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Information and Communication Technology (ICTs) Tools Adoption Maintenance and Utilization. The Case of Nigerian University Teaching Hospitals.

By: Pius Reuben Ewoh, piusreubenewoh@gmail.com

Abstract

There has been a growing trend for information and communication technology tools adoption and utilization for organisations and hospital to handle critical and complex cases, and to manage health information systems and data processing in delivering effective healthcare and social wellbeing inclusion. As well as reducing operational cost. However, research has revealed that majority or all public hospital in sub-Sahara Africa Nigeria has under-utilized these technologies due to lack of maintenance and performances in the Hospital workplaces. This has become a big concern in the African continent, especially Nigeria.

This paper look at the quantitative and qualitative research approach to explore ICTs tools adoptions, maintenance and management initiatives based on selected ICTs strategy documents, with interviews and questionnaire administrations to the staff of the selected hospital in Nigeria. This research paper suggests that the promotion of information communication technology tools adoptions and utilization for healthcare delivery is needed, as healthcare professional, and stakeholders in the sectors needs to be aware of the importance of ICTs tools development, management, maintenance and policies. The implementation of these strategy in hospital operations will help improve and reshaped healthcare delivery process for better outcome.

Based on this research analysis of literature review, questionnaire, interviews and focus group session, the result revealed that information communication technology is under-utilized, under-developed, lack maintenance and the level of diffusion in these teaching hospital is at the growing stage. Government's policy makers, and stakeholders needs to truly formulate policies and strategies that will enhance and promote information communications technology for healthcare services adoptions and activities. The policy formulations will take consideration of information when formulating and implementing an information communication technology-based solution for health and policy initiatives. This research will contribute to the existing body of knowledge in Information and communication technology, policy agenda on health sector, National policy implementation plan, Initiatives for the diffusion and digitalisation of health in healthcare delivery systems.

Keywords: Information communication technology, healthcare services delivery, Internet for medical things, Technology Improvement, Strategy, Challenges and Maintenance.

1. Introduction

Information technology adaptation and utilization has shaped and changed the way healthcare business and services is delivered due to the growing need of ICTs implementation in workplaces. As the paradigm shift from manual filing to electronic systems. The World population now exceeds six billion of which more than 4.7 billion reside in the developing world (UNDP, 2000; US Census Bureau, 2001) the internet and computer software application has made the world become as global village through the use of smart devices such as computer, telephone, Software through internet connections.

The application of information and communication technology in healthcare is becoming glaring in the management of healthcare care service, whereby clinician and non-clinician will be to make quality healthcare decision effectively. The Nigerian National Health Services in 1998 had reorganised the significant of ICTs in the future that Nigeria Health workers will require to be computer literate in order to function and apply ICTs in health care delivery and administrative functions.

Information and communication technology have reshaped life in our day to day living in our workplaces. This paper will highlight deeply the drivers of this ICTs in healthcare delivery. Health Information system remain the key for the management of the hospital information systems with the application of computer technology for hospital staff and patient data is pulled and processed through electronic medical record systems in a timely manner.

The emergence of ICTs into the African region began during the 1990s and the boom started in late 2000. The African continent covers approximately 20% of the global land mass and is home to 15% of the world population with approximately 1 billion people living in its 55 countries (Elahi, de beer, Kawooya, oguamanam, and Rizk, 2013). With this population in Africa it represents a significant portion of the world population and ICT is a vital tool to release the creative potential and knowledge embedded in her people for industrial growth and transformation. In spite of great strides in terms of socioeconomic development, ICTs diffusion in the health sector is a data mining, key for economic prosperity and advancement in health and wellbeing of the people.

This research presented in this paper will help the federal and State ministry of health, scholars, scientist in future technology research hubs and Nigerian government to enact or amend and implement information and communication technology health policies in real time for effective and efficient health sector reform. The use and application of ICTs based solutions in the Nigerian teaching hospitals, Federal medical centres and Neuro-psychiatric hospitals will help all staffs and patients to ensure electronic health (e-health) is properly implemented or digitalized to handle complex and advance case with the use of technology.

