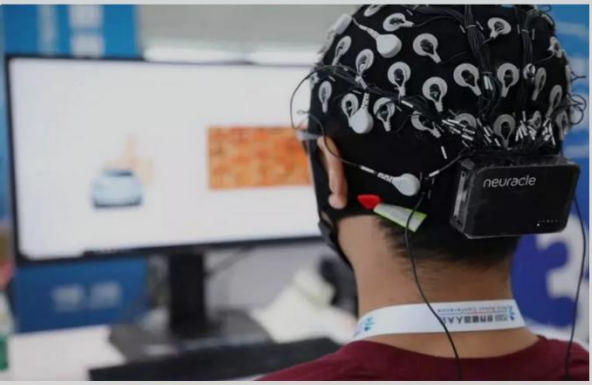


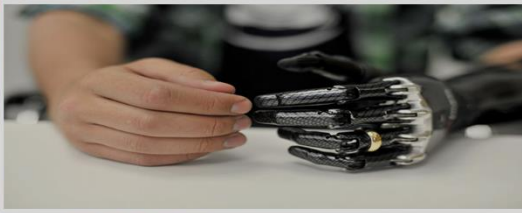
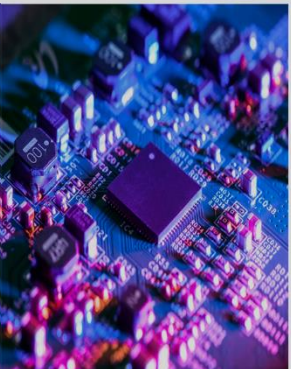



NIGERIA

COMSTECH PROFILE OF MEMBER STATES

Science, Technology and Innovation Indicators



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FOREWORD

It gives me great pleasure to share the *Science, Technology and Innovation Profiles of OIC Member States* as prepared by COMSTECH. These profiles of member states are being printed, as well as being shared on the COMSTECH website. A few words are therefore in order to explain the wider aims and purposes of this exercise.

The member countries of the OIC are vigorously engaged with science, technology and innovation, both as a pursuit of knowledge and in harnessing the forces of nature for human betterment. Depending on their circumstances they have advanced to different levels, but much needs to be done, in general, to catch up with the attainments of the more advanced countries. However, there exists a well-defined need to catalogue national efforts in this direction. In particular, to identify respective strengths, achievements and shortcomings, as well as the institutions and policies that are shaping the scientific research and development profiles of OIC member states.

It is with the above goals and purposes that COMSTECH has ventured on this ambitious task viz. preparing a summarized version of the science, technology and innovation landscape of each member state. We have initiated this effort starting with the profiles of countries leading in this area, and will be continuing and sharing as we proceed onwards.

Undoubtedly much more could be said about each country than the summary that we have presented, but our emphasis is on the essentials and on maintaining brevity. COMSTECH welcomes feedback from member states on this effort and will be happy to update the website profiles on the basis of information received officially.

I hope that the scientific community as well as the planners and administrators of member states will find these profiles both useful and inspiring.

Prof. Dr. M. Iqbal Choudhary
Coordinator General COMSTECH
UNESCO Chair

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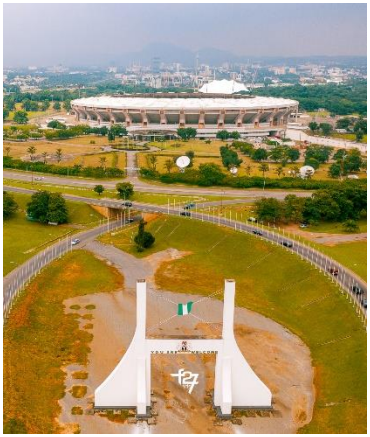
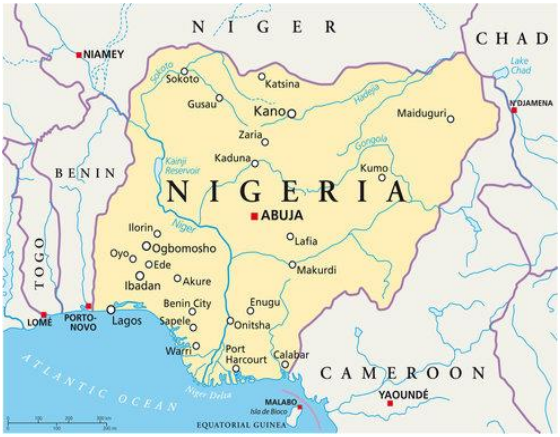
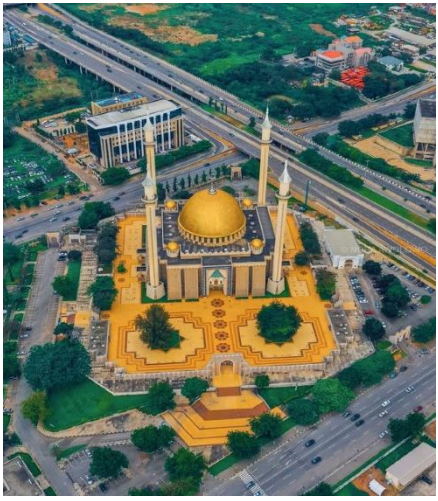
NIGERIA, officially known as the Federal Republic of Nigeria is located on the western coast of Africa. Nigeria is geographically situated between the Sahel to the North and the Gulf of Guinea to the South in the Atlantic ocean. Nigeria is bordered to the North by Niger, to the Norteast by Chad, to the east by Cameroon and to the west by Benin. Nigeria is the most populous country of Africa with the census figures of 206.1 million in 2020. Abuja is the capital city of Nigeria. Lagos is the largest city by area and one of the largest metropolitan areas in the world. Total Land Area of Nigeria is 923,769 square kilometres (356,669 sq mi).





Nigeria is comprised of the diverse geography including plains in the north and south while plateaus and hills located in the center of the country. The lowlands of Nigeria are major river basins fed especially by the Niger River. Nigeria is ethnically very diverse country with more than 250 ethnic groups speaking 500 distinct languages. There are three major ethnic groups in the country: the Hausa-Fulani, the Yoruba and the Igbo. The languages of Nigeria are classified into three broad linguistic groups: Niger-Congo, Nilo-Saharan and Afro-Asiatic. To facilitate linguistic unity at national level, English is chosen as the official language of Nigeria. Nigerian population is estimated to be 53.5% Muslim, 45.9% Christian (10.6% Roman Catholic and 35.3% other Christian), and 0.6% as others.

