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TELEMEDICINE AS A PANACEA TO MEDICAL TOURISM IN AFRICA EXPLOITING COMMUNICATION SATELLITE TECHNOLOGIES

Theme: Digital Inclusion – Health **Presenter**: Engr. Lasisi Salami LAWAL (CEng, PhD), **Institution**: Senior Research Fellow, Federal University of Technology, Minna. Acting General Manager, Nigerian Communications Satellite Ltd.

Presentation Outline



- Research team
- Introduction
- Research methodology
- Research findings and outcomes
- Recommendations
- Conclusions

Research Team





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Introduction





- Nigeria's healthcare sector struggles with brain drain and insufficient infrastructure.
- As a result of this, affluent Nigerians choose to receive medical treatment in more developed countries.
- Medical tourism costs the Nigerian economy \$1.3 billion annually.
- Health service delivery is often poor for Nigerians who cannot afford to be treated abroad.
- This research aimed to:
 - i. Implement a robust network design to exploit the application of communication satellites to deliver broadband for telemedicine services in designated rural communities and internally displaced person (IDP) camps in Nigeria.
 - ii. Evaluate the acceptability, utility, and adoption of Very Small Aperture Terminal (VSAT)-based internet for telemedicine delivery using a peerto-peer mobile application.
 - iii. Make recommendations to relevant authorities and stakeholders on VSAT-based telemedicine research findings to drive digital health inclusion in Nigeria and Africa as a whole.

Research Methodology



RESEARCH

METHODOLOGY



- This research draws on a mixed methodology (quantitative and qualitative) approach comprising:
 - . Case studies covering the assessment of past telemedicine projects
 - **ii. Surveys** covering interviews, consultations, and discussions with stakeholders on healthcare technologies and deployed 'Action Research'
 - iii. Action research covering the deployment of VSAT-based internet with a mobile health application (the **One2One app**) to determine the applicability of satellite technology for telemedicine services.
- The collection and analysis of patient data during the action research phase was done using Microsoft Excel.
- A **descriptive analysis** of the data collected was carried out to measure the success of the telemedicine approach adopted.

Research Findings and Outcomes





- A total of 766 patients received medical attention during the Satellite for Digital Health (S4DH) medical outreach program.
- 81.8 percent of the patients and medical personnel who participated in our survey strongly agreed that the One2One mobile health application provided an acceptable way to deliver healthcare services and reduce medical tourism from rural areas to urban centers including outside the shores. The One2one mHealth application software has been made available on google store free.
- Communications Satellite Networks can deliver telemedicine services in areas with little or no terrestrial mobile networks to fast track the UN Sustainable Development Goal 3 on health. Robust networks require taking into account equipment sizing from the gateway of the teleport to the end user equipment for delivery of efficient broadband services end-to-end.
- Major challenges facing the adoption of telemedicine in Nigeria are language barriers and low literacy levels, especially in underserved communities.
- Poor sanitary conditions and inadequate health education in IDP camps are major causes of prevailing health conditions at the camps.
- Accessibility to IDP camps is poorly regulated and may pose security challenges to the inhabitants of the camps.

Research Findings and Outcomes (4 papers in Conference Proceedings and Journals)



- Digital Health Inclusion: A Pilot Study of Health Services Deployment Using Communications Satellite for the Underserved in Nigeria. Submitted to International Journal of Telemedicine and Applications.
- Overview of Satellite Communications and its Applications in Telemedicine for the underserved in Nigeria: A case study submitted to the 2nd International Conference on Electrical, Computer, Communications and Mechatronics Engineering (ICECCME). Notification of Acceptance was communicated on 16th August, 2022 and Conference Date is 16-18 November 2022 at Maldives. We have since register our accepted paper for virtual attendance. IEEE Copyright and Consent Form has been signed as demanded by conference organizers for publication of paper in IEEE Xplore.
 - A Review of Telemedicine and its Potential in Developing Countries submitted to the 8th International Conference on Mechatronics Engineering (ICOM'22). Notification of Acceptance was communicated on 30th June, 2022 and Registration for the Conference has been made and Paper Presentation was delivered on 9-10 August, 2022 at Kuala Lumpur. The paper was re-written in IET template format and we signed IET Assignment copyright for publication in IET explore.
 - Internally Displaced Persons (IDPs) in Abuja: An Overview of Health Situation and Solution was Submitted to International Journal of Health, Safety and Environment (IJHSE). It has been accepted for journal publication. Published on 15th October, 2022.



Recommendations



Government and Policy Makers:

- i. Sensitizing the public and stakeholders (Health Institutions, Teaching Hospitals, African Regional Office of World Health Organization) on the benefits of adopting digital health especially in University Teaching Hospitals and other related health organizations will increase its acceptance rate and adoption in the country and continent at large. Framework and policies at local, state, national and regional level are required to drive implementation.
- ii. The Federal Government of Nigeria needs to invest heavily in the four key branches of medicine that account for 60% of medical tourism. These branches are **oncology**, **orthopedics**, **nephrology**, and **cardiology**.
- iii. Satellite-based solutions can be utilized by the National Emergency Management Agency (NEMA) and other emergency and disaster management agencies to deliver healthcare services to Nigerian citizens during disasters and emergency situations.
- iv. To foster the inclusion of IDPs in health insurance schemes, a comprehensive database should be created for these citizens along with other palliative measures.

Recommendations



- Telemedicine Researchers and Software & Hardware Designers driving eHealth Facilities:
- i. The video call feature of the One2One mobile health application was essential for physical examinations in telemedicine. This feature is, therefore, highly recommended for developers of telemedicine software.
- ii. Telemedicine services can only work with sufficient bandwidth. This should be taken into account when designing a telemedicine network architecture.
- iii. Language translation features should be incorporated into mobile health applications to bridge the language and literacy gap in rural communities.
- iv. Hardware designers should consider implementing ehealth facilities with minimal power consumption for optimal usage of the facilities using green power technologies considering inadequacy of public power supply in rural communities in the continent.

Conclusion



- Telemedicine serves as a means to transcend geographic, time, social, and cultural barriers to healthcare delivery in line with attainment of UN SDG goal 3.
- Mobile health applications with audio, video and text capabilities can be leveraged to provide telemedicine services in both urban and rural locations using VSATbased Internet.
- Language barriers encountered during this project were resolved by employing support staff who were fluent in both English and the local languages of the communities visited. However, incorporating language translation features for future telemedicine software is highly recommended and part of ongoing next steps.
- The One2One mobile healthcare application is available on Google Play Store underscoring the importance of digital mobile apps in the Telemedicine drive and adoption.