UK RESEARCH FUNDING FOR DEVELOPMENT IN NIGERIA

An analysis of funding and reach (2014-2019)

Front cover image:
Hauwa'u, 25, mother from Rogogo community, Katsina. Credit: Lindsay Mgbor / DFID

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About UKCDR

The UK Collaborative on Development Research (UKCDR) is a collaborative of government and research funders working in international development, governed by the Strategic Coherence for ODA-funded Research (SCOR) Board. Our core contributing members include the Department for Business, Energy and Industrial Strategy (BEIS); the Department for International Development (DFID); the Department of Health and Social Care (DHSC); UK Research and Innovation (UKRI); and Wellcome. UKCDR exists to amplify the value and impact of research for global development by promoting coherence, collaboration and joint action among UK research funders.

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Commission of this report

In November 2018, the Strategic Coherence for ODA-funded Research (SCOR) Board commissioned UKCDR to carry out in-depth analyses on UK ODA-funded and Wellcome-funded research investments and partnership activities in Kenya, Nigeria and South Africa. These analyses will contribute to the UK's new commitment to partnership with African nations, announced by the former UK Prime Minister Theresa May in mid-2018. This approach is expected to lead to a scale up of coherence in research and development in these three countries led through new platforms bringing together teams from across government focused on science, technology and innovation (across the Science and Innovation Network, the Department for Digital, Culture, Media and Sport and the Department for International Development).

Acknowledgments

List of abbreviations and acronyms

AfriHeritage	African Heritage Institute
Ag Sci	Agricultural Sciences
AHRC	Arts and Humanities Research Council
AII	Africa Institutions Initiative
ALERRT	African Coalition for Epidemic Research, Response and Training
AMS	Academy of Medical Sciences
ANZSRC	Australian and New Zealand Standard Research Classification
BBSRC	Biotechnology and Biological Sciences Research Council
BEIS	Department for Business, Energy and Industrial Strategy (UK)
CARTA	Consortium for Advanced Research Training in Africa
COAST	Collaborative Actions for Sustainable Tourism
CPED	Centre for Population and Environmental Development
CSEA	Centre for the Study of the Economies of Africa
DAC	Development Assistance Committee
DEFRA	Department for Environment, Food and Rural Affairs (UK)
DELTAS	Developing Excellence in Leadership, Training and Science Initiative
DFID	Department for International Development (UK)
DHSC	Department of Health and Social Care (UK)
D-MAG	Data Mapping and Analysis Group
DORA	San Francisco Declaration on Research Assessment
ECOWAS	Economic Community of West African States
Env Sci	Environmental Sciences
EPSRC	Engineering and Physical Sciences Research Council
ESRC	Economic and Social Research Council
EU	European Union
FCO	Foreign & Commonwealth Office
FIIRO	Federal Institute of Industrial Research and Oshodi
FME	Federal Ministry of Education
FMIC	Federal Ministry of Information and Culture
FMST	Federal Ministry of Science and Technology
FY	Financial Year
GCRF	Global challenges Research Fund
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on Research and Development
GNI	Gross National Income
HDI	Human Development Index
HEW	Health Extension Worker

I&C	Information and computing sciences
IIDP	Institute for Infectious Diseases of Poverty
LMIC	Low- and middle-income country
MEPIN	Medical Education Partnership Initiative in Nigeria
MRC	Medical Research Council
NARSDA	National Space Research & Development Agency
NAS	Nigerian Academy of Science
NBTE	Nigeria Board of Technical Education
NCD	Non-Communicable Disease
NCSTI	National Council on Science, Technology and Innovation
NERC	Natural Environment Research Council
NIHR	National Institute for Health Research
NRIC	National Research and Innovation Council
NRIF	National Research and Innovation Fund
NSTIR	National Science, Technology Innovation Roadmap
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PANDORA-ID-NET	Pan-African Network for Rapid Research, Response, Relief and Preparedness for Infectious Diseases Epidemics
PCT	Patent Cooperation Treaty
PI	Principle Investigator
Psych and Cog	Psychology and Cognitive Studies
QALY	Quality-Adjusted Life Year
R&D	Research and Development
RAEng	Royal Academy of Engineering
RCR	Relative Citation Ratio
ReMPro	Research Management Programme
RSA	Rapid Situation Analysis
SCOR	Strategic Coherence for ODA-funded Research
SDG	Sustainable Development Goal
SIN	Science and Innovation Network
SSTIC	State Science, Technology and Innovation Council
STFC	Science and Technology Facilities Council
STI	Science, Technology and Innovation
TB	Tuberculosis
TETFund	Tertiary Education Trust Fund
TVET	Technical and Vocational Education and Training
TXA	Tranexamic Acid
UK	United Kingdom
UKCDR	UK Collaborative on Development Research
UKRI	UK Research and Innovation
USA	United States of America
WHO	World Health Organization
WOMAN	World Maternal Antifibrinolytic

Executive summary

This report presents an analysis of the nature and reach of UK Official Development Assistance (ODA) and Wellcome funding for international development research and partnership activities in Nigeria between 2014 – 2019, positioned within the wider profile of the Nigerian national research and innovation system.

The analyses provide a baseline of UK funding and collaboration intending to improve coherence and visibility of its investments to inform future activities under the UK Government's new and distinctive commitment to work alongside, invest in, and partner with African nations. This commitment, announced by former UK Prime Minister Teresa May in 2018, aims to establish long-term, meaningful and mutually beneficial partnerships. Alongside other areas of engagement, this will lead to a broadening and deepening of UK research and innovation investments and partnerships in Nigeria. This investment will be led by the UK Government through hubs in various African nations, focused on science, technology and innovation.

UKCDR used multiple methods including portfolio-level, and global funding data analysis of UK ODA and Wellcome-funded projects, stakeholder interviews and bibliometrics to draw out high-level research trends and impacts. Key findings from the report include:

While only a small proportion of UK funding goes to research related to Nigeria, it makes up a large proportion of research funding for the country, making it key to Nigeria's research ecosystem. UK ODA and Wellcome research investment related to Nigeria between 2014 – 2019 totalled £665.4m on 87 research projects. However, this is reduced to an estimated £77.7m, after controlling for data limitations (multi-country awards were equally divided by the number of countries of focus). This is comparatively less than the UK funds on research to other countries in the region (such as South Africa and Kenya). Research investments are varied – spanning all the United Nations' Sustainable Development Goals (SDGs) with strong focus on SDG 3: Good health and well-being, and projects are delivered through complex and diverse funding schemes.

UK-funded research in Nigeria has strong partnerships with Kenyan and South African as well as UK institutions. The project outputs are significant with 2,393 publications from 2017 to August 2019, with the majority focused on medical and health sciences research. Important and broad national, regional and global reach is demonstrated from this investment in the range of case studies provided spanning Post-partum haemorrhaging, Tuberculosis diagnosis, Preparedness for infectious disease outbreaks and Tourism policy and practices..

There is great opportunity and need for more UK-funded research and innovation in Nigeria due to its large economy and relatively strong education system, contrasted against poverty and fragility in certain regions. The UK currently supports many junior fellowships in Nigeria (particularly at the master's level through the Commonwealth and Chevening scholarships) and this capacity could now be further built upon with more substantial investment. **UK funders could also broaden investments to further align with Nigerian national priorities** outlined in the Science Technology & Innovation (STI) roadmap.

