TELE-MEDICINE AS A PANACEA TO MEDICAL TOURISM IN AFRICA EXPLOITING COMMUNICATION SATELLITE TECHNOLOGIES

BY

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FOR

INFORMATION SESSIONS ON CONNECT2RECOVER: RESEARCH COMPETITION PAPERS FOCUSING ON AFRICA.

THEME: DIGITAL INCLUSION FOR JOB CREATION AND HEALTH

21ST APRIL, 2022

PRESENTATION OUTLINE

- About Research Project
- Expected Research Outcomes/Services
- Project Team/Partners/Collaborators
- **Justification of Research, Purpose/Expected Outcomes**
- Ethical Approval by a University Teaching Hospital
- Impact/Outcomes/Success Stories
- Ongoing Activities/Progress
- Recommendations/Conclusion

ABOUT RESEARCH PROJECT

- Nigeria's health service struggles with brain drain, insufficient infrastructure and inadequate specialist skills on one hand, and affluent patients choosing to be treated abroad;
- Medical tourism is costing the Nigerian economy in the region of $1.3 billion annually.
- Hence, the health service for dependent Nigerians, in particular those living in rural and remote areas, is often poor and inadequate.
- One way to mitigate these shortcomings is to make use of digital solutions enabling shared specialist resources that reside in Nigerian central health facilities and elsewhere.
- The research project draws on a mixed methodology approach comprising case studies, a survey and action research to examine and determine the resilience of communications satellite technology to provide telemedicine service.
- We officially commenced activities on 7th January, 2022 for the next 6 months.

EXPECTED RESEARCH OUTCOMES/SERVICES

- Such services can critically improve access to high quality healthcare advice and services. Utilizing this technology for early diagnosis and prompt treatment is a realizable goal.
- To gather insights, the project draws on a mixed-methods approach comprising: case studies, a survey and action research to determine the potential for implementing a satellite communication network for telemedicine in rural areas.
- Such implementation facilitates broadband availability in rural Africa as well creating a mobile emergency response facility that can be quickly be deployed to a disaster location or
- internally displaced persons (IDP) camps to extend emergency healthcare service delivery in an attempt to enhance African nation's disaster response preparedness and effectiveness utilizing Communications Satellite Technology.

PROJECT TEAM/PARTNERS/COLLABORATORS

- **Dr. Lasisi Salami LAWAL (CEng)**, Senior Research Fellow, Federal University of Technology, Minna; and Acting General Manager, Satellite Applications, Nigerian Communications Satellite Ltd, Abuja, Nigeria (Investigator)
- **Prof. Abiodun Musa Aibinu**, Professor of Mechatronics Engineering, Federal University of Technology, Minna, Nigeria (Investigator)
- **Dr. Omotayo O. Oshiga**, Senior Lecturer, Nile University of Nigeria.(Investigator)
- **Prof. Steve A. Adeshina**, Professor and Dean, Faculty of Engineering, Nile University of Nigeria. (Supervisor)
- **Prof. Chatwin R Chris**, Professor in Engineering (Engineering and Design), School of Engineering and Informatics, University of Sussex, United Kingdom. (Supervisor)
- **Prof. Gail Davey**, Professor of Global Health Epidemiology, Brighton & Sussex Medical School , United Kingdom (Supervisor)
- **Dr. Abdulrahaman Jaafar**, Head of Department and Assistant Chief Medical Officer (ACMO), Aviation Medical Clinic, Kaduna, Federal Airport Authority of Nigeria.(Investigator)