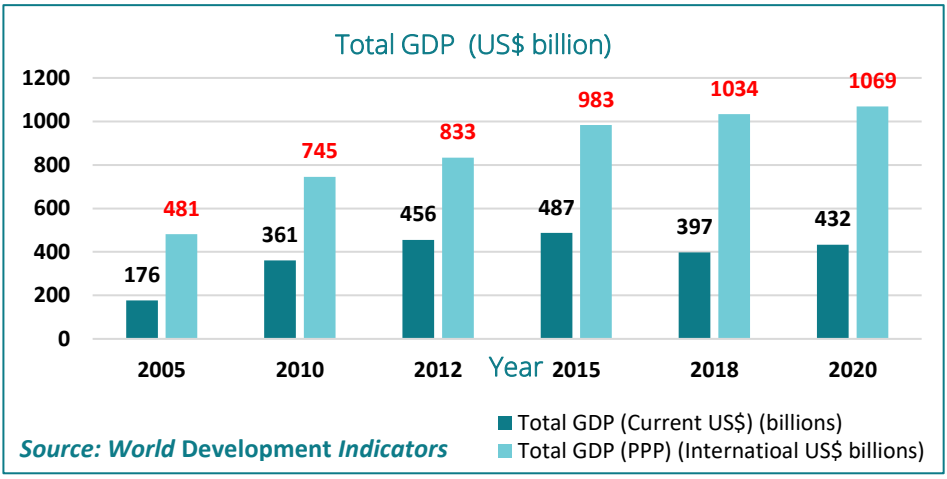
The Nigerian economy is one of the largest in Africa and referred to as the Giant of Africa. Nigeria is emerging as the global power with strong influence in Africa. Nigeria is a founding member of the African Union and a member of many inter-government organizations including Organisation of Islamic Cooperation (OIC), United Nations (UN), the Commonwealth of Nations, Non-Aligned Movement (NAM), Economic Community of West African States (ECOWAS), African Caribbean and Pacific (ACP), Organization for Economic Cooperation and Development (OECD) & International Fund for Agricultural Development (IFAD).



According to a World Bank survey, the agriculture sector is the largest employer of labor and income-generating activity in Nigeria. The majority of people in the Nigerian agriculture industry mainly produce and process cash crops such as cocoa, peanuts, cotton, palm oil, corn, rice, sorghum, millet, cassava, yams, rubber, and more. They also raise animals like cattle, sheep, goats, and fish for their commercial values.

Source: https://www.britannica.com/facts/Nigeria;
https://en.wikipedia.org/wiki/Nigeria;
https://www.osgf.gov.ng/storage/app/media/pdf/Internationalorg.pdf;
https://www.futurelearn.com/info/blog/biggest-employment-industries-in-nigeria

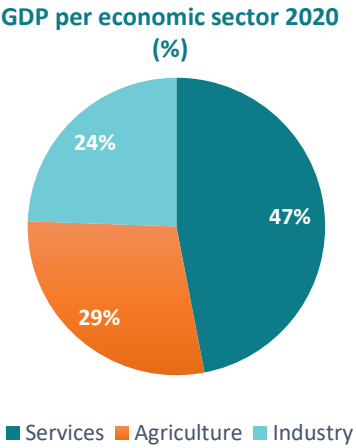
A. ECONOMIC OVERVIEW

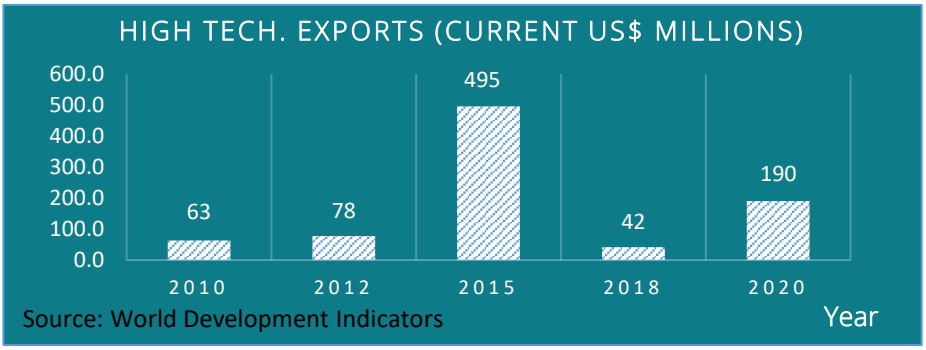


Source: World **Development** *Indicators*

- The economy of Nigeria largely depends on crude oil and petroleum exports. In 2020, Nigeria was the 26th economy in terms of GDP (current US$), ranked number 50 in total exports and number 148th economy in terms of GDP per capita (current US$). Nigeria ranked 125th out of 127 countries according to the Economic Complexity Index (ECI). Between 2005 and 2014, the Total GDP (Current US$) increased by about 222% starting from US$ 176 billion and reached an all-time high of US$ 568 billion in 2014. Oil and Petroleum commodities boom in 2014, led to the decline in the value of Total GDP (current US$) of Nigeria between 2015 and 2018. However, The total GDP (current US$) value started increasing again in 2020 which is a positive indicator. Between 2005 and 2020, the total GDP in terms of purchasing power parity increased by 122%.

- The major contributions to Nigeria's economy are summarized in the accompanying figure. Services (47%) sector sector accounts for the largest share of Nigeria's GDP. Agriculture sector contributed 29% and Industry sector contributed 24% share of total GDP.
  Source: https://www.statista.com/statistics/382311/nigeria-gdp-distribution-across-economic-sectors/





- The trend of High Technology Exports of Nigeria depicts an unsteady behavior with all-time high value of US$ 495 millions in the year 2015. Between 2018 and 2020, the value of High Technology Exports increased by about 4.5 folds. High Technology exports were 6.9% of total manufactured exports and manufacturing industry contributed a value of 12.7% in the Nigeria's GDP in 2020.

- The top exports of Nigeria are Crude Petroleum ($30B), Petroleum Gas ($5.89B), Scrap Vessels ($1.29B), Special Purpose Ships ($775M), and Refined Petroleum ($613M). In 2020, Nigeria was the world's biggest exporter of Scrap Vessels ($1.29B).
  Source: https://oec.world/en/profile/country/nga

❖ Key Economic Initiatives and Plans:

1. Nigeria's Vision 20:2020:

The NV20:2020 economic transformation blueprint is a long term plan for stimulating Nigeria's economic growth and launching the country onto a path of sustained and rapid socio-economic development. The blueprint articulates Nigeria's economic growth and development strategies, for the eleven-year period between 2009 and 2020, and will be implemented using a series of medium term national development plans.

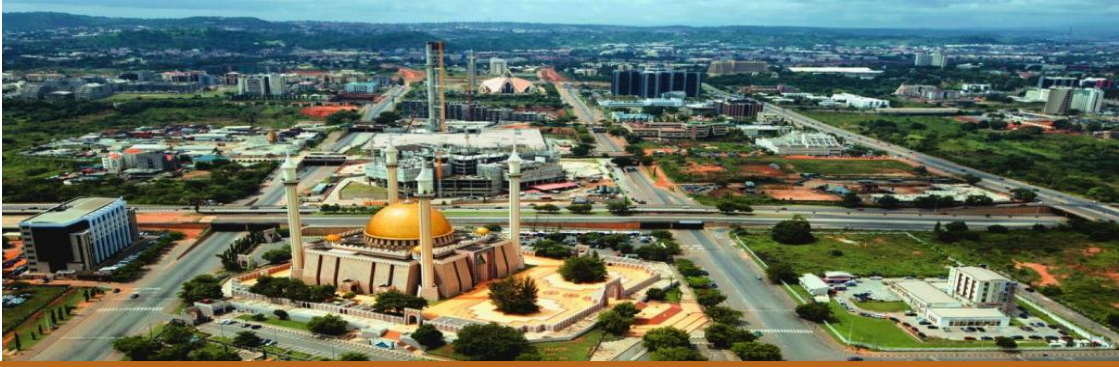
Source: https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/laws/1516.pdf