2. Background

2.1 Adaptations of ICTs in Africa

In the 1990s and the early 2000s, ICT research and adoption aims in the region was focused in bridging the digital divide through overcoming connectivity and access barriers for more and more of the Africa's nations by providing internet connections to meet up with other part of the world in information dissemination and sharing vital key data and processing in the knowledge based 22nd century. As the diffusion of ICTs increased across the African continent in the late 2000s and early 2010s, the focus started to shift to the uptake and impact of these ICTs to transform societies and economies (eTransform Africa, 2012; World Bank, 2012).

Today ICTs in one sector "Health care" is becoming and gaining momentum in the way care are delivered to patient and how the health information systems is utilized with the use of computer and telecommunication technologies to process, diagnosis, and treatment of patient for effective healthcare decision and quality healthcare provision. And how this technology is utilized in accessing other African continent in the suburb with the use of telecommunication, coverage systems in delivering care to the lost or excluded populations. Social and healthcare inclusion of the people under the bottom of the pyramid into the universal coverage systems as part of the resolution of the united nation in world health organisation millennium development goals agenda for Africa and other under-developed nations. Yet this resolution is yet to fully become a reality in the healthcare systems.

As research continues to improve with increase lunching of space technology for research advancement in all field of life, ICT began to diffuse into the African region through research institutions to improve and utilized the benefits of ICTs in the advancement of human day to day living and solving the eco-systems problems all as well as social well-being. This Initiative began in Africa when the World Health Organisation, World Bank, United Nation development programmes as well United State Aid initiative development in 1993, where most provinces in Mongolia, and other countries in Africa were provided with personal computers funded by the world health organisation to support health service delivery (Bra et al, 1995).

2.2 Adoption and Utilization of ICT in Nigeria Institutions

Going by the earlier history and ICTs revolutionary initiative in Nigeria would be traced to the days of colonial era in 1950 before Nigeria gain independence in 1960. The initiative was keen and focused on Print and electronic media. Policy where not properly formulated because of the control of government military regime that focus on Decree and rule. So, the full potential of ICTs was absent and under- utilized. Research revealed that the private sector adopted the systems and initiative more quickly. (Emadoye, 2002). After the change of the government from colonial to the Independence and to the military era and back to civilian democracy rule.

As policy for Information and communication technology continue to reshape in the early stage, in the late 80s, ICTs was adopted into the Nigeria university teaching hospital through INDEHELA projects of the computing centre of Kuopio University Finland, in collaboration with the Obafemi Awolowo university teaching hospital in Nigeria. Furthermore, research has revealed that the internet continued to diffuse into the university systems to improve learning process and knowledge sharing to advance research in all field of endeavour. This was a project initiated between international centre for theoretical physics (ICTP), Trieste Italy, and Obafemi Awolowo University in 1999, Idowu et al 2015).

ICT policies and implementations would have been stable or improved, but due to subsequent change of government in power between democracy rule and the long military regime, the diffusion and adaptation of ICT was hampered and under-utilized. Policies that was supposed to give meaning or help the citizen was abrogated by the then military era. ICT Utilization and adaptation began to decline and restricted to only few hands in the military.

Until 2000-2001 of the Olusegun Obasanjo administration that established the National Information Technology Development Agency (NITDA) to serve a bureau for the implementation of National Policy on Information technology that reconnect the lost world, however, the Agency was dealing with internet coverage, but the initiative does not focus on using ICTs in Healthcare delivery system. Although until now, the systems were not properly utilized and sustained in all area of the sectors of economy. Though this paper will only focus on ICTs tools adoption, maintenance and utilization in delivering healthcare services in some selected Nigeria University teaching hospitals.

2.3 Telecommunication Sector in Nigeria

The telecommunication sector has been effective since the early 50s until the sector was not able to sustain the business due to government policies, Corruptions, funding, and maintenance. Then in 2001 during the boom of the Global systems of Mobile communication (GSM) a radical reform was carried out that transform mobile telephony systems in Nigeria. Nigerian Communication Commission issued operation licences to Globalcom (Glo), Mobile Telephone Network (MTN), Econet Nigeria to Celtel - to Zain now known as Airtel, and later Etisalat came into the market. The Nigerian Tele-communication Limited (Nitel) a Nigeria government telephony company established a mobile line call Mobile telecommunication Limited (Mtel) but was not able to survive the competition in the market. This has enabled Health workers and professional to be able to reach out to doctors- patient relations, some of the services has been offered using mobile phone. Until the modern day that we have smart phones and PDAS which is used for internets, and delivery of healthcare services (m-Health). Mobile health has helped transform the way healthcare services is delivered. It has help to improved health care delivery in the rural and urban area across health facilities.