PROJECT TEAM/PARTNERS/COLLABORATORS

- **Dr. Ubong Udoyen** ; CEO, One2One Healthcare, Nigeria and Assistant Clinical Professor, Department of Psychiatry, Yale University School of Medicine, USA (Investigator)
- ***Dr. Theddeus Iheanacho*** *; Associate Professor, Department of Psychiatry, Yale University School of Medicine, New Haven, CT, USA (Investigator)*
- **Dr. Abimbola Alale**; Managing Director and Chief Executive Officer of Nigerian Communications Satellite Ltd, Nigeria (Supervisor)
- **Prof. Abdullahi Bala;fsssn;** Vice Chancellor, Federal University of Technology, Minna, Niger State, Nigeria (Supervisor)
- **Prof. Mohammed Nasir Sambo**, Professor of Health Policy and Management with Bias for Health Care Financing with keen Interest in Digital Technology for Health Systems, Executive Secretary of The National Health Insurance Scheme (NHIS), Nigeria (Supervisor)
- **Prof. Isa Ali Ibrahim (Pantami) (FNCS, FBCS, FIIM);** Professor of Cyber Security and Honorable Minister of Communications and Digital Economy of Federal Republic of Nigeria (Supervisor)






JUSTIFICATION OF RESEARCH, PURPOSE/EXPECTED OUTCOMES

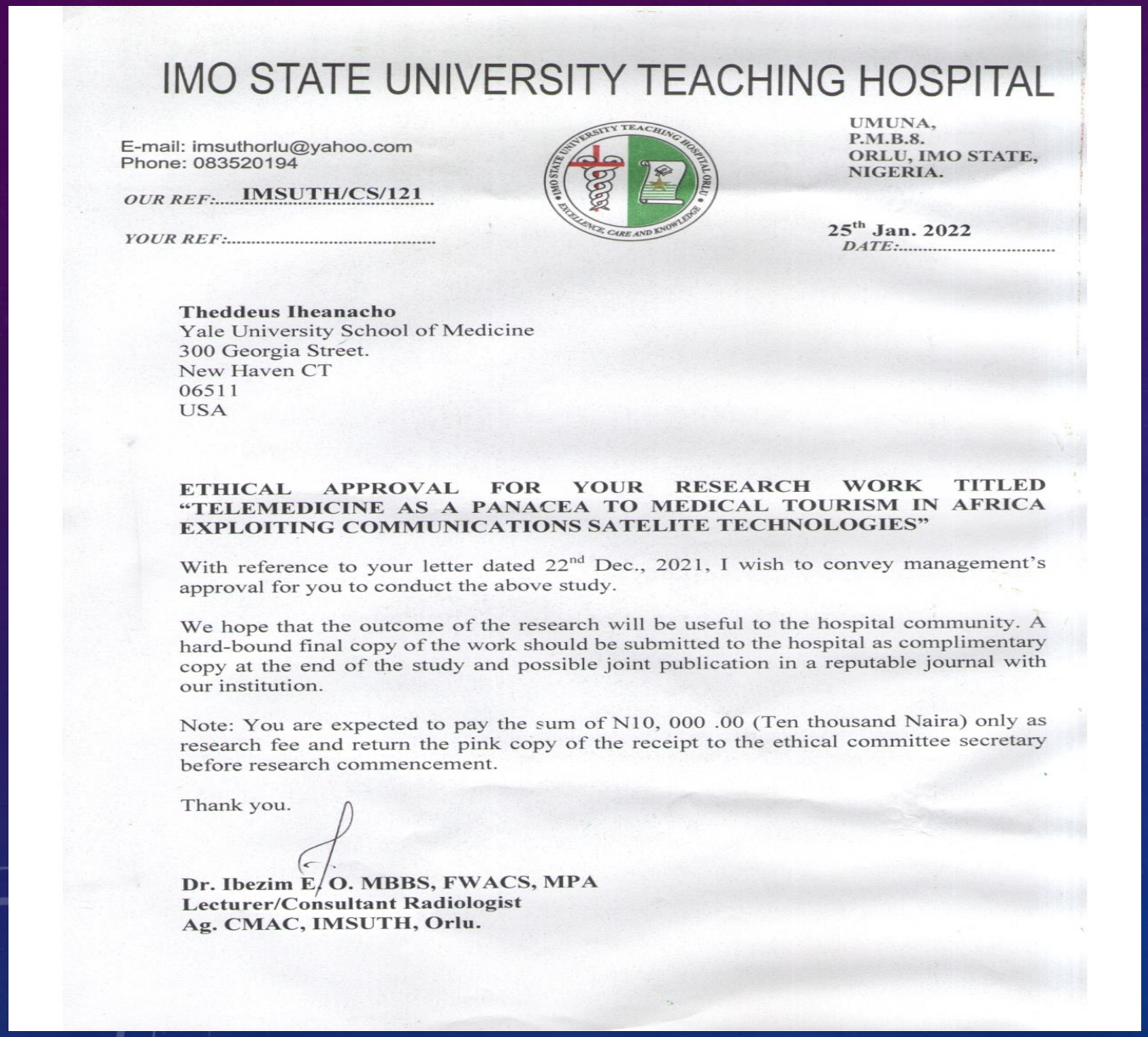
JUSTIFICATION OF STUDY

- ✓ The continued impact of COVID-19 in Nigeria on public health, social welfare, economic activities and healthcare policies makes it imperative that we deploy space-based technology-driven telemedicine to enhance remote access to medical professionals, specialists and expert consultation for low resource areas in Nigeria.

PURPOSE/EXPECTED OUTCOMES AND OTHER OBJECTIVES

- ✓ Robust Network Design of Application of Communications Satellite to Deliver Broadband for Telemedicine to designated pilot clinical site and Internally Displaced Persons (IDP) Camps in Nigeria.