2. The Economic Recovery and Growth Plan (ERGP):

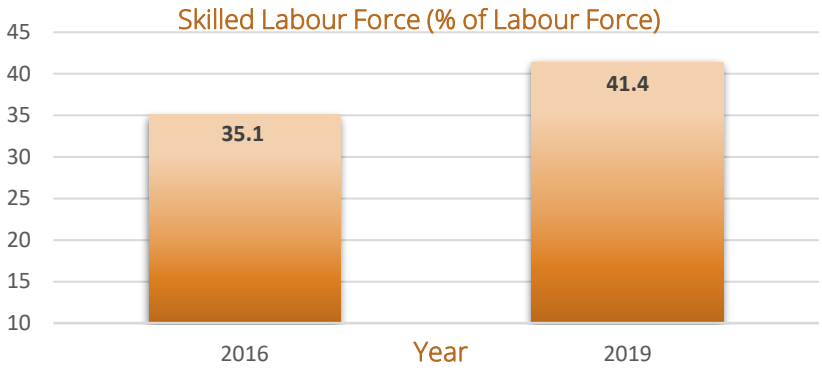
The ERGP was launched in April 2017, which is a medium term all-round developmental initiative focused on three broad strategic objectives:

1. Restoring growth;
2. Investing in people;
3. Building a globally competitive economy of Nigeria.

Source: https://nigeriaembassygermany.org/mosaic/_M_userfiles/Economic-Recovery-Growth-Plan-2017-2020.pdf



B. SOCIAL AND HUMAN DEVELOPMENT



Source: Human Development Report: http://www.hdr.undp.org/en/indicators,

- In 2016, Nigerian skilled labour force was 35.1% of total labour force which has increased to 41.4% in 2019.

- In 2018, Literacy rate of adult males was 71.3% while for adult females it was 52.7%. Overall adult literacy rate was 62%. In 2021, Nigeria's government expenditure on education was 5.7% of total GDP.

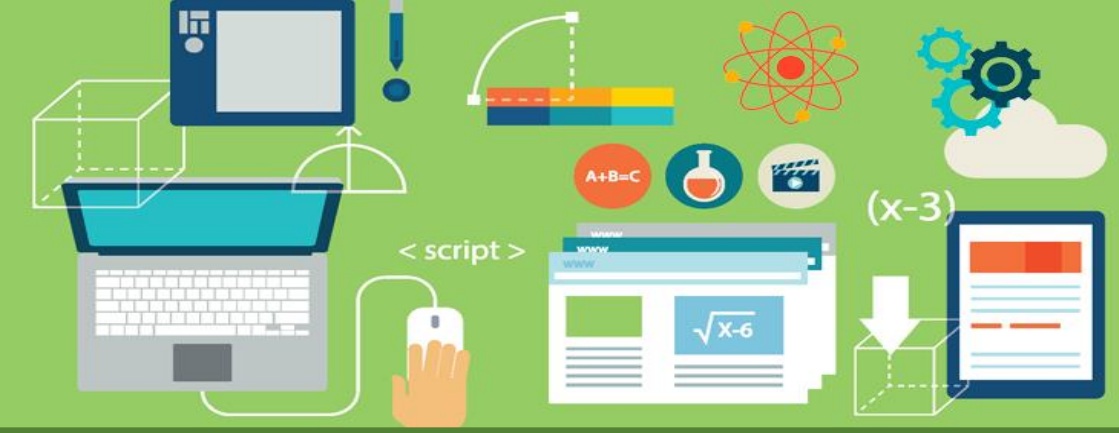
- Total life expectancy at birth increased from almost 48 years in 2005 to over 54 years in 2019. In 2005, mortality rate under 5 years age per 1000 live births was 155 which reduced to 113.8 in 2020.

- Gender Development Index (GDI) is increasing steadily and reached 0.88 in 2019.

- In 2005, the percentage of population using the internet was just 3.5% but it increased to the value of 33.6% in 2019.In 2019, Electricity was accessible to 55.4% of the population.

- In 2005, the number of arrivals for International Tourism was above 2.7 million which increased to almost 5.3 million in 2016.

Source: World Development Indicators Data by World Bank



C. KEY GOVERNMENT ORGANIZATIONS RELATED TO SCIENCE, TECHNOLOGY AND HIGHER EDUCATION

❖ **Policy Frameworks:**

- **National Science, Technology and Innovation Policy 2012:**
  The National STI Policy was constitutionally recognized for the first time in 1986 but it was revised several times according to the advancements in the STI domain. The mission statement of National STI policy revised in 2012 is as follows:

  "Evolving a nation that harnesses, develops and utilizes STI to build a large, strong, diversified, sustainable and competitive economy that guarantees a high standard of living and quality of life for its citizens."
  http://oer.covenantuniversity.edu.ng/media/attachments/2021/01/07/national-sti-policy.pdf

- **National Research and Innovation Fund (NRIF):**
  Nigeria established a National Research and Innovation Fund (NRIF) counting on a minimum of 1% of GDP and at least 5% strategically sourced from Government Allocations, Public and Private Partnership, International R&D Funds, and Venture Capital for implementation and achievement of the 2012 STI policy.
  https://www.gov.uk/world/organisations/uk-science-innovation-network-in-nigeria

- **Nigeria Industrial Revolution Plan 2014 (NIRP):**
  In 2014, Nigerian government introduced NIRP with the following objectives:

    - making the country the preferred manufacturing hub in West Africa;
    - the preferred source for supplying low and medium technology consumer and industrial goods domestically and regionally;
    - diversifying and increasing government income and exports;
    - pursuing job and wealth creation, and import substitution.

  According to NIRP, the Industries would focus more on agro-allied, metals and solid minerals, oil and gas, construction, light manufacturing activities and services.