3. Research Methodology

This research was conducted to know the diagnostic need assessment of the hospital to a hospital modernisation pathway. However, this section of this paper will focus on information and communication technology sections of the questionnaire as research in the visited hospital. This section investigates the indicators of information communication technology tools adoption, Maintenance and utilization in the visited hospitals in Nigeria. These hospitals comprise of three federal medical centres, two Neuro-psychiatric hospital and seven University teaching hospital in Nigeria. The materials used for this research was Questionnaire, focus group session, Personal Interview and observations. The excise was conducted for about 3 hours minimum each of the following Hospital Irrua Teaching Hospital Irrua,(IRRU), University of Benin Teaching Hospital (UBTH), Federal Neuro-Psychiatric Hospital Uselu (FNH-Uselu), Federal Medical Centre Yenagoa (FMC-Yenagoa), University of Port-Harcourt teaching Hospital Choba (UPTH), Rivers State University Teaching Hospital (RSUTH), University of Uyo Teaching Hospital (UUTH-Uyo), University of Calabar Teaching hospital (UCTH), Federal Neuro-Psychiatric Hospital Calabar (FNH-C), Alex Ikwme University Teaching Hospital Ebony State (AFUTHA), Federal Medical Centre Umahia (FMC-U) and Federal Medical Centre Owerri (FMC-O). The researcher (Author), visited these hospitals and administered fifty questionnaires to each hospital, had a focus group sessions with the Chief Medical Directors, Chairman Medical Advisory Committee, Director of Nursing, Director of Laboratory Services, Director of Pharmaceutical Services, Director of Finance and Accounts, Director of Administration, Director of Works, Head of Legal Services , Head of Public private Partnership Units, Others and Heads of the department (HOD), the team carryout inspections of the whole facilities, ask some questions to the patents in the hospital, Interviews and observations was taken down on ICTs tools and availability, functioning or not functioning, computers availability, Internet connectivity and maintenance, utilization. Mobile phone communications and PDAS, in delivering healthcare services. The result was analysed. The researcher visited all the specialty of the hospitals and the Administrative offices to ask questions on the ICTS services and utilization. Collated questionnaire for all the speciality of the hospital was analysed using Microsoft excel software chart and analysis. The study will measure five indicators of ICTs tools in the visited government hospitals which comprises of Computers Availability/ Adoption, Computer Usability, Telephone Availability/Adoption, Internet facilities Availability/Adoption, and Internet Functionality/ Usability and maintenance

4. Results and Discussions

ICT Tools/ Indicators Description	Number of Respondent	Number of Questionnaire	NO	Yes
Maintenance Plan Available in the Facilities	120	120	No	
Manual filing Record Availability	120	120		Yes
Training and Utilization of Technology base Platform	100		No	
Electronic Medical Record Availability	120	120	No	
Internet Functionality & Usability	100	120	No	
Internet facilities Availability & Adoption	100	120	No	
Telephone Availability & Adoption	120	120		Yes
Computer Availability & Adoption	100	120		Yes
Computer Functionality	100	120		Yes

Table 1. Total Survey Result for the Visited Hospitals

5. Results

This research revealed that the hospitals does not have internet and functional internet facilities, no maintenance plan available or followed, Training and utilization for technology based platform was 100/20, meaning significantly there was no training to utilize and operation of technologies as a result of not been available. Electronic medical record was not in place in any of the hospital, Telephone mobile, Computer and manual medical records were in place and functional.

For example, see, Figure 1. Cluster chat for the ICTs tools and parameter Assessment above states clearly the Information communication technology tools availability, usability, and functionality for effective healthcare service delivery and administrative functions. Furthermore, to understand the chat Indicators in appendix, with 0.1 are tools and services not available in the hospital. While indicators labelled 100 are the services and tools available in the hospital. Based on the result obtained it is clearer that Indicators that will enhance effective healthcare delivery are not met. Staffs where not trains to utilized technology-based services. Clinical and non-clinical staffs are not able to use the internet because the necessary tools were not available for the computer to function. Filing systems still remain manual based, instead of electronic health record. Schedule maintenance plan was not in place for ICTs tools and major medical devices, while most of the ICTs tools are obsolete.