- ✓ Evaluate the acceptability, utility and adoption of Vsat-Based Telemedicine delivered using peer-to-peer telemedicine app (One2one Health App).
- ✓ Publication of Research Results in conference proceedings (CP) and referred journal paper.
- ✓ Make Recommendations to relevant authorities on VSAT-Based Telemedicine research findings as part of National ICT strategy, policy and recommendations to drive digital health inclusion in Nigeria and Africa in general.
- ✓ Other Objectives are:
  - ✓ Conduct qualitative interviews among clinicians, patients, and technical staff to evaluate acceptability, potential for scale up and barriers to utilization.
  - ✓ Analyze data from the completed questionnaires and interviews.

ETHICAL APPROVAL BY A UNIVERSITY TEACHING HOSPITAL



IMO STATE UNIVERSITY TEACHING HOSPITAL

E-mail: imsuthorlu@yahoo.com
Phone: 083520194

UMUNA,
P.M.B.8.
ORLU, IMO STATE,
NIGERIA.

OUR REF: IMSUTH/CS/121

YOUR REF:

DATE: 25th Jan. 2022

Theddeus Iheanacho
Yale University School of Medicine
300 Georgia Street.
New Haven CT
06511
USA

ETHICAL APPROVAL FOR YOUR RESEARCH WORK TITLED "TELEMEDICINE AS A PANACEA TO MEDICAL TOURISM IN AFRICA EXPLOITING COMMUNICATIONS SATELITE TECHNOLOGIES"

With reference to your letter dated 22nd Dec., 2021, I wish to convey management's approval for you to conduct the above study.

We hope that the outcome of the research will be useful to the hospital community. A hard-bound final copy of the work should be submitted to the hospital as complimentary copy at the end of the study and possible joint publication in a reputable journal with our institution.

Note: You are expected to pay the sum of N10, 000 .00 (Ten thousand Naira) only as research fee and return the pink copy of the receipt to the ethical committee secretary before research commencement.