A range of different UK funding models focused at the researcher and institution levels are available in Nigeria allowing both bottom-up and top-down development of research priorities. However, top-down alignment with Nigerian national research priorities are more limited (at the time of the review there was no permanent in-country UK presence related to research, although this is now being developed under the 'new partnerships with Africa'. There is also no national partnership UK funding with Nigeria, such as the Newton Fund). **The UK Government's new partnerships with Africa has currently narrow but important foundations in Nigeria** which provide an exciting opportunity for expansion of activities and fulfilment of need.

Introduction

1.1 Purpose

The purpose of this report is to provide a summary and analysis of the nature and reach of UK Official Development Assistance (ODA) and Wellcome-funded research investments and partnership activities in Nigeria and position these within the wider profile of the national research and innovation system. This report provides a baseline of UK research investments, to improve coherence and visibility, and inform future UK activities in Nigeria under the new partnership with Africa, announced by the UK Prime Minister mid-2018[1]. This report is one of three produced by UKCDR, as commissioned by the Strategic Coherence for ODA-funded Research (SCOR) Board, examining the research investments and partnership activities in three African countries – namely Kenya, Nigeria and South Africa.

1.2 Scope

The UK government is committed to spending 0.7% of its Gross National Income (GNI) on ODA. Since 2015, it has taken a whole-government approach to its international development effort that leverages wider expertise through the UK's world-leading science, research and development base to tackle global problems. Wellcome is the UK's largest philanthropic research funder with decades of funding into Africa, greatly complementing UK ODA funding.

This report analyses quantitative and qualitative aspects of UK ODA-funded and Wellcome direct research and innovation investments and partnership activities committed between 2014 and 2019 to provide a comprehensive overview of these investments, their reach and the partnerships involved. Additionally, the report considers indirect, past (significant commitments that are still active) and pipeline commitments, where relevant. The report asks the following four questions:

● What is the total investment of UK ODA and Wellcome on research related to Nigeria?

● Where does UK research funding go?

● What is the potential impact of UK research funding?

● How does the investment extent and outputs from UK funding compare to other external funding to Nigeria?

1.3 Setting the scene - The Nigerian research and innovation system

Table 1 - Nigeria country profile

	Total	Country ranking
Population (2019)[2]	200,963,599	7 / 232
Human Development Index (2018)[3]	0.532	158/189
GDP per capita (2018)[4]	$2,028.2	
Life expectancy at birth (years) 2017[5]	54	
DAC List Classification[6]	Lower middle-income country	

Nigeria is the most populous country in Africa, the largest economy on the continent and has one of the largest oil and natural gas reserves in the world, contributing to a trade relationship with the UK worth £4 billion in 2015[7]. Nigeria is a significant trade and investment partner for the UK in Africa. Through Nigeria's Vision 20:2020 it aimed to be among the top 20 economies in the world for 2020 (but hasn't reached that target at the time of this publication).

However, Nigeria scores very low in the Human Development Index (HDI) and faces a number of challenges to its future growth and development. Despite significant natural resources, approximately two-thirds of the entire Nigerian population live either below the national poverty line or just above. Conflict continues to affect its oil-rich delta region and there is a violent Islamist insurgency in its North-East which has caused a humanitarian crisis. The government of Nigeria is taking the lead to tackle these issues, but struggles with corruption, as well as the necessary capacity and resources. The UK is focused on helping Nigeria overcome these challenges[8].

Table 2 - Key statistics on research and innovation in Nigeria

	Nigeria
RESEARCH	
Target spend on R&D (% of GDP)	1%
Quality of scientific organisations[9]	2.8* (rank 122/137)
Availability of scientists and engineers[10]	3.8* (rank 79/137)
OUTPUTS/PUBLICATIONS[11]	
Total number of publications 2018 (citable publications)	9,299 (8,346)
Total number of publications 1996-2018 (citations per publication)	90,031 (7.17)
H-Index	181 (68/239)
Percentage of outputs that are Open Access (2018)	35.55% (3,306 documents)
Output as a percentage of Africa (2018)	12.1% (14.92% in 2009, 10.2% in 2015)
Output as a percentage of the world (2018)	0.3%
COLLABORATION	
International collaboration 2018 (% of total)	45.87%
University-Industry collaboration (score/ranking)[19]	2.5* (133)
INNOVATION[20]	
Country position in Global Innovation Index 2019[21]	114 (118 in 2018)
Capacity for Innovation (2017-8)[22]	3.9* (82/137)
Global competitiveness index[23]	3.3* (125/137)

*Denotes scores based on a 1-7 scale as calculated by the World Economic Forum

1.4 Nigerian research policy and funding

Science and innovation are embedded in the government's development strategy under Nigeria's Vision 20:2020 to foster prosperity and socioeconomic growth[24]. In 2011, Nigeria reviewed its science policy and put more focus on innovation, launching the new Science, Technology and Innovation (STI) policy which was first constitutionally recognised in 1986[25]. The National Science, Technology Innovation Roadmap (NSTIR) 2030 was also developed in 2017 to provide a long-term framework for science and technology[26].

The most recent data on the gross domestic expenditure on research and development (GERD) in Nigeria shows that 0.22% of GDP was invested in research in 2017 - the same year that the heads of states of the African Union called for a minimum of 1% of GDP to be spent on research and development (R&D). In 2019, the Federal Ministry of Science and Technology (FMST) was allocated 35 billion Nigerian naira (£78 million)[27] - a significant reduction from the allocation in 2017 of 65 billion Nigerian naira (£137 million). There are competing demands for government funds with defence, health and agriculture

deemed as high priority areas due to the security challenges and need for diversification from its oil-based economy. In 2011, the Federal Executive Council approved a National Research and Innovation Fund (NRIF) to provide a minimum funding level 1% of GDP and diversify sources from government allocations, public and private partnerships, international R&D funds and venture capital, but this has not yet materialised[28].

Though Nigeria does not have a national research agenda, the following key thematic areas were identified in the STI roadmap:

- Artificial intelligence and robotics

- Biotechnology (including pharmacology)

- Environment, meteorology and water resources

- Facilities and networked systems

- Health and nutrition

- Material science (including nanotechnology)

- Mathematics, computational and communication systems

- Renewable energy systems and photonics

- Science communication and technology diffusion

- Space and geospatial systems

Furthermore, the emphasis of the National Research and Innovation Council (NRIC) in STI is on space science and technology, biotechnology and renewable energy technologies[29].

1.5 Nigerian research landscape and stakeholders

Though the quality of Nigerian scientific institutions ranks lowly in the World Economic Forum's Global Competitive Index (Table 2), there are pockets of excellence. In Scimago's Institutional Ranking, 17 Nigerian universities are ranked within the world's top 1,000 institutions - including the University of Ibadan, the Federal University of Technology Akure, and the University of Nigeria[30]. This compares to 31 in South Africa and 38 in Egypt, despite Nigeria having significantly more universities. Other high-quality university faculties include the Obafemi Awolowo University, University of Lagos, Ahmadu Bello University and the University of Nigeria[31].