  Source: https://nipc.gov.ng/wp-content/uploads/2019/03/nirp.pdf; https://blogs.lse.ac.uk/africaatlse/2021/09/10/nigeria-needs-new-industrial-strategy-manufacturing-economic-plan/

❖ Ministries and Organizations responsible for Science, Technology and Higher Education:

- **Federal Ministry of Science, Technology and Innovation (FMSTI):**

  A key state ministry mission is to facilitate the development and deployment of science and technology apparatus to enhance the pace of socio-economic development of the country through appropriate technological inputs into productive activities in the nation.

  https://en.wikipedia.org/wiki/Federal_Ministry_of_Science,_Technology_and_Innovation

- **Federal Ministry of Education (FME):**

  The mandate of the federal ministry is to:

  - Formulate and coordinate a national policy on education;
  - Collect and collate data for purposes of education Planning and Financing;
  - Prescribe and maintain uniform standard of education throughout the Country;
  - Control and monitor the quality of education in the Country;
  - Harmonize educational policies and procedures of all the States of the Federation through the instrumentality of the National Council on Education (NCE);
  - Effect co-operation in educational matters on an international scale;
  - Develop curricula and syllabuses at the National Level.

  https://education.gov.ng/our-mandate/

- **National Research and Innovation Council (NRIC):**

  The NRIC was inaugurated on February 18, 2014 with an aim to accelerate the growth of innovation-based entrepreneurship in the country and to create the conditions for the commercialisation of

current and future research findings in Nigerian universities and research institutes.
https://techpoint.africa/2019/04/05/national-research-and-innovation-council/

- **National Council on Science, Technology and Innovation (NCSTI):** NCSTI is hosted by the Federal Ministry of Science, Technology and Innovation (FMSTI). The Council is the second highest decision-making body on science, technology and innovation (STI), and related issues in Nigeria. It has all heads of parastatals under the ministry as well as commissioners and permanent secretaries of ministries of science and technology from the 36 states of the federation and the Federal Capital Territory (FCT), Abuja as members.
https://sciencenigeria.com/national-council-on-sti-brainstorms-on-harmonising-research-efforts/

- **State Science, Technology and Innovation Council (SSTIC):** SSTIC provides leadership and direction for STI activity at a state level, promote science education and disseminate STI information, align policies and programmes with those of the NRIC, promote and implement decisions and programmes of NCSTI.

- **Tertiary Education Trust Fund (TETFund):** TETFund was established for the purpose of promoting higher education. TETFund also manages a NGN5 billion National Research Fund (USD13.8 million) providing grants in three areas: humanities and social sciences, STI and cross-cutting research.

https://assets.publishing.service.gov.uk/media/5ef4ad5ee90e075c5cc9d7e6/NA_report_Nigeria__Dec_2019_Heart___1_.pdf

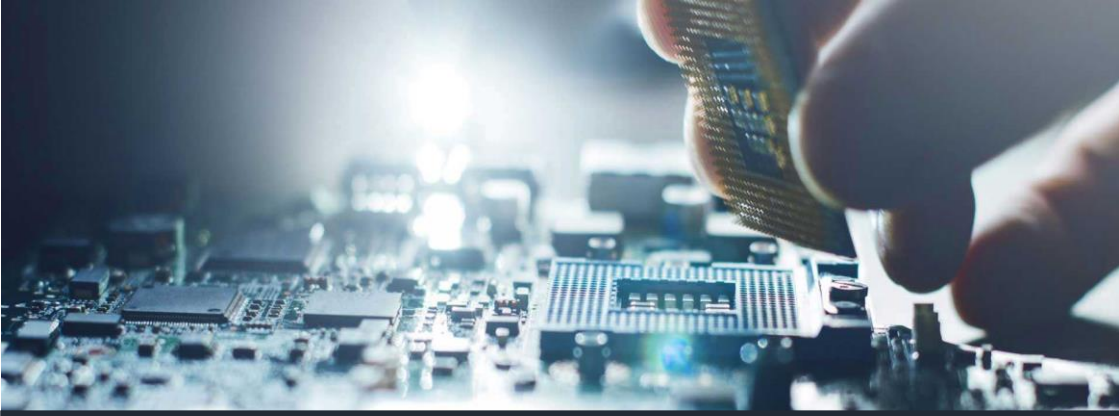
- Following are the names of few major research centers/institutes of Nigeria contributing to different research areas of S&T:

1. Agricultural Research Council of Nigeria (ARCN) located in Mabushi Abuja
2. Agricultural Rural Management Training Institute (ARMTI), located in Ilorin
3. Animal Health Research Institute
4. Cocoa Research Institute of Nigeria
5. Federal College of Freshwater Fisheries Technology, New Bussa, Niger state.
6. Federal Institute of Industrial Research (FIIRO), Oshodi in Lagos state.
7. Forestry Research Institute of Nigeria (FRIN), Ibadan
8. Institute for Advanced Medical Research and Training
9. Institute for Agricultural Research (IAR)
10. Institute of Archaeology and Museum Studies
11. Institute of Chartered Chemists of Nigeria (ICCON)
12. Institute of Child Health
13. Institute of human virology
14. Institute of Operations Research of Nigeria (INFORN)
15. International Institute of Tropical Agriculture (IITA)
16. International Livestock Research Institute
17. National Agency for Food and Drug Administration and Control (NAFDAC)
18. National Agency for Science & Engineering Infrastructure (NASENI), located in Abuja
19. National Agricultural Extension Research and Liaison Services (AERLS)
20. National Animal Production Research Institute located in Zaria
21. National Center for Agricultural Mechanization

22. National Center for Energy Research and Development
23. National Center for Technology Management
24. National Centre for Genetic Resources and Biotechnology (NACGRAB)
25. National Cereals Research Institute (NCRI)
26. National Horticultural Research Institute (NIHORT)
27. National Institute for Pharmaceutical Research and Development (NIPRD)
28. National Institute of Freshwater Fisheries Research, New Bussa
29. National Institute of Pharmaceutical Research and Development (NIPRD)
30. National Research Institute for Chemical Technology (NARICT)
31. National Root Crops Research Institute
32. National Space Research and Development Agency (NASRDA)
33. National Veterinary Research Institute (NVRI) located at Ikoyi, Lagos
34. Nigeria Institute of Science Laboratory (NISLT)
35. Nigerian Academy of Sciences
36. Nigerian Building and Road Research Institute (NBRRI)
37. Nigerian Educational Research Council
38. Nigerian Institute for Oceanography and Marine Research (NIOMR)
39. Nigerian Institute for Oil Palm Research (NIFOR)
40. Nigerian Institute for Trypanosomiasis Research (NITR)
41. Nigenan Institute of Food Science and Technology
42. Nigerian Institute of Medical Research (NIMR)
43. Nigerian Stored Products Research Institute (NSPRI)
44. Projects Development Institute (PRODA)
45. Raw Materials Research and Development Council (RMRDC)
46. Rubber Research Institute of Nigeria (RRIN)
47. Scientific Equipment Development Institute (SEDI-E)

48. Sheda Science and Technology Complex
49. Sokoto Energy Research Centre (SERC)
50. The Nigerian Institute of Medical Research
51. Unilorin Sugar Research Institute (USRI)

Source: https://nigerianinfopedia.com.ng/research-institutes-in-nigeria/



D. RESEARCH AND DEVELOPMENT

- **National Health Research Ethics Committee (NHREC):** NHREC was established under the Federal Ministry of Health which sets standards for conducting research on humans and animals (including Clinical trials), registers and audits health research ethics committees and adjudicates complaints about their functioning and takes disciplinary action in cases of violations of ethical or professional rules.
  Source:
  https://assets.publishing.service.gov.uk/media/5ef4ad5ee90e075c5cc9d7e6/NA_report_Nigeria__Dec_2019_Heart___1_.pdf

- **National Raw Materials Competitiveness Strategy (2016):** The National Strategy for Competitiveness in Raw Materials and Products Development in Nigeria provides the implementation guidelines with eleven strategic foci, with consideration to environment and sustainability. Out of those eleven strategic foci, one is Research and Development. The implementation plan recognizes that technology and innovation are imperative to achieve competitiveness. The plan also exemplifies R&D projects in agro based raw materials and products development, mineral-based raw materials and products development, as well as R&D projects relevant to the environment, including forestry resources

and health. The implementation plan articulates a well-focused innovation system that generates the necessary expertise for science, technology and innovation development supportive of industrialization.