Also, in Hospital B chat in appendix, ICTs tools and parameter assessment above and in the chat states clearly the information communication technology tools availability, usability, and functionality for effective healthcare service delivery and administrative functions. Thus, to

fully understand the chat indicators with 0.1 are tools and services not available in the hospital, while indicators labelled 100 are the services and tools available and functional in the hospital.

In Hospital C, ICTs tools and parameter assessment states clearly that the Information communication technology tools availability, usability, and functionality for effective healthcare services and administrative functions. Furthermore, to understand the chat Indicators with 0.1 are tools and services not available and not functioning in the hospital. While indicators labelled 100 are the services and tools available and functional in the hospital. All the indicators under 100 and labelled 100 are ICTs services, tools and equipment available and functional. In the services label with 0.1 are the services and tools not available, basically, there no maintenance plan in place.

In Hospital D, ICTs tools and assessment above states clearly the Information communication technology tools availability, usability, and functionality for the facility. Scale 0.1 of the chart in appendix in each of the parameters represent not available and not functional. The scale of 100 as label signifies that the services and ICTs tool available. Finally, in Hospital E above and in the chat, ICTs tools and assessment below states clearly the information communication technology tools availability, usability, and functionality for the facility. Scale 0.1 in each of the parameters represent not available and not functional. While scale 100 as label signify that the services and ICTs tool available. See appendix for details chart results.

Discussions

The Chief medical director's office has its own personal internet for his or her own use. While clinician has to bring their own device. Else they will be subject to browse using computer in the cyber cafe centres. The method of filing does not help these hospitals because files are stored in a filling room with medical record in a paper-based form, which may be difficult to find when patient visit the hospital.

Information technology base activities are drawn majorly for administrative functions of computer document processing and not as application in majored medical device to deliver healthcare. This is one of the reasons while trained clinicians is required to apply the knowledge in real time. Also, most of the digital technology deployed for healthcare delivery, for example digital x-ray were not working or not properly utilized, as because most of the staff lack the technical know-how on how to apply these technologies for a day to day healthcare service delivery. Maintenance is a major issue entirely in all the departments and units of the hospitals because, one of the most significant issues in these hospitals is lack of maintenance and obsolete equipment are cited as the major issues with ICTs based technology and medical devices. Research also revealed that none of the healthcare facilities has an electronic functional medical record. In a facility where you find telephone and internet facilities is majorly from a USB Technology that gives internet access to one or two persons for their office use only. Clinical and Non-clinical staffs lack training majorly in these hospitals to apply healthcare technology-based services. In most cases some of the office are left black out with the ICTs systems not functioning or if they are not generating their power. Epileptic power

supply is also an issue. In some cases where ICTs tools like UPS system was supposed to be use for Special baby care unit (SBCU), was replaced with Stabilizers to only stable power during when the power system supply is on.

6. Conclusion

This research focuses on Information and Communication Technology tools adoptions, utilizations and maintenance in Nigerian teaching hospitals, Neuro-Psychiatric Hospital and Federal medical centres. The role and impact of ICTs in these hospital shows that Information technology adoptions has yielded a great significant impact in healthcare delivery of these teaching hospital and medical centres in where there are available but was under-utilized. However, it would be said that the level of penetration and diffusion is still at a growing stage. Adoptions and utilization of technology-based platform in healthcare services delivery has little yielded a greater result in terms of data processing and engaging with the radiology department and administrative functions in some of the hospital that is available. Also, it has also impacted greatly in the laboratories for effective test sample analysis. However, more effort needed to be focus on maintenance, internet facilities and connections in all units, acquisitions of new technology to avoid obsolete or outdated devices. The training of staff and technology transfer will enable these hospitals to continue to offer quality healthcare services.