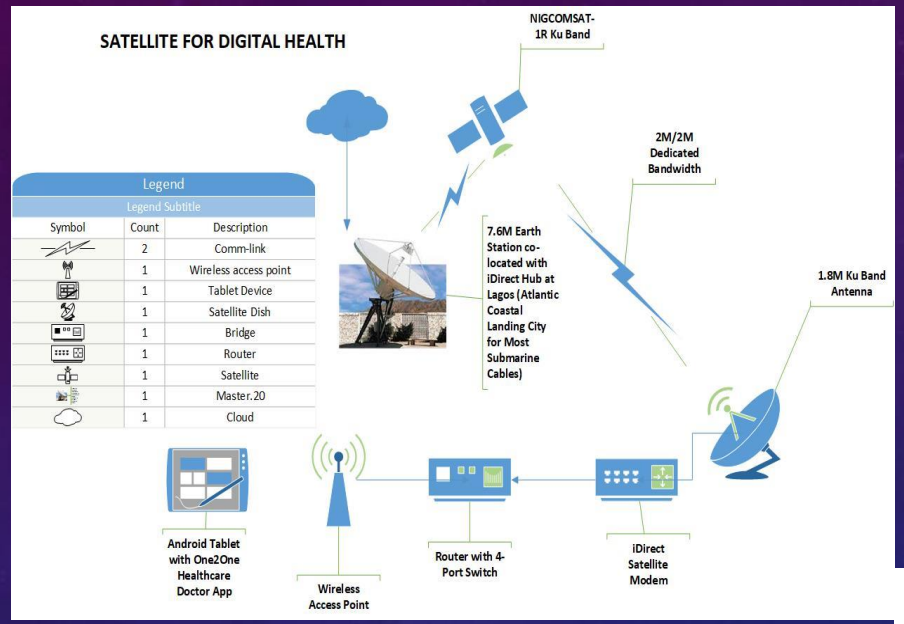
Thank you.

Dr. Ibezim E. O. MBBS, FWACS, MPA
Lecturer/Consultant Radiologist
Ag. CMAC, IMSUTH, Orlu.

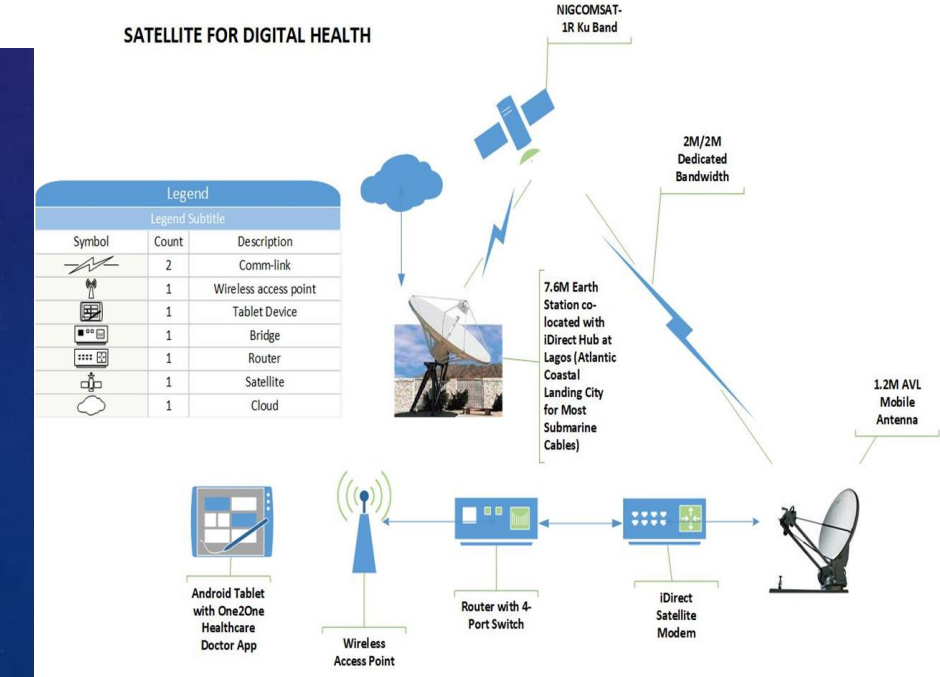
Before Commencement Medical Outreach Trial in the Field using the Designed VSAT-based Telemedicine with Peer-to-Peer App at Aviation Medical Clinic, Kaduna and IDP Camps, we secured Ethical Approval for the Research Work on 25th January, 2022 after necessary paperwork and documentations with Imo State University Teaching Hospital through one of our co-investigator; Dr Theddeus Iheanacho.