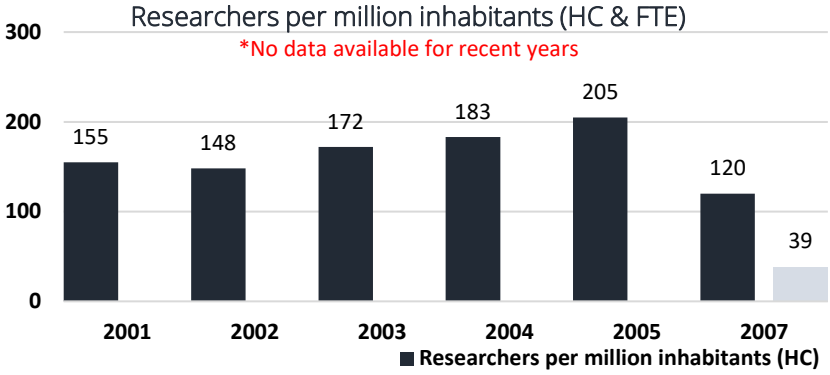
Source:
https://oer.covenantuniversity.edu.ng/media/attachments/2021/01/07/implementation-plan_compressed.pdf

- **National Science, Technology Innovation Roadmap (NSTIR) 2030:**
  The NSTIR 2030 is a high-level document that lays out the long-term framework for science and technology. The document sets specific goals for a number of knowledge sectors and focuses on linking research in all areas to national development and supporting industrial innovation. It aims to facilitate the creation and acquisition of knowledge for production, adaptation, replication, and utilization of technologies, support the establishment and strengthening of STI organizations, institutions, structures and processes, coordinate and manage STI activities and promote the creation of innovative enterprises.

- There is no accurate data available for the Gross Expenditure on Research and Development (GERD) in Nigeria. Some sources claim that the share of GERD as percentage of total Nigerian GDP is estimated between 0.1% to 0.5% during past fiscal years. In 2007, the share of GERD as percentage of total GDP was 0.13%.

- **Researchers Intensity:**

No data of Researchers per million inhabitants is available for recent years. Between 2001 and 2007, the average number of researchers per million inhabitants (head count) in Nigeria were around 164.



Source: UNESCO Institute of Statistics

❖ **Key R&D initiatives:**

- The National Office for Technology Acquisition and Promotion has established more than 40 intellectual property and technology transfer offices at universities and research institutes across the country. Upto 40 business and technology incubators have also been established.

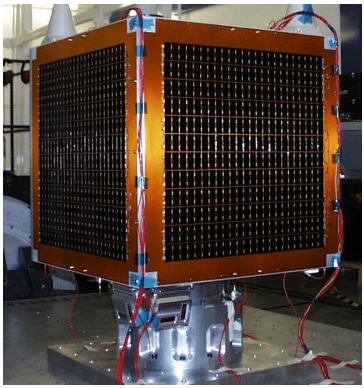
- The FMSTI signed MoU with three Nigerian companies (named TigerFoods Ltd, LenofKonsult and Lashone Links Ltd.) for the commercialization of endogenous research in areas such as dairy, soybean and cassava processing technologies.

- **Space Science and Technology in Nigeria:**
  Nigeria is the first country in its region who invested in the subregion's first satellite back in 2003, named **NigeriaSat-1**. NigeriaSat-1 was used for environmental monitoring, alerting to

impending disasters and tracking desertification, among other things. Nigeria has also launched other satellites and space programs with a vision to be capable enough to send their astronauts to the space one day.

The African Regional Centre for Space Science and Technology Education, based at Obafemi Awolowo University in Nigeria, is recognized across the continent as a centre of excellence.

Source: UNESCO Science Report 2021



E. HIGHER EDUCATION

Following are the rankings of Nigerian universities:

University Name	National Ranking	Global Ranking
University of Ibadan	1	1231
Covenant University Ota	2	1370
Obafemi Awolowo University	3	1477
University of Nigeria	4	1622
University of Lagos	5	1766
University of Port Harcourt	6	1923
Federal University of Technology Akure	7	2252
Ahmadu Bello University	8	2262
Landmark University	9	2415
Federal University of Technology Minna	10	2577

Source: https://www.webometrics.info/en/Africa/nigeria

The International Association of Universities lists a total of 126 higher education institutions of Nigeria. https://www.whed.net/results_institutions.php

- **The Nigerian Research and Education Network (NgREN):** NgREN was developed through a collaboration between the National University Commission and the World Bank. NgREN organises regular stakeholder sensitization meetings, operational readiness workshops and technical training on various aspects of research communication, while also channeling development assistance from other national and regional research networks into technical capacity strengthening among its university members.

- With millions of students enrolled in the Nigerian Higher Education, it is the largest higher education system in Africa. The Nigerian higher education comprises polytechnics, colleges of education, universities, etc. The Federal government of Nigeria has established the following agencies as the external supervising agencies to oversee the various higher institutions in the country:

  i. National Universities Commission
  ii. National Commission for Colleges of Education
  iii. The National Universities Commission is a parastatal under the Federal ministry of education.

- **National University Commission (NUC)** as an external quality assurance agency of the Nigerian University System, it has the following roles;

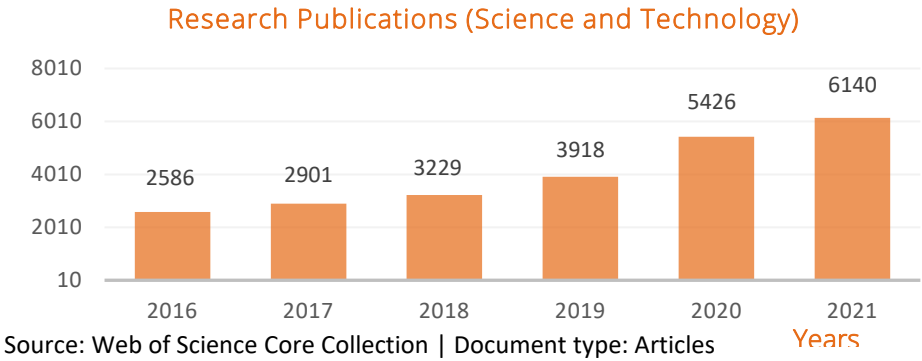
i. Advising the federal Government on the establishment and location of universities, creating new facilities and postgraduate units in the universities.
ii. Advising Government on the fundamental needs of the universities.
iii. Carrying out periodic plans on the general programme to be pursued by universities staff.
iv. Preparing periodic plans on the general programme to be pursued by the universities.
v. Receiving and disbursing Federal grants to Federal Universities.
vi. Establishing and maintaining the minimum academic standards. The audit role and the supervisory functions of NUC has indeed contributed to the quality and sustainability of higher education in Nigeria.