Table 3 - Key actors and responsibilities in Nigeria's research system

Type of stakeholder	Stakeholders
Ministries	The **Federal Ministry of Science and Technology** (FMST)[32] has primary responsibility for research, and through its parastatal bodies and agencies conducts various specialised R&D projects and activities. The **Federal Ministry of Education** (FME) provides block funding for universities. Other relevant ministries include the **Federal Ministry of Information and Culture** (FMIC)[33]
National research policy and funding	The **National Research and Innovation Council** (NRIC), set up in 2014, sets national priorities on R&D and coordinates STI activities in line with these, is responsible for the establishment of new research institutes and the strengthening of existing ones, and facilitates fund raising activities to support innovation activity[34]. Membership includes the **FMST, FMIC, FME**, and the **Federal Ministry of Environment**[35]. **National Council on Science, Technology and Innovation** (NCSTI) sets broad directions to coordinate STI activities in line with national priorities, monitors the activity of public STI agencies and is responsible for the dissemination of outputs from scientific research. **State Science, Technology and Innovation Council** (SSTIC) provides leadership and direction for STI activity at a state level, promotes science education and disseminates STI information. **Tertiary Education Trust Fund** (TETFund) established for the purpose of promoting higher education, TETFund also manages a 5 billion naira National Research Fund (US $13.8 million) providing grants in three areas: humanities and social sciences, STI and cross-cutting research[36]. **Nigerian Research Councils** drive R&D in specialised areas of natural and applied science and technology with direct funding from the Treasury but under supervision and direction from the FMST[37].
Research organisations	Nigeria currently has 174 universities (43 federal, 52 state and 79 private)[38]. There are also 128 polytechnics and 117 colleges of education[39]. Universities are block-funded directly via the FME, and federal research institutes are funded via the federal ministries to which they report. 17 Parastatal bodies and research institutes under the supervision of the FMST include; **National Space Research and Development Agency** (NARSDA); the **Federal Institute of Industrial Research and Oshodi** (FIIRO). The heads of these federal research institutes are politically appointed[40].
Research intermediaries	**Nigerian Academy of Science** (NAS) is an independent scientific body which aims to develop and advance STI in Nigeria.

1.6 Nigerian research collaboration and innovation

Despite Nigeria's track record on science and innovation, many of Nigeria's innovations have been introduced abroad rather than benefitting Nigeria with notable examples in agricultural innovations and information and communications technology development[41]. International collaboration in Nigeria accounts for over 45% of all publications captured by Scimago[42].

1.7 Nigerian scientific outputs

Though Nigeria has the largest higher education system in Africa, its research output is low, equating to 0.3% of global output (Table 2). Nigeria's h-index (which measures both the productivity and citation impact of scientific publications) is 181, ranking Nigeria 68th of 236 countries and 2nd in Africa. Medicine and engineering ranked as Nigeria's top two most popular research publication topics in 2018 (Table 4).

Table 4 - Top 10 subject areas of Nigerian research thematic areas

Rank	Subject area	Percentage of Published Documents (2018)
1	Medicine	16.4%
2	Engineering	9.9%
3	Social Sciences	8.6%
4	Agricultural and Biological Sciences	8.3%
5	Environmental Science	5.9%
6	Computer Science	5.4%
7	Biochemistry, Genetics and Molecular Biology	4.9%
8	Energy	4.3%
9	Materials Science	4.2%
10	Earth and Planetary Sciences	3.7%

Source: Scimago

1.8 UK government partnerships in Nigeria

Several collaboration agreements exist between British and Nigerian research and academic institutions – particularly through student/lecturer exchange programmes[43]. Nigeria sees the UK as a leader in innovation, and areas of UK expertise complement many of Nigeria's objectives such as those around collaboration and co-operation for global peace and security; stamping out corruption; working together to tackle malaria and other diseases; reducing maternal and child mortality; and improving education for millions of Nigerians[44].

2. Methodology overview

(Full methodology breakdown can be found in Annex 2, available in the supporting document (Annex 2-8) on the UKCDR website)

All methodologies, scope and design in this report were developed collaboratively by the UKCDR team and UKCDR members.

To understand the extent and impact of UK ODA and Wellcome research funding in Nigeria, this report asks four questions, presented in the scope. To address these questions, this report makes use of a combination of the following quantitative and qualitative tools:

2.1 Portfolio-level analysis

Data on research funding related to Nigeria awarded between 2014/15-2018/19 were collected from BEIS, DFID, DHSC (collectively accounting for more than 95% of the total ODA research budget)[45] and Wellcome (Table 5).[46] This timeframe was selected as many of these organisations would not have been allocated ODA funds prior to 2014/15.

Table 5 - List of funders with data included in the portfolio-level analysis of UK ODA-funded and Wellcome-funded research projects relating to Nigeria

Funder
Department for Business, Energy and Industrial Strategy (BEIS)* via delivery partners[†]:   - Academy of Medical Sciences   - British Academy   - Royal Society   - UK Research and Innovation   - UK Space Agency
Department for International Development (DFID)*
Department for Health and Social Care (DHSC)*
Wellcome

* indicates data obtained from ODA-funded research

[†]Non-extensive list of BEIS-delivery partners for ODA-funded research

2.1.1 Data limitations from portfolio-level analysis

There are two important considerations regarding the analysis of the data:

- Though the funded research projects address issues relevant to Nigeria, most grants were awarded to UK institutions which in turn disburse funds to in-country partners. It is not possible from the data to determine exact funding to Nigerian institutions. Therefore, the awarded grant amounts do not reflect funds that the UK sends to Nigeria. Rather, it reflects investments in research related to Nigeria.

- Almost all included research projects (88.2%) have multiple countries of focus and it was not possible to disaggregate spend per individual country from the data provided. To correct for this, most of the portfolio-level analysis equally divides individual grant amounts by the total number of nations listed as a country of focus when presenting financial information. While such an assumption is imperfect, accounting for this helps to frame our understanding of the true underlying size of UK investments into research relating to Nigeria. This technique was agreed to by the funders included in the portfolio-level analysis.

2.2 Stakeholder surveys

While the analysis of portfolio-level data is vital to understand the extent and impact of UK ODA research funding in Nigeria, important elements of the STI relationship between the two countries would otherwise be missed should the analysis employ purely quantitative tools. To that end, surveys were completed by 10 stakeholders based in both countries (two in Nigeria, eight in the UK) to provide insight on the perceptions of this relationship. These stakeholders were from the following groups:

- Research funders based in the UK

- Research providers based in Nigeria.

2.2.1 Limitations of stakeholder survey

The views expressed in the responses serve as a starting point to understand the perceptions and impact of UK research funding in Nigeria and should not be considered as embodying the general views of the groups which those stakeholders represent. This is due to two main reasons:

- The small number of stakeholders surveyed. Only two in-country stakeholders were surveyed, and none were interviewed. Additionally, only eight UK research funders were surveyed. Given this small sample size, the responses in this survey are not indicative of a cross-section of Nigerian research in-country stakeholders and make the data difficult to generalise.

- UK funders were asked questions relating to the perceptions and impact of UK research funding in three different African countries collectively (though every attempt has been made to extract and present the responses relevant to Nigeria - including those that were more generalised across three countries)

2.3 Bibliometric analysis

The potential impact of UK ODA-funded and Wellcome-funded research investments in Nigeria was evaluated using bibliometric analysis, providing a statistical overview of the publication outputs arising from these investments and resulting collaborations.