IMPACT/OUTCOMES/SUCCESS STORIES

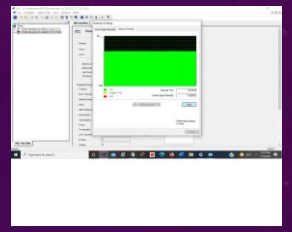
Robust Network Design for the fixed Site at Aviation Medical Clinic, FAAN, Kaduna and Mobile Emergency response satellite Kit deployment in disaster locations and Internally Displaced Persons (IDP) camps to extend emergency healthcare services to the needy with considerations to Earth Station Antenna diameter at the teleport using link budget to deliver Broadband with appropriate customer premise equipment (CPE) and Bandwidth.



Aviation Medical Clinic, Kaduna



Mobile VSAT Antenna for emergency healthcare delivery and Internet Services



IMPACT/OUTCOMES/SUCCESS STORIES

Deployed 1.8M Ku Band Very Small Aperture Terminal (VSAT) at Aviation Medical Clinic, FAAN, Kaduna after evaluation of Design parameters and performance analysis using Sat Master Pro and Excel Based Link Budget Calculator.

Commissioned 1.8M Ku Band VSAT with dedicated 2M/2M Mbps bandwidth.
The Resident Doctor (Co-Investigator), Resident Research Assistants (Nurses) and Principal Investigator

IMPACT/OUTCOMES/SUCCESS STORIES

Administration of Telemedicine at Aviation Medical Clinic Kaduna and 3-days medical outreach at host airport community and environs.

S4DH

SATELLITE FOR DIGITAL HEALTH (S4DH) RESEARCH PROJECT

DIGITAL HEALTH INCLUSION VIA NIGCOMSAT-1R COMMUNICATIONS SATELLITE TO ENHANCE NIGERIA'S HEALTH SERVICE DELIVERY.

HOST UNIVERSITY

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA NIGER STATE, NIGERIA.

COLLABORATORS AND SUPPORT PARTNERS

NIGCOMSAT

brighton and sussex medical school

Brighton and Sussex Centre for Global Health Research

NILE UNIVERSITY OF NIGERIA

one2one HEALTHCARE

UNIVERSITY OF SUSSEX

FEDERAL MINISTRY OF COMMUNICATIONS & DIGITAL ECONOMY

For further information on Connect2Recover research competition winners, please visit: https://www.itu.int/en/ITU-D/Pages/connect2recover/research-competition/winners/default.aspx

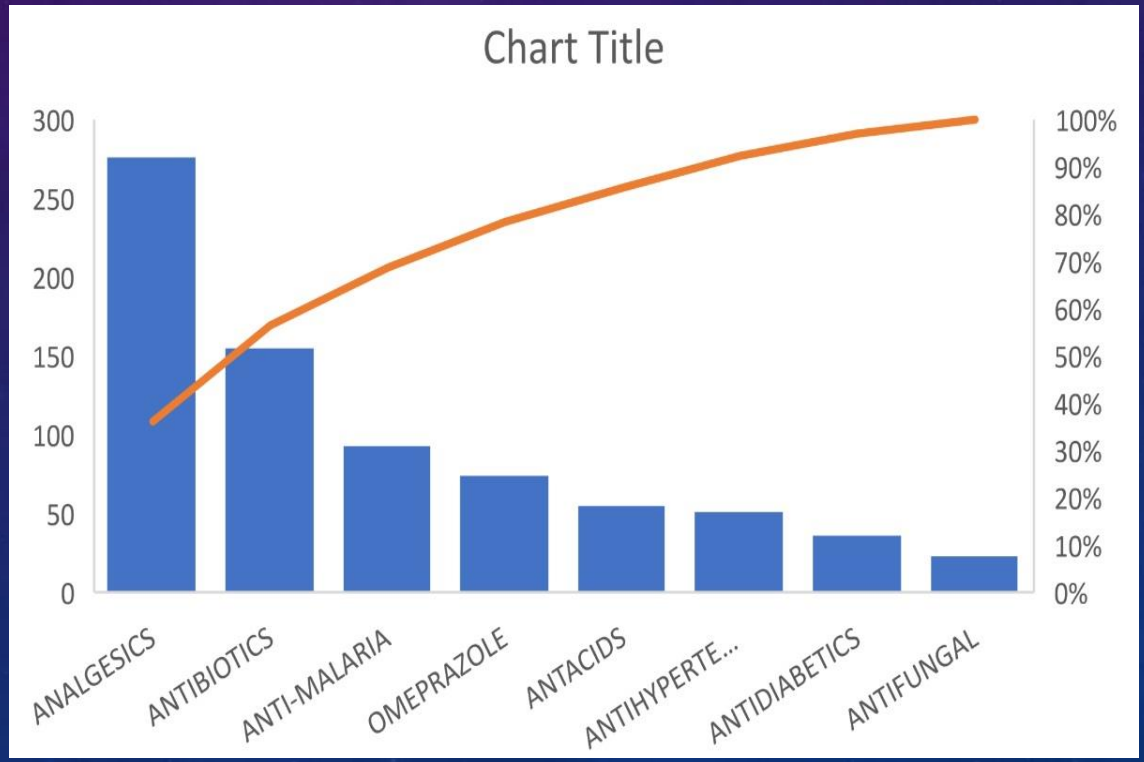
On research project and activities, please visit www.s4dh.com.ng