Source:
https://www.researchgate.net/publication/350021987_Higher_Education_in_Nigeria_Challenges_and_the_Ways_Forward

❖ **Following are the names of some engineering universities of Nigeria:**

- Ahmadu Bello University, Zaria, Kaduna State.
- Federal University of Technology (FUTA), Akure, Ondo State.
- University of Benin (UNIBEN), Benin, Edo State.
- University of Ilorin (UNILORIN), Ilorin, Kwara State.
- Federal University of Technology, Minna, Niger State.
- Obafemi Awolowo University, Ife, Osun State.
- University of Lagos, Lagos State.
- University of Nigeria Nsukka, Enugu State.
- Ladoke Akintola University of Technology, Oyo State.
- Federal University of Technology (FUTO), Imo State.

F. RESEARCH PUBLICATIONS



Source: Web of Science Core Collection | Document type: Articles

- There is a consistent increase in number of research publications from Nigeria in the field of science and technology. In 2016, the number of scientific research publications were 2586 which increased by around 137% to 6140 in 2021.
- In 2019, Nigeria published highest number of scientific publications in West Africa. Between 2012 and 2019, Nigeria joined the list of top 15 publishers in the African region within the field of AI & Robotics and Materials Science by publishing 1600 and 1402 scientific publications respectively.
- Between 2017 and 2019, top five partners for scientific co-authorship with Nigeria are South Africa (2765), USA (2122), Malaysia (1939), UK (1890) and India (819). Nigerian scientists quadrupled their publications on eco-construction materials from 23 (2015–2015) to 95 (2016–2019) publications.

Share of scientific publications in Nigeria by broad field of science, 2017-2019 (%)

- The largest number of Nigeria Scientific publications are classified under the headings of Health Sciences (33%), followed by Cross Cutting strategic technologies (19%), Agriculture, fisheries & forestry (9%), Engineering (7%), Physics & astronomy (7%), Environmental sciences (7%), ICT, maths & statistics (5%), Animal & plant biology (4%), Built environment & design (2%) and Geosciences (1%).

Source: UNESCO Science Report 2021

G. INTERNATIONAL COOPERATION AND SUPPORT INITIATIVES

- **UNDP Nigeria and PwC Cooperation to promote Technology initiatives**

  The United Nations Development Programme (UNDP) Nigeria and PwC have signed a Memorandum of Understanding (MOU), to collaborate on strategic initiatives that foster knowledge exchange as well as sustained learning and access to resources for upscaling innovation capacities. This is first of its kind collaboration with an aim to catalyse development and policy dialogues that connect and link the private and public sectors with the start-up ecosystem.

  Learn more:
  https://www.ng.undp.org/content/nigeria/en/home/presscenter/pressreleases/2021/pwc--undp-sign-mou-to-promote-technology-initiatives-in-nigeria-.html

- **MoU on cooperation in Outer Space with India**

  On 13 August 2020, the Nigerian Federal Ministry on Science and Technology signed a MoU with Indian Ministry of External Affairs and Indian Space and Research Organisation (ISRO). The MoU aim was to develop India-Nigeria collaboration in space science, planetary exploration, ground stations, development of micro and mini satellites and joint Space R&D. It provides for capacity building assistance by ISRO, exchange of scientific know-how, exchanges between academic institutes and joint symposiums/conferences.

Cooperation in remote sensing, communications and navigation will benefit Nigeria in the fields of forestry, environment, agriculture, mining, watershed development and connectivity.

Learn more: https://www.mea.gov.in/press-releases.htm?dtl/32890/Signing+of+an+MoU+on+Cooperation+in+Outer+Space+with+Nigeria

❖ MoU on ICT training and capacity building with Huawei Technologies Company

The Nigerian Government signed MoU with Huawei Technologies Company on Information Communications Technology (ICT) to train and empower 1,000 Federal Civil Servants across Ministries, Departments and Agencies in the country.

Learn more: https://von.gov.ng/2022/03/07/federal-government-huawei-sign-mou-on-ict-training-programme/

❖ MoU with Morocco to develop biotechnology products

The MoU was signed by Nigerian Federal Ministry of Science, Technology and Innovation (FMSTI) and RAHAD Global Investment Limited on behalf of Morocco. The objective of the MoU was to carry out research and develop biotechnological products and processes including the production of bio-fertiliser and bio-fungicide, portable water and waste water treatment, disinfectants, gas treatment, reduction of Sulphur dioxide, soil biodegradation, Sulphur reducing bacteria, application of stem cells for diabetics and cancer related diseases, among others.

Learn more: https://mreinvest.marocainsdumonde.gov.ma/en/news/nigeria-morocco-ink-mou-develop-biotechnology-products

❖ MoU between ABU, UNESCO/ICHEI and SUSTech China:

Southern University of Science and Technology (SUSTech), International Centre for Higher Education Innovation (ICHEI) under the auspices of UNESCO, and Ahmadu Bello University (ABU) have

signed a tripartite MOU to do cooperation in following programmes:

- Exchange of undergraduate and/or graduate students;
- Exchange of faculty, staff and/or postdocs;
- Exchange of scientific materials, publications and information;
- Dual doctoral degree programs;
- Joint research, joint research centres or institutes;
- Any other form of cooperation jointly agreed upon.

Learn more: https://abu.edu.ng/news-and-events/news/full-news.php?token=breaking-news-abu-signs-mou-with-southern-university-of-science-and-technology-china

❖ The African Resource Management Constellation (ARMC):

The African Resource Management Constellation (ARMC) is a collaboration currently involving Nigeria, South Africa Kenya, and Algeria. The ARMC partner countries agreed to launch one satellite each, forming a constellation of four Earth observation (EO) satellites in space with the same payloads, providing coverage and data for the management of resources in Africa.

Learn more: https://africanews.space/four-african-countries-reignite-plan-to-launch-pan-african-satellite-constellation/

❖ Nigeria, Czech Republic Sign MoU for Technology Transfer:

The memorandum of understanding was signed between Czech Republic and the Federal Republic of Nigeria on technology transfer and joint research for the mutual benefits of the two countries, but most importantly, for bridging technology gap between Nigeria and developed nations.

Learn more: https://www.thisdaylive.com/index.php/2020/12/11/nigeria-czech-republic-sign-mou-for-technology-transfer/

- **US-AID MoU with Lagos State to improve water and sanitation services:**

  On December 8, 2021, the U.S. Agency for International Development (USAID) and the Lagos State Government signed a Memorandum of Understanding (MOU) to improve access to safe water, sanitation, and hygiene (WASH) services. The collaboration aims to improving infrastructure and accountability, strengthening regulatory oversight of the Lagos State Water Regulatory Commission, and strengthening the governance, financial and technical capabilities of Lagos water utilities and private sector water vendors.