UKCDR fully acknowledges that assessments of scientific research output must encapsulate more than just publication and citation metrics, as stated in the San Francisco Declaration on Research Assessment (DORA).

Data was sourced from Dimensions– an online subscription-based platform that collates information on grants, publications, citations, alternative metrics, clinical trials, patents and policy documents from more than 350 public and private research funders from 39 countries. A complete list of funders whose data is available on this platform can be found in Annex 5. Several bibliometrics platforms (such as Web of Science and European Pub Med Central) were considered, but Dimensions was selected chosen due to its superior coverage and the completeness of its data.

Additionally, the data features publications from between 2017 and August 2019, assuming a three-year time-lag between the time of funding and the time of publication, in alignment with the timeframe used for the portfolio-level analysis.

2.3.1 Data limitations from bibliometric analysis

Important considerations regarding data from Dimensions:

- Dimensions does not allow for the filtering of research projects with an international development focus or those that are ODA-funded in an automated way. Therefore, data for any research project related to Nigeria is used – regardless of whether they have an international development focus or are ODA-funded.

- At present, DFID data is not routinely collected by Dimensions, and, due to difficulties in identifying alternative and robust methods of identifying publications acknowledging DFID funding, the decision was made not to include DFID in this component. As DFID are a significant and historical funder of international development research (representing approximately one third of the British government's total ODA R&D budget between FY2016/17 and 2020/21)[47], it is acknowledged that the publications identified for this period are underestimated.

- Citation measures, most notably the Relative Citation Ratio (RCR), were not included in this component as this information is generally collected two years after publication. Given the date range for this component, as mentioned above, only 19% of the data showed provided an RCR, all of which were publications from 2017.

2.4 Analysis of global funding data

To contextualise the magnitude of these investments at a global level, they were compared to those made by funders from other countries on research relating to Nigeria over the same period. Similar to the bibliometric analysis, a summary of statistics with data obtained from Dimensions was used.

2.4.1 Data limitations from analysis of global funding data

As the same source of data as the bibliometric analysis is used, it is subject to some of the same limitations outlined in Section 2.3.1 - namely the need to incorporate data from all research projects relating to Nigeria (due to the lack of an automated method to identify research projects with an international development focus or those that are ODA-funded) and the absence of data from certain research funders – such as DFID.

Additional considerations are:

● Of the 354 funders (public and private) with data on the Dimensions database, 154 (43.5%) are based in the United States – potentially skewing the results to show a greater proportion of research investments coming from the USA than may necessarily be the case. Importantly, it is the completeness of a given country's research funding landscape captured by the Dimensions database that determines the extent of the over/underestimation of the proportion of that country's contribution to research investments on projects relating to Nigeria.

● Grant information is handled in a similar way to the portfolio-level analysis of UK ODA-funded and Wellcome-funded research projects/ Projects with multiple countries of focus listed on the OECD's Development Action Committee (DAC) list[48] are subject to having their grant amounts equally divided by their respective total number of DAC-listed countries of focus for the same reasons outlined in Section 2.1.1.

2.5 Case studies and programme highlights

Case studies add depth to the analysis, giving insights into the impact of ODA/ Wellcome research funding has had on the lives of Nigerian beneficiaries and programme highlights demonstrate the diverse nature of UK investments. The information on the projects and investments profiled in the case studies and programme highlights were obtained from UKCDR members and stakeholders, who nominated the projects and investments for inclusion (Annex 7) and desk-based research.

This section also features case studies and programme highlights that fall outside of 2014/15- 2018/19 so as to not exclude those longstanding UK research investments whose impacts are still being realised to this day. Additionally, research projects often require a number of years before they reach their respective impact stage.

3. Findings

3.1 What is the total investment of UK ODA and Wellcome on research relating to Nigeria?

Since April 2014, the UK government departments with the largest ODA research budgets (DFID, BEIS and DHSC) and Wellcome have invested a total of £665.4m on 87 research projects that listed Nigeria as a country of focus (Table 6). This figure is reduced to an estimated £77.7m after correcting for multiple countries of focus (using the method in Section 2.1.1).

BEIS funded the greatest number of research projects, individual awards were typically smaller in size (Figure 1) and over a shorter amount of time (Table 6), particularly when taking into account multiple countries of focus - between BEIS (estimated £313.8k), DFID (estimated £2.0m), DHSC (estimated £764.2k) and Wellcome (estimated £360.8k).

Table 6 - Research projects relating to Nigeria funded by UK ODA and Wellcome (initiated between FY 2014/15 – 2018/19)
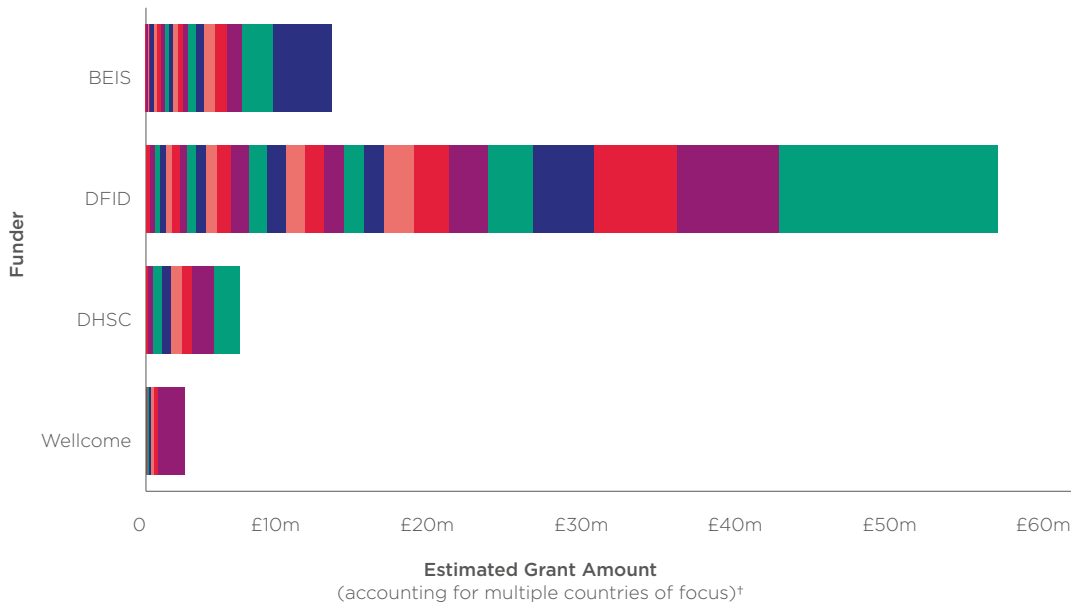
Funder	No. of research projects	Total grant amount awarded*	Estimated total grant amount awarded (correcting for multiple countries of focus) †	Average duration of research project (months)
BEIS (total)	44	£55.3m	£13.8m	31.9
AMS	*3*	*£149.5k*	*£35.8k*	*12.0*
British Academy	*3*	*£1.1m*	*£1.1m*	*45.4*
Royal Society	*6*	*£1.6m*	*£766.2k*	*49.7*
UKRI	*31*	*£48.6m*	*£8.4m*	*32.3*
UK Space Academy	*1*	*£3.9m*	*£3.9m*	*26*
DFID	28	£572.5m	£55.2m	73.5
DHSC	8	£32.5m	£6.1m	41.7
Wellcome	7	£5.1m	£2.5m	41.2
Total: ODA only	**80**	**£660.3m**	**£75.1m**	**47.4**
Total: ODA and Wellcome	**87**	**£665.4m**	**£77.7m**	**46.9**

Totals may not add up due to rounding.