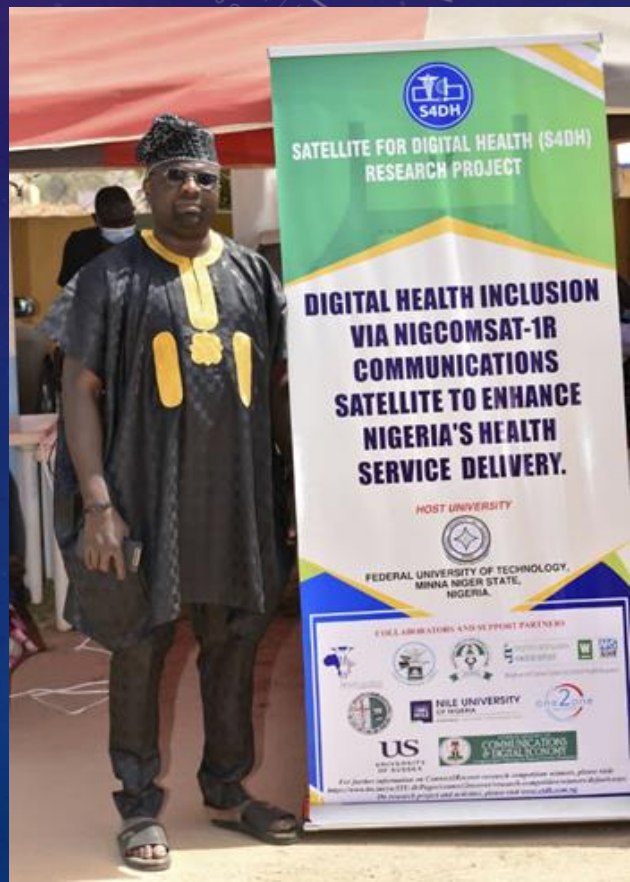
IMPACT/OUTCOMES/SUCCESS STORIES

Total Numbers of patients administered since ethical approval to date.

Total number of persons who registered and received service	701
Total number of Children registered for de-worming.	364
Number of patients who were seen by a doctor	337
Number of Persons who got HIV Testing Service	4
Number of Referrals	2

MOST PRESCRIBED MEDICATIONS	NUMBER OF PERSONS WHO RECEIVED MEDICATION
ANALGESICS	276
ANTACIDS	55
ANTIBIOTICS	155
ANTIDIABETICS	36
ANTIFUNGAL	23
ANTIHYPERTENSIVE	51
ANTI-MALARIA	93
OMEPRAZOLE	74





ONGOING ACTIVITIES/PROGRESS

- Familiarization visits to collaborating institutions, Online interactions with universities and research institutes with telemedicine and eHealth research and projects as well as visits to IDP camps in Nigeria for the next Medical outreach using the mobile VSAT Kit.