  Learn more: https://www.usaid.gov/nigeria/press-releases/dec-10-2021-usaid-signs-mou-lagos-state-improve-management-water-and

H. INNOVATION, ENTREPRENEURSHIP & TECHNOLOGY PARKS

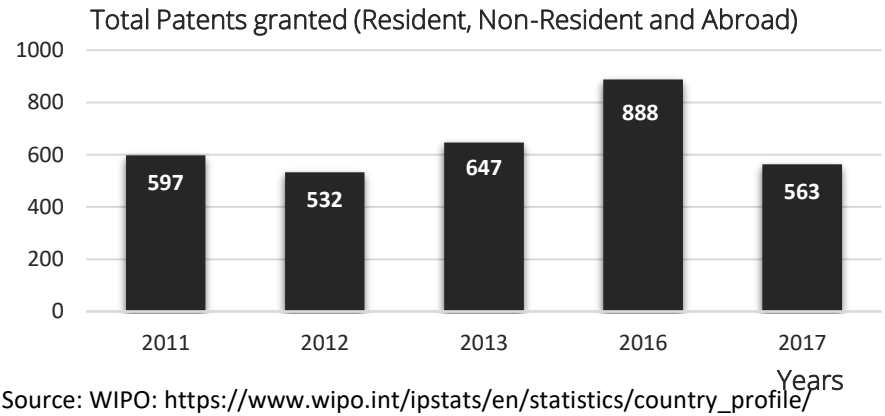
❖ **Science Governance: Key policy initiatives and programs for innovation**

- **The Industry Policy and Competitiveness Advisory Council:** The council was formed in 2017 with an objective to assist the Nigerian government in formulating policies and strategies for implementation to enhance the performance and industrialization of the nation.
  Source: https://ncc.gov.ng/stakeholder/media-public/news-headlines/315-the-nigerian-industrial-policy-and-competitiveness-advisory-council-visits-ncc

- **National Board For Technology Incubation (NBTI):** The NBTI was established with the mission to develop the necessary infrastructure for nurturing technology start-ups; to promote Nigeria's indigenous potentials through value-added and technology-related activities; and to create enabling environment for effective linkage amongst technology providers, entrepreneurs, and capital. Their general mandate is to facilitate the establishment and coordinate the activities of Technology Incubation Centres and Science & Technology Parks which are designed to nurture new technology based start-up businesses nationwide.
  Source: https://nbti.gov.ng/

- **Technology Incubation Programme (TIP) in Nigeria:**
  The Technology Incubation Programme (TIP) in Nigeria is an integrated support programme provided by governments, academic institutions and private sector either individually or in partnership with the intention of creating and nurturing of budding value-added and technology-based enterprises. The goal of the programme is to assist small scale budding entrepreneurs to overcome the initial hurdles of carrying viable Research and Development results as well as innovative efforts into profitable enterprises.
  Source: https://www.ijert.org/technology-incubation-programme-for-development-of-sustainable-entrepreneurial-skills-in-nigeria-2

- The number of total patents granted to Nigerian Innovators is not consistent. The all-time high number of patents (888) were granted in 2016. According to UNESCO Science Report, Number of IP5 patents granted (Between 2015 and 2019) to Nigerian scientists and innovators are 224 which is highest number in the West African region.

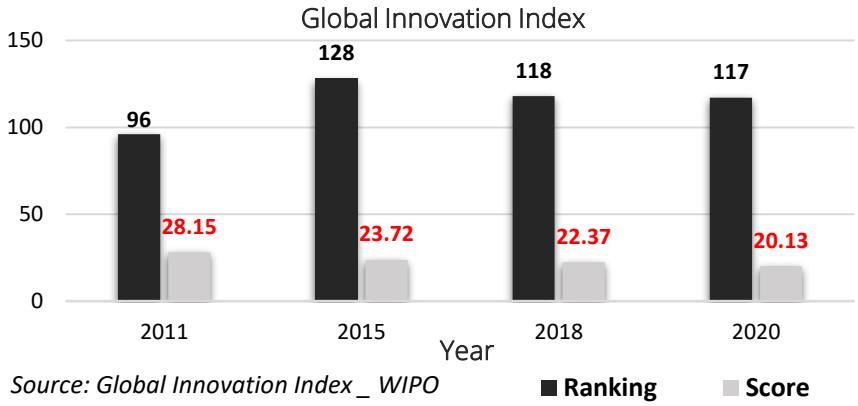


Source: WIPO: https://www.wipo.int/ipstats/en/statistics/country_profile/

- The Global Innovation Index of Nigeria does not reflect any noticeable improvement in the innovation capabilities of the country. Nigeria ranked 118th among 132 economies featured in the GII 2021. In Global Innovation Score of Nigeria was 28.15 which has decreased

consistently and reached 20.13 in 2020. Nigeria ranked 28th among the 34 lower middle-income group economies and 16th among the 27 economies in Sub-Saharan Africa. However, the decreasing ranking of Nigeria from 96 to 117 between 2011 and 2020 should be a matter of concern for the country.

Source:
https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2021/ng.pdf



Source: Global Innovation Index _ WIPO

❖ **Technology Parks:**

- Akwa Ibom Science and Technology Park, Uyo (Akwa Ibom).
- Abuja Technology Village Free Zone Compan, Abuja.
- Lion Science Park, Nsukka.

- **The Nigerian Co-creation Hub:**
  CcHUB is Nigeria's first open living lab and pre-incubation space designed to be a multi-functional, multi-purpose space where work to catalyze creative social tech ventures take place. The HUB is a place for technologists, social entrepreneurs, government, tech companies, impact investors and hackers in and around Lagos to co-create new solutions to the many social problems in Nigeria. In 2019, the Nigerian CcHub acquired the Kenyan iHub, creating West Africa's first 'mega-incubator'. Since its inception in 2011, CcHub has

incubated more than 120 early-stage ventures. Whereas CcHub has adopted a commercial model, charging for workspace and creating its own Growth Capital Fund - Nigeria's first fund targeting social innovation.

Learn more: https://cchubnigeria.com/

- **Technology Incubation Centres:**

The Nigerian government is strongly promoting the culture of innovation and R&D competitiveness. Nigeria is divided into six (6) regional zones (Zone a – Zone f) for technology incubation centres. Following is the list of some Nigerian technology incubation centres listed on The National Board for Technology Incubation (NBTI)'s website:

- Technology Incubation Centre Lagos
- Technology Incubation Centre Ado-Ekiti
- Technology Incubation Centre Abeokuta
- Technology Incubation Centre Akure
- Technology Incubation Centre Ibadan
- Technology Incubation Centre Ile-Ife
- Technology Incubation Centre Kebbi

- Technology Incubation Centre Sokoto
- Technology Incubation Centre Katsina
- Technology Incubation Centre Gusau
- Technology Incubation Centre Kaduna
- Technology Incubation Centre Jigawa
- Technology Incubation Centre Kano
- Technology Incubation Centre Minna
- Technology Incubation Centre Ilorin
- Technology Incubation Centre Jos
- Technology Incubation Centre Makurdi
- Technology Incubation Centre Lakoja
- Technology Incubation Centre Lafia
- Technology Incubation Centre Nnewi
- Technology Incubation Centre Aba
- Technology Incubation Centre Enugu
- Technology Incubation Centre Abakaliki
- Technology Incubation Centre Owerri
- Technology Incubation Centre Benin
- Technology Incubation Centre Warri
- Technology Incubation Centre Calabar
- Technology Incubation Centre Uyo
- Technology Incubation Centre Yenagoa
- Technology Incubation Centre Porthacourt
- Technology Incubation Centre Bauchi
- Technology Incubation Centre Yola
- Technology Incubation Centre Borno
- Technology Incubation Centre Gombe
- Technology Incubation Centre Jalingo
- Technology Incubation Centre Damaturu

