3.00 for schools as opposed to 2.49 obtained for hospitals. The results obtained for FPC from the questionnaires and checklist gave similar results. The study encountered some limitations at the data gathering stage. The facilities had a very poor database. Hence, the study relied majorly on the data extracted through the questionnaire.

5. Recommendation

It is therefore imperative that operators of the different hospitals and schools should improve on the maintenance management practice. Funding for building maintenance should be adequately provided for and maintenance of database is enhanced or developed. It is recommended that maintenance-state evaluation of the buildings and entire facility be conducted routinely and that professional capacity enhancement training and retraining be organized to keep maintenance staff competent for the job.

Additionally, the regulating agencies should set regulations that support maintenance as an element of production and engage in sensitization programmes to educate facility operators and users on the importance of having the facility operate at an optimal level.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

Appendix A: Demographic Criteria Frequency and Percentage

Demographic Parameters	Frequency		Percentage	
	Hospital	School	Hospital	School
Gender				
Female	32	10	31.37%	9.01%
Male	70	101	68.63%	90.99%
Grand Total	102	111	100.00%	100.00%
Age				
21 - 30	17	16	16.67%	14.41%
31 - 40	33	32	32.35%	28.83%
41 - 50	27	40	26.47%	36.04%
51 - 60	20	12	19.61%	10.81%
Above 60	5	11	4.90%	9.91%
Grand Total	102	111	100.00%	100.00%
Employment Status				
Casual	17	28	16.67%	25.23%
Contract	7	21	6.86%	18.92%
Permanent	78	62	76.47%	55.86%
Grand Total	102	111	100.00%	100.00%
Education Level				
Bachelor Degree	62	50	60.78%	45.05%
Diploma	17	29	16.67%	26.13%
Post Graduate	17	23	16.67%	20.72%
Secondary School	6	9	5.88%	8.11%
Grand Total	102	111	100.00%	100.00%

Appendix B: School and Hospitals that Participated in the Survey

Name of School/Hospital	Number of Responses
Schools	
College of Health Science and Management	5
Rivers State University	106
Hospitals	
General Hospital Abua	10
General Hospital Asrari-Toru	9
General Hospital Bodo City Gokana	9
General Hospital Eleme	3
General Hospital Gokana	8
General Hospital Joinkrama Ahoada West	8
General Hospital Ndoni	6
General Hospital Ogu-Bolo	5
General Hospital Okomoko-Etche	7
Neuropsychiatric Hospital Rumuigbo	8
Rivers State Hospital Management Board Ahoada	11
Zonal Hospital Bori, Khalga	5
Zonal Hospital Isiokpo	8
Zonal Hospital Okrika	5
Grand Total	213