7. Recommendations

The author will recommend that the federal government of Nigeria and federal ministry of health should ensure that healthcare project is fully funded for ICTs base technology in the hospital. And to enable the management of these facilities to deliver effective and efficient technology driven healthcare system. Secondly, electronic medical records are key for effective patient electronic health record systems to avoid error and inaccuracy in healthcare systems. Thirdly, government and the authority should focus on maintenance to enable and grantee equipment uptime and to avoid error reading and negative result. Fourthly, internet-based technology and Internet of medical things is the key to health awareness, coverage systems and campaign to effective health and social well-being. Telephony services, procurements of new computer devices to enable the entire hospital and clinics connect to internet with a local or hub network to interconnect all computer systems in all department and units of the hospital. It should be taken seriously. And finally, the government should ensure training of local staff to be able to learn and utilized these technology systems for effective healthcare service delivery.

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Appendix

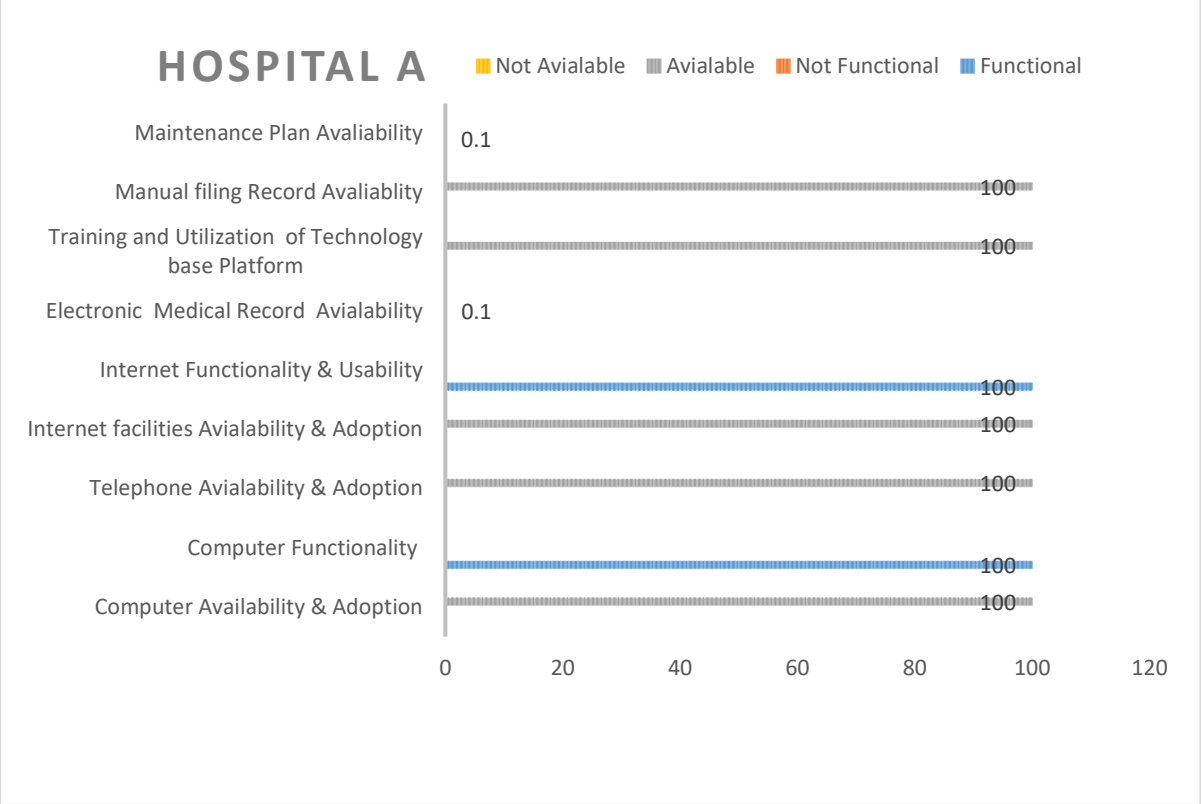

Figure 1: Hospital Information Communication Technology Assessment.