Source: https://nbti.gov.ng/zone-f/

I. COMBATING THE COVID-19 PANDEMIC

Nigeria, as with the most of the countries, has faced several challenges to combat the COVID-19 pandemic. Following are some of the ways through which Nigeria tried to cope the pandemic and facilitated the public:

❖ Vaccine Development and Administration:

- The ACEGID Covid-19 vaccine was developed by professor Christian Happi, a molecular biologist and genomicist, with his research team at the African Center of Excellence for Genomics of Infectious Diseases (ACEGID) in Nigeria. ACEGID is a WHO and Africa CDC Reference Laboratory for genomic research in Africa.
  Source: https://qz.com/africa/1911951/nigerian-scientists-develop-covid-19-vaccine-need-human-trials/

- A leading science and biotechnology company, Merck signed agreement with biotechnology company Innovative Biotech (IB) to design the manufacturing process for the first vaccine production facility in Nigeria.
  Source: https://www.merckgroup.com/en/news/ib-collaboration-nigeria-14-12-2021.html

- In 2017, Nigeria's cabinet approved a plan to produce basic vaccines with pharmaceutical firm May & Baker Nigeria (MAYBAKE.LG) via a joint venture.
  Source: https://edition.cnn.com/2022/01/07/africa/nigeria-working-covid-vaccine-intl/index.html

- In 2021, Nigeria received over 800,000 doses of COVID-19 vaccines donated by the Government of Japan through COVAX.

❖ Nigeria's Indigenous efforts to combat COVID-19:

- **Nigerian Doctor Invents Portable Low-Cost Ventilator**

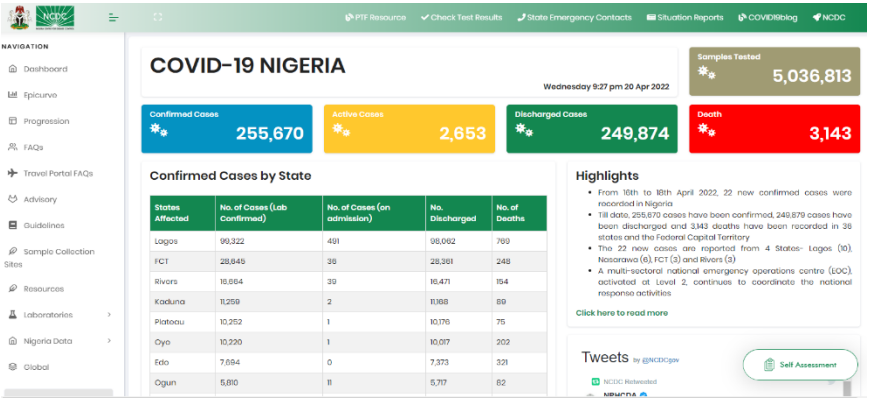
  Nigerian doctor, Dayo Olakulehin, has invented a cheap, portable, easily deployable, easy to use and rechargeable battery-powered ventilator. The D-Box, just launched in Lagos, costs around 100 times less than a conventional ventilator at an introductory price of US$300. Conventional ventilators cost around $30,000; low-cost alternatives still in development are to be sold for $3,000. The D-Box requires little or no expertise to use and is powered by a rechargeable battery. D-Box is a joint venture product of the Canadian product development firm Inertia Engineering + Design, headed up by Ray Minato and LigandCorp, owned by Dr. Dayo Olakulehin.

  Source: https://healthmanagement.org/c/icu/news/nigerian-doctor-invents-portable-lowcost-ventilator

- **NCDC COVID-19 Monitoring Microsite**

  Nigeria Center for Diseases Control (NCDC) launched a website portal where real-time data of COVID-19 pandemic in Nigeria can be monitored. Not only monitoring but also online bot for self-assessment, public health awareness information and travel guidelines during pandemic are also available on the website.

  Visit the microsite through following link: https://covid19.ncdc.gov.ng/



- **COVID-19 eTraining course on Infection Prevention and Control**

  The Nigeria Centre for Disease Control (NCDC) launched a COVID-19 eTraining course on Infection Prevention and Control. The online course is available to the public and is aimed at healthcare workers to reduce the risk of transmission of COVID-19 and other infectious diseases while administering healthcare in Nigeria.

- **COVID-19: Nigerian military begins mass production of ventilators, PPE kits**

  The Nigerian military says it has successfully produced a ventilator using local content and has begun mass production of Personnel Protective Equipment (PPE) kits and more units of ventilators to cushion its shortage in the country and boost the fight against the

the deadly Covid-19 (Coronavirus). Each unit of the kits consists of standardized gowns, face shield and nose masks to be sold at affordable rates. DICON engineers, consultants and medical teams have successfully produced a digital mechanical ventilator known as **DICOVENT**. The newly designed low-cost machine is a simple mechanical ventilator that can deliver positive pressured ventilation using a volume-controlled ventilation (VCV) system. While DICOVENT may not be able to meet the high demands of critical patients, it can be used for Continuous Mandatory Ventilation (CMV) and Intermittent Positive Pressure Ventilation (IPPV).

Source: https://businessday.ng/news/article/covid-19-nigerian-military-begins-massproduction-of-ventilators-ppe-kits/

- **Tech startups joined Nigeria's fight against coronavirus:** In Nigeria, tech startups stepped up in the fight against Covid-19.

1. **Lifebank**, a health startup that finds and delivers blood to patients has turned its attention to seeking critical medical equipment for Covid-19 treatment and has created a national register to track hospitals with working ventilators and respirators.

2. Hotel booking platform **Hotels.ng** has partnered with hotels to

create isolation centers across Nigeria, an added buffer for the country's limited quarantine facilities. Some of the support has come in form of targeted funding too.

3. One year-old genomics research startup **54gene** has launched a $500,000 fund to boost local testing capacity for coronavirus.
4. **Ventures Platform**, a local VC firm, has also partnered with the Lagos science and research agency to find and fund innovative tech-based solutions that tackle coronavirus-related issues.
5. **Wellvis Health** created COVID Triage, 54 a digital self assessment tool that helps users test whether they have been exposed to the virus and take the next steps. In turn, the NCDC collects this data to see who might be at high risk of contracting COVID-19 and isolate them.
6. **GloEpid** by Tech4Dev has developed a contact-tracing tool that uses a smartphone, GPS and Bluetooth connection to trace the movements of those who have been potentially exposed to the virus.

Source:
https://qz.com/africa/1828438/coronavirus-nigerian-tech-startups-step-up-toassist-government/;
https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2021/01/Health-Systems-Digital-Health-and-COVID-19.pdf

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Compiled in 2022