*Figures presented in this column reflect the total grant amount of research projects without taking into account research projects having multiple countries of focus.

†Made by equally dividing individual grant amounts by that research project's total number of countries of focus.

Figure 1 - Estimated size of individually-awarded grants (accounting for multiple countries of focus)† by UK ODA research funders and Wellcome on research projects relating to Nigeria (initiated between FY 2014/15 – 2018/19)
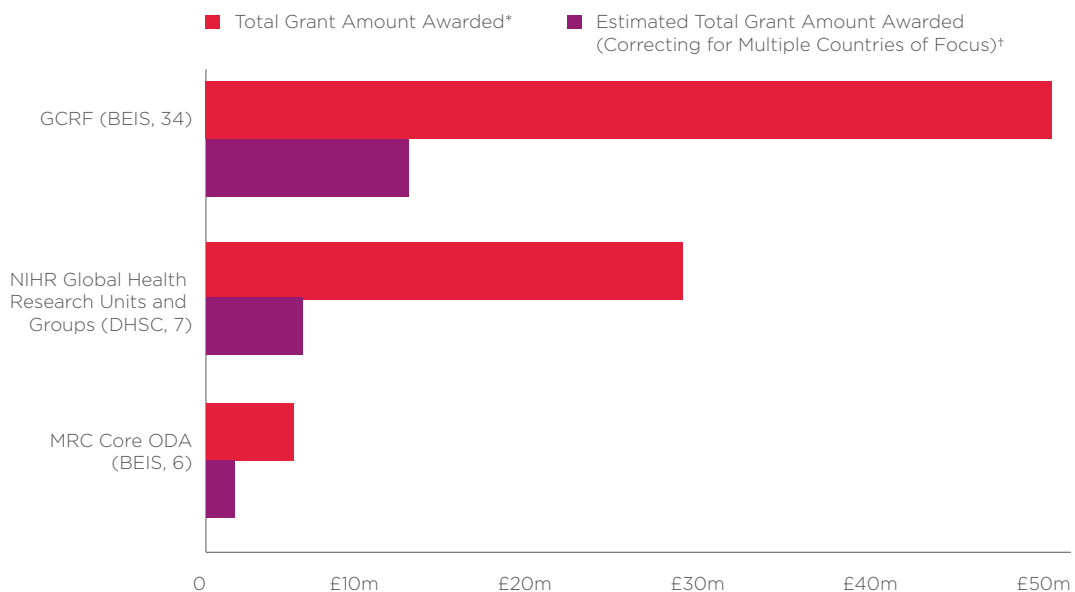

Grants are displayed in size order.

†Made by equally dividing individual grant amounts by that research project's total number of countries of focus.

Figure 2 summarises the most prominent UK ODA funding programmes that have invested the most funds on research projects relating to Nigeria during this period (programmes that invested more than £5m of ODA).

Figure 2 - Major UK ODA funding programmes that have awarded more than £5m to research relating to Nigeria (initiated between FY 2014/15 – 2018/19)

(Funder and number of projects indicated in brackets)

*Figures presented on the total grant amount of research projects do not take into account research projects having multiple countries of focus.

†Made by equally dividing individual grant amounts by that research project's total number of countries of focus.

Box 1 - Historical DFID funding on research relating to Nigeria

As mentioned in Section 2.1, FY 2014/15 was selected as the beginning of the period for consideration for the portfolio-level analysis as this coincided with the launch of the Newton Fund that introduced several funders to the ODA research space.

Prior to this, ODA-funded research had largely been administered through DFID who, in the five financial years prior to 2014/15 alone, had funded 23 projects related to Nigeria worth £399.0m (estimated £46.0m when taking into account multiple countries of focus). Going back to December 2007, a total of 26 research projects worth £501.1m (estimated £55.1m when taking into account multiple countries of focus) has been funded– all of which are still active.

This includes £50m worth of support (estimated £8.3m when taking into account its six countries of focus across Africa and Asia) to the Statistics for Results Facility to deliver an effective system-wide approach to statistical capacity building leading to a sustained improvement in the production, availability and use of quality statistics.

Box 2 - Programme highlight - The Think Tank Initiative

The Think Tank Initiative provides funding for core and technical capacity building support to think tanks in 20 countries for a 10-year period, 2009 to 2019. In total, 43 policy research institutions are supported. The initiative seeks to build expertise in research methods to facilitate robust and transformative research, policy engagement, communication as well as more generally well-integrated organisational structures – with the key emphasis placed upon achieving long-term sustainability.

Nigerian think tanks that received funding are the African Heritage Institute (AfriHeritage), Centre for Population and Environmental Development (CPED) and the Centre for the Study of the Economies of Africa (CSEA). One particularly successful policy intervention has come as a result of the work of the CSEA in tackling Nigeria's 'resource curse'. With the majority of Nigeria's public revenue coming from the oil industry, the country is vulnerable to inflation and weak economic growth rates. CSEA supported the Nigerian government's decision to create a sovereign wealth fund, a government owned investment tool, and demonstrated that this would aid transparency and social equity. However, they also highlighted that the dissemination of evidence was key to the programme's success. CSEA's research support shows a greater appreciation for bridging the research–policy gap and a broad-based governance approach.

The Think Tank Initiative is jointly funded by DFID, the Hewlett Foundation, the Bill and Melinda Gates Foundation, the Ministry of Foreign Affairs of the Netherlands, the Norwegian Agency for Development and Cooperation, the International Development Research Centre and the Canadian government.

Box 3 - Programme highlight - Africa Institutions Initiative

The Africa Institutions Initiative (AII) was a Wellcome-funded programme running from 2009 until 2015 worth c.£30m. This involved the funding of a series of seven consortia across 18 African countries. Its principal aim was to strengthen research capacity across the continent with partnerships each led by an African institute and a Northern partner. Partnerships are more specifically intended to build sustainable local research capacity with African universities to become more centrally involved in health research projects.

Nigerian involvement was focused on the Consortium for Advanced Research Training in Africa (CARTA) (awarded £3.4m and continuing under a Developing Excellence in Leadership, Training and Science, or DELTAS, award) and the Institute for Infectious Diseases of Poverty (IIDP) (awarded £1.3m). Both consortia pursued a merit-based funding mechanism for students with some quotas between institutions and are led by institutions in Kenya and Ghana respectively. The wider activities of the consortia involve supporting a range of training opportunities, engaging external stakeholders, improving research governance and growing 'Evaluation and Learning' capacity.

Wider success of engagement with the AII can been seen in the adoption of features of the initiative by other programmes such as by the Medical Education Partnership Initiative in Nigeria (MEPIN). This included the establishment of a Nigerian focused medical school consortia led by the University of Ibadan to strengthen the medical education system in the country.