Mobile 1.2m Composite Ku-Band Reflector, Circular Hand Crank for Emergency/Manual Stow of Az and El Axes Integrated with Ku-band 4W BUC and LNB undergoing series of tests before deployment in Internal Displaced Persons (IDP) camps. Planned Field trial scheduled for April 29th to 1st May, 2022.

ONGOING ACTIVITIES/PROGRESS

- Study, revision, data gathering on the Telemedicine project, E-health care and associated healthcare technologies.
- Recommendations to relevant authorities on VSAT-Based Telemedicine research findings as part of National ICT strategy, policy and recommendations to drive digital health inclusion in Nigeria and Africa in general (ongoing).
- Publication of research results in referred conference proceedings (CP) and referred journal paper (JP). The two papers have reached finalization stage for publication. The title of the papers are:

I. ***DIGITAL HEALTH INCLUSION: A CASE STUDY HEALTH SERVICES DELIVERED USING COMMUNICATIONS SATELLITE FOR THE UNDERSERVED IN NIGERIA***

II. ***A CURSORY LOOK AT ACCESSING HEALTH FACILITIES FOR INTERNALLY DISPLACED PERSONS (IDPS) IN NIGERIA***

RECOMMENDATIONS/CONCLUSION

- Telemedicine can only work with sufficient broadband bandwidth. Communications satellite networks can provide the required connection quality with great consideration to Teleport Antenna, Customer Premise Equipment (VSAT) sizing and dedicated bandwidth for a TDMA network. Thus, they are a viable option to provide services in rural areas; underserved and unserved locations in developing countries. The project determines the potential for deploying such a solution in Nigeria to address digital health inclusion and digital health insurance inclusion of citizens in rural and semi-urban areas.
- Specifically, the project also investigates the resiliency of communication satellite technologies to deliver broadband for telemedicine in rural areas of Nigeria using an app designed as a distributed peer-2-peer network referred to as one2one app with two variants available on play store (One2one healthcare doctor for specialists and One2one healthcare patient for patients). It leverages on specialists around the world to enhance and improve sustainable healthcare service delivery in rural areas. The aim is to validate the case for delivering rural and community healthcare services sustainably with near real-time video consultation.
- Furthermore, the project seeks to explore the creation of a mobile emergency response facility that can quickly be deployed to a disaster location to extend emergency healthcare service delivery and thus making critical contribution to enhancing African nation's disaster response preparedness and effectiveness utilizing communications satellite technology.

CONCLUSION

- This is a very beneficial research as it facilitates digital health inclusion for all via Communications Satellite in line with goal 3 of United Nations Sustainable Development goals (SDG). Investing in highly cost-effective health-promoting interventions with policy interventions will help check medical tourism which has become synonymous with Nigeria in particular.
- Good health and Well-being is one of the 17 SDGs established by United Nations in 2015. The official wording of the goal is: To ensure healthy lives and promote well-being for all at all ages. With our research and field trial so far, it won't be an over statement to say goal 3 can only be realized through digital health inclusion in African continent facilitated through use of communications satellites.
- This is because Africa remains the least wired continent in the world. i.e In Nigeria alone, 31.6 million live in areas without telecom coverage (unserved) representing 15.12% of the population in 114 clusters – Nigerian Communications Commission (NCC) report and as contained in Nigerian National Broadband Plan 2020 – 2025 document.
- For further information on our research project and activities, please visit www.s4dh.com.ng

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA
Technology for Empowerment

AVIATION MEDICAL CLINICS

IMO STATE UNIVERSITY TEACHING HOSPITAL, ORLU
EXCELLENCE, CARE AND KNOWLEDGE

US
UNIVERSITY OF SUSSEX

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AFRICAN ROOTED GLOBALLY POSITIONED

one2one HEALTHCARE

FEDERAL MINISTRY OF COMMUNICATIONS & DIGITAL ECONOMY
Leveraging Digital Technology for National Economic Development

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HONORIS UNITED UNIVERSITIES

brighton and sussex medical school
wellcome
NHS NIHR
Brighton and Sussex Centre for Global Health Research

NATIONAL HEALTH INSURANCE SCHEME
EASY ACCESS TO HEALTH CARE FOR ALL