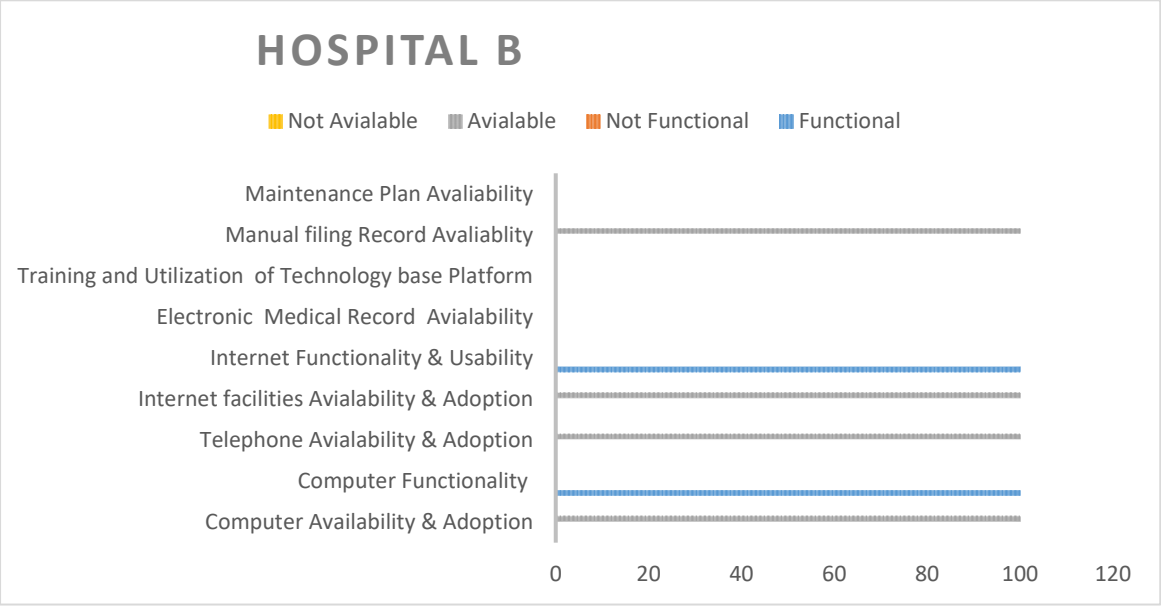

Figure 2: Hospital Information Communication Technology Tools Assessment.