3.2 Where does UK research funding go?

3.2.1 Lead institutions

The estimated £77.7m of research grants, taking into account multiple countries of focus (Table 6) was awarded to 40 different lead institutions[49] – with at least an estimated £20.3m being awarded to 27 lead institutions based in the UK. This includes the ten lead institutions awarded with the most funding on research projects related to Nigeria (Table 7) led by Inmarasat who were awarded a £3.9m grant on a project aiming to extend the reach of basic medical services to remote areas of Nigeria using satellite technology. Funds awarded to lead institutions in the UK may be disbursed to partner institutions (including those in Nigeria).

Table 7 - Top 10 lead institutions awarded the most estimated funds taking into account multiple countries of focus† by UK ODA research funders and Wellcome on research projects relating to Nigeria (initiated between FY 2014/15–2018/19)*

Rank	Institution (country)	Estimated total grant amount awarded (correcting for multiple countries of focus)†
1	Inmarsat (UK)	£3.9m
2	London School of Hygiene & Tropical Medicine (UK)	£2.7m
3	University of Leeds (UK)	£2.6m
4	Wellcome Trust Sanger Institute (UK)	£1.9m
5	Liverpool School of Tropical Medicine (UK)	£1.7m
6	University of Warwick (UK)	£1.4m
7	King's College London (UK)	£1.4m
8	University College London (UK)	£1.1m
9	Lancaster University (UK)	£741k
10	University of Sheffield (UK)	£660k

†Made by equally dividing individual grant amounts by that research project's total number of countries of focus.

*Funds awarded to lead institutions may be disbursed to partner institutions (including those in Nigeria)

3.2.2 Nigerian institutions

Beyond the lead institutions, a total of 114 institutions from 34 countries have been involved with the 68 research projects related to Nigeria included in the portfolio-level analysis (Figure 3)[50]. Of these institutions, 20 are based in Nigeria, including the University of Ibadan who were involved with 19 research projects related to Nigeria initiated between 2014/15 and 2018/19 – almost one-quarter of all the UK-funded research projects included in this analysis. This figure ranks first among all other research institutions - based in the African nation (Table 8) or otherwise.

Figure 3 - Location of institutions involved with UK ODA-funded and Wellcome-funded research projects relating to Nigeria (initiated between FY 2014/15–2018/19)

Number of Institutions

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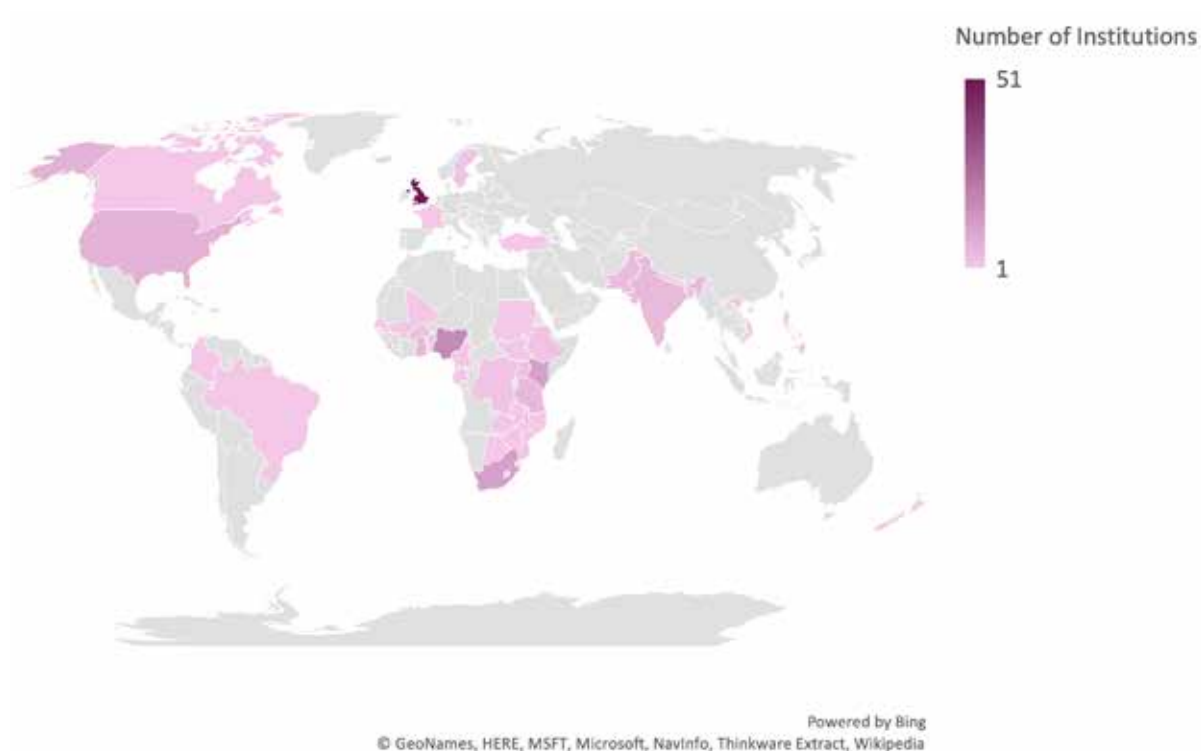© GeoNames, HERE, MSFT, Microsoft, NavInfo, Thinkware Extract, Wikipedia

Table 8 - Nigerian institutions involved with at least two UK ODA-funded and Wellcome-funded research projects relating to Nigeria (FY 2014/15 –2018/19)

Rank	Institutions	No. of projects
1	University of Ibadan	18
2	University of Nigeria, Nsukka	5
3	Lagos State University	3
=4	Federal University of Technology Akure	2
=4	Network of Migration Research on Africa	2
=4	University of Lagos	2
=4	Ahmadu Bello University	2

3.2.3 Institutional linkages

Collaboration is a priority of research programmes offered by funders to address key challenges faced by low- and middle-income countries (LMICs). The advantages of such collaborations are well-documented, such as the opportunity for researchers to exchange experiences, debate academic ideas and support research capacity strengthening practices, thereby expanding the reach and benefits of the projects in this analysis. Academic institutions in the UK should also be considered as among the beneficiaries of the projects.

Looking more closely at the 114 institutions involved with the research projects included, the greatest number of times any two institutions collaborated on a research project was four times and occurred with the pairings presented in Table 9:

Table 9 - Collaborations between two institutions on UK ODA-Funded and Wellcome-funded research projects relating to Nigeria (Initiated between FY 2014/15–2018/19) occurring more than twice

Institutions	No. of Collaborations
• African Population and Health Research Centre (Kenya) and University of Ibadan (Nigeria)	4
• Addis Ababa University (Ethiopia) and Douala General Hospital (Cameroon) • Addis Ababa University (Ethiopia) and Liverpool School of Tropical Medicine (UK) • African Population & Health Research Centre (Kenya) and University of Warwick (UK) • Douala General Hospital (Cameroon) and Liverpool School of Tropical Medicine (UK) • Kenya Medical Research Institute (Kenya) and Makerere University (Uganda) • King's College London (UK) and University of Ibadan (Nigeria) • University of Ibadan (Nigeria) and University of Warwick (UK) • London School of Hygiene and Tropical Medicine (UK) and University of Ibadan (Nigeria) • University College London (UK) and University of Ibadan (Nigeria) • University of Leeds (UK) and University of Nigeria, Nsukka (Nigeria)	3

The above pairings do not necessarily list an organisation that was designated as the lead organisation for a research project. Rather, it shows those two institutions that were listed as either a lead institution or the location of any of the co-investigators for a given research project.