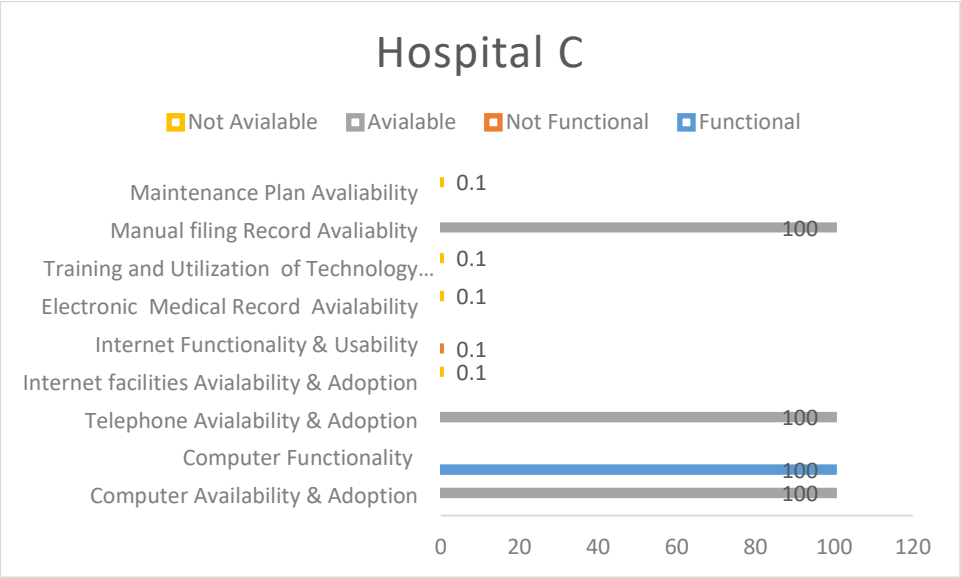

Figure 3: Hospital Information Communication Technology Tools Assessment

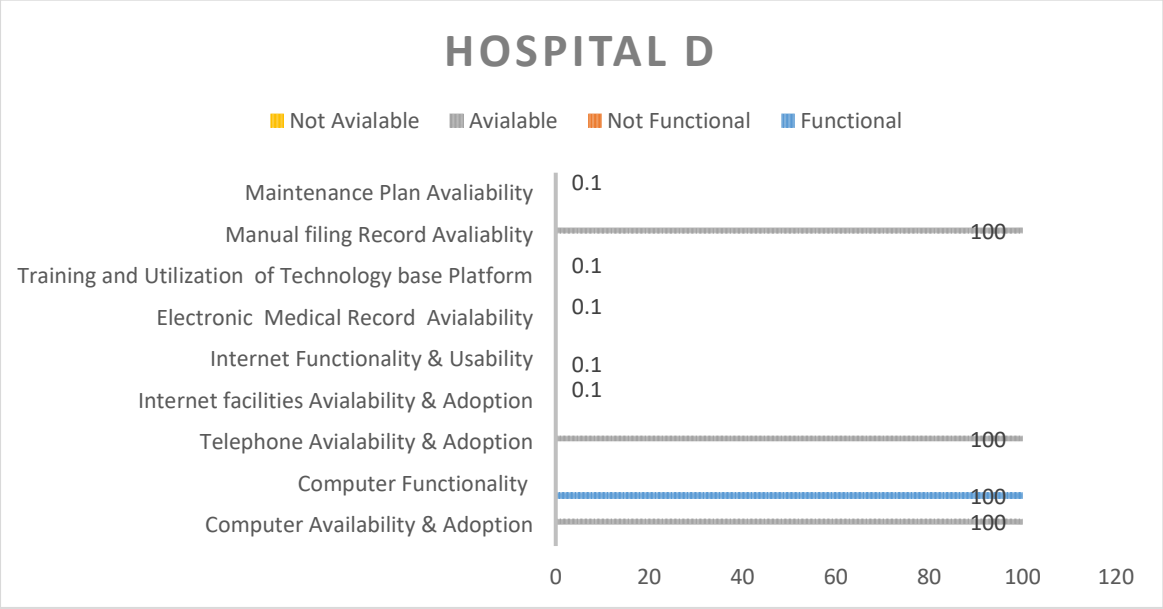

Figure 4: Hospital Information Communication Technology Tools Assessment

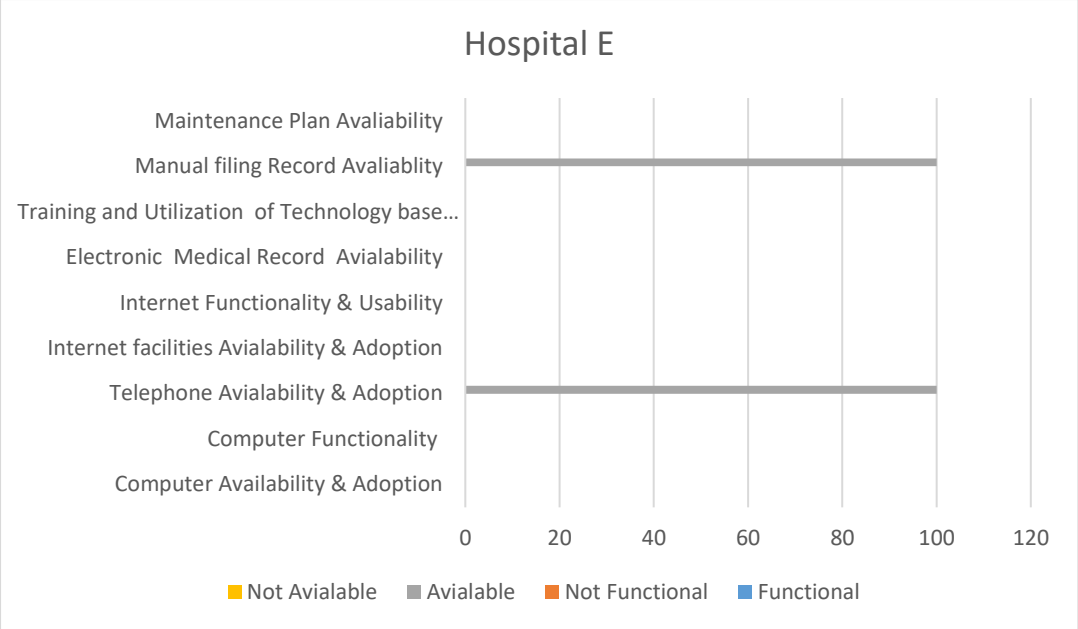

Figure 5: Hospital Information Communication Technology Assessment