3.2.4 Issues and opportunities linked to funding distribution

The two in-country respondents highlighted that most UK research funding went to UK research institutes with their partnership with Nigerian institutions seen as providing training opportunities for Nigerian nationals. It was also mentioned that in-country research institutions were not able to compete to secure UK research grants.

Reflecting on the reasons for this, both respondents indicated that pre-existing links with UK institutions were a key reason for success. These notions were echoed by the UK research funders who noted that pre-existing partnerships with UK universities were advantageous in a variety of ways. Often researchers in successful institutions receive advice for applications, experience working

in research teams, and support in proposal writing from UK partners familiar with applying for funding through UK systems. One UK funder mentioned that funding is based on competition and excellence rather than equity and may therefore result in 'excellent' researchers from 'weaker' institutions being less likely to make successful funding applications due to having less support and experience.

Inadequate infrastructure was highlighted as a reason for lack of success in receiving UK funds, with the need for capacity strengthening among young and future researchers in Nigeria emphasised.

3.2.5 Funding for capacity strengthening

Most UK funders interviewed indicated that research capacity strengthening is embedded within research programmes that they fund rather than as standalone programmes. Examples include training in research methodologies, user engagement, paper writing and conference presentations. UKRI, for example, fund some programmes via the Global Challenges Research Fund (GCRF) which includes funding for indirect costs for building institutional capacity and training.

Other institutional capacity building activities focused on financial and research management currently funded by the UK include the Good Financial Grants Programme and Research Management Programme (ReMPro), which are both led by the African Academy of Sciences (AAS).

3.2.6 Funding distribution across the SDGs

To gain a deeper understanding of the investments made, each of the research projects included in the portfolio-level analysis was assigned with up to 5 of 14 of the SDGs, based on the qualitative information provided.

The three SDGs not selected to classify projects against were SDG 1: No Poverty, SDG 10: Reduced Inequality and SDG 17: Partnership for the Goals as each of these goals is deeply embedded within the funding programmes strategies. This is particularly apparent with SDG 10 and SDG 17 where ODA is referenced multiple times within each goal's respective targets and indicators as a tool to achieve the SDGs. In the case of SDG 1, this goal is focused on the eradication of poverty in all its forms everywhere – which is at the core of each funder's research programme.

Figure 4 summarises the total number of research projects (with Nigeria listed as a country of focus) per SDG as well as their corresponding estimated funding amounts accounting for multiple countries of focus.

For projects assigned multiple SDGs, funding amounts were not divided accordingly. Estimated funding amounts presented in Figure 4 represent the total value of research projects that are relevant to that SDG (correcting for multiple countries of focus) and does not equate to the total value of the portfolio of UK ODA-funded and Wellcome-funded research projects.

Figure 4 - Estimated financial breakdown by SDG of research projects relating to Nigeria (Initiated between FY 2014/15-2018/19) funded by UK ODA research funders and Wellcome (accounting for multiple countries of focus)†*.

Estimated Grant Amount
(accounting for multiple countries of focus)†
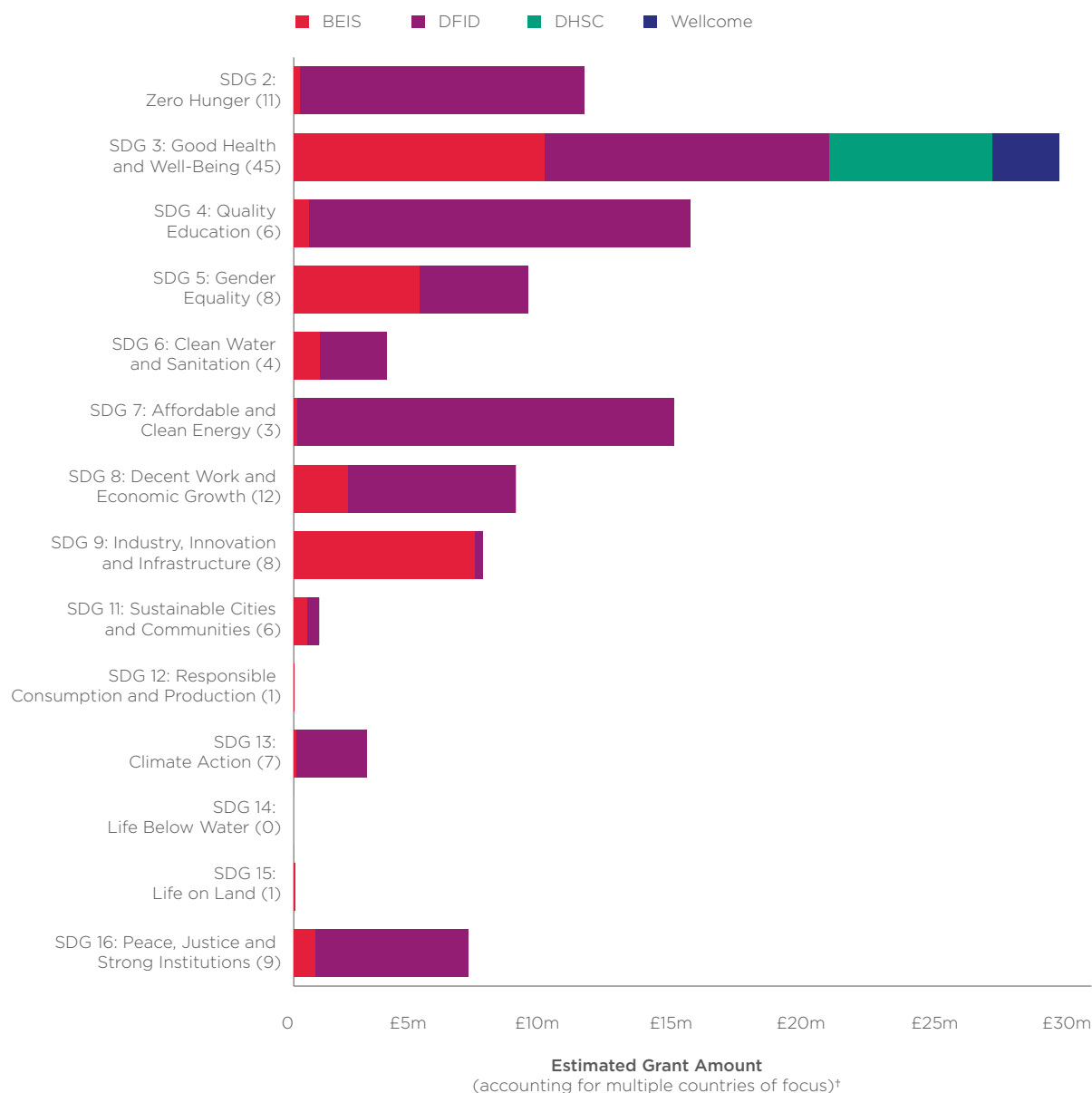
(Total number of projects per SDG is indicated)

†Made by equally dividing individual grant amounts by that research project's total number of countries of focus.

*The total funding value across all SDGs presented in the figure does not equate to the total value of the portfolio of UK ODA-funded and Wellcome-funded research projects.

3.2.7 Alignment of UK ODA and Wellcome funding with national research & development priorities

The stakeholder surveys indicated UK research and innovation funding was felt to align to national priorities in Nigeria to a large extent. One Nigerian research institute respondent indicated the need to spend more on capacity

strengthening, particularly around proposal writing, and to expand thematic areas of health research, specifically investing in research on non-communicable diseases as past funding focused more on infectious diseases.

One UK funder mentioned that UK government departments investing ODA in research should work together to ensure alignment with Nigerian national priorities, as well as the need to design future programmes with clear theories of change and based on evidence to ensure greater policy impact.

3.3 What is the reach and potential impact of UK research funding?

3.3.1 Publication volume

Data from the bibliometric analysis showed that between 2017 and 2019, UK-funded research output relating to Nigeria totalled 2,393 publications (Figure 5). As this data was collected in August 2019, the publication number is not indicative of the final publication output in the whole of 2019, and it is likely that this figure will be higher than indicated in this analysis.

Figure 5 - Total number of publications produced in 2017 – 2019* resulting from UK research funding relating to Nigeria
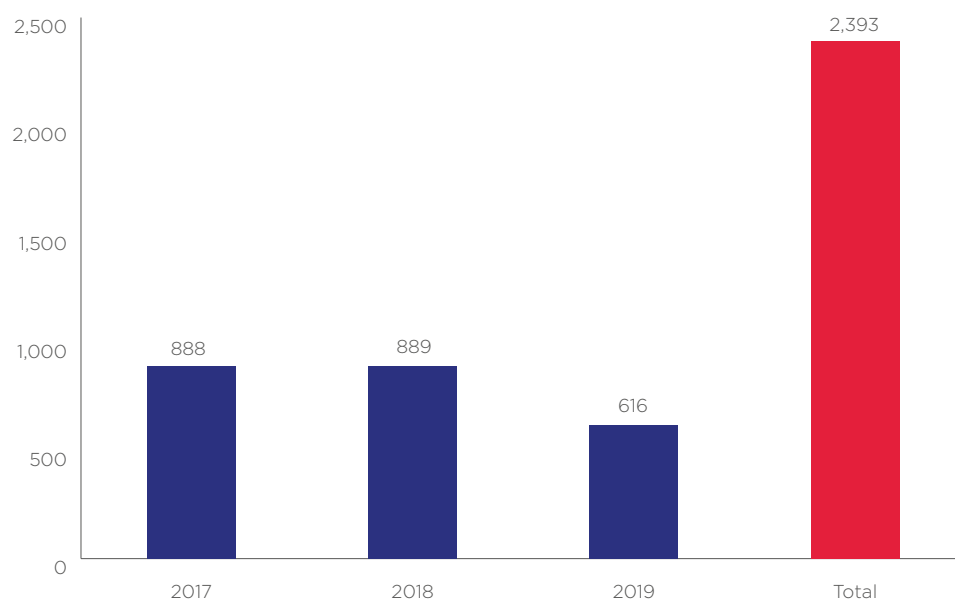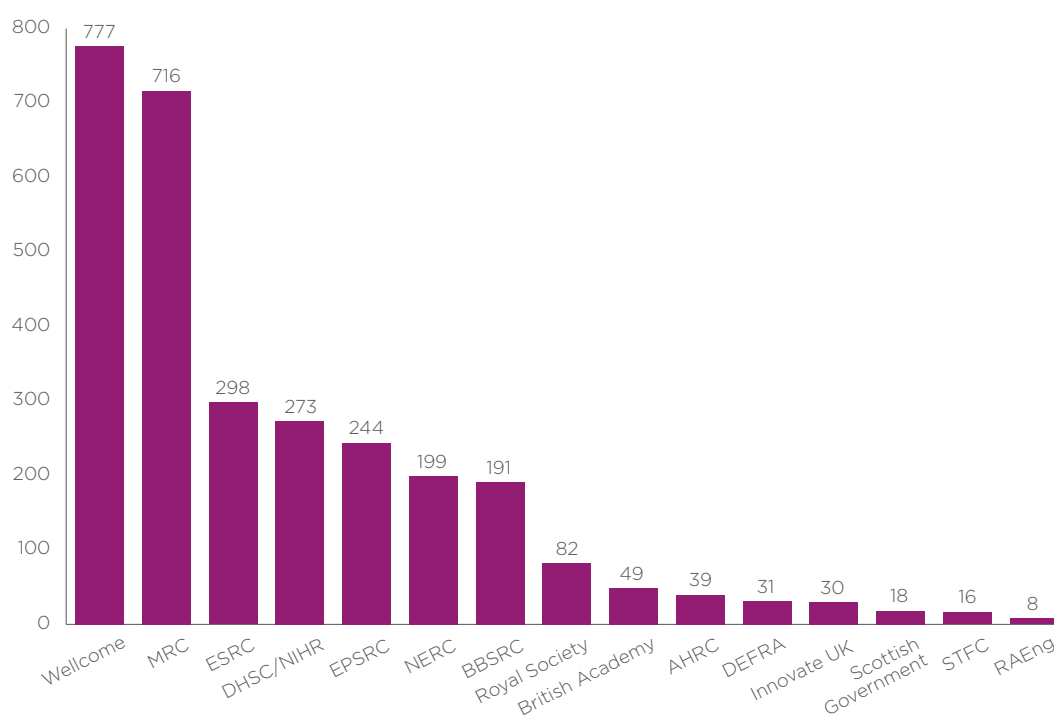

Source: Dimensions

*The data for 2019 was collected in August 2019, and therefore is not representative of the total number of publications in 2019

3.3.2 Publications per funder

The majority (1,907 publications, 80%) of research output during this period listed a single UK funder, however most of these publications were co-funded with other international funders. The remaining publications (20%) were funded by two or more UK funders. Wellcome was associated with the greatest number of research outputs followed by UKRI, most notably the UK Medical Research Council (MRC) which has a long history of funding research through ODA funding (Figure 6). It is important to note that more recently-funded research is unlikely to have many publications and much of the diversification of the ODA budget for research only started in 2016 (following the launch of the UK's revised aid strategy in November 2015).

Figure 6 - Number of publications per UK research funder (2017 – 2019)*

Source: Dimensions

*As publications are counted once for each mention of UK funder, where UK research funders were co-funders, there may be double counting.

Abbreviations: **AHRC** - Arts and Humanities Research Council; **BBSRC** - Biotechnology and Biological Sciences Research Council; **DEFRA** - Department for Environment, Food and Rural Affairs; **DHSC** - Department of Health and Social Care; **EPSRC** - Engineering and Physical Sciences Research Council; **ESRC** - Economic and Social Research Council; **MRC** - Medical Research Council; **NERC** - Natural Environment Research Council; **NIHR** - National Institute for Health Research; **RAEng** - Royal Academy of Engineering; **STFC** - Science and Technology Facilities Council.

3.3.3 Thematic focus of UK-funded research output

The majority of UK-funded research outputs focuses on medical and health sciences. Figure 7 presents the 10 most common thematic areas of UK-funded research publications relating to Nigeria (which together comprise 92% of all

publication outputs considered in the bibliometric analysis). The Australian and New Zealand Standard Research Classification (ANZSRC) was used to categorise publications as this was considered by UKCDR as the most detailed and wide-ranging system. The ANZSRC was also deemed more appropriate than using the SDGs (as in Section 3.2.6) as the publications considered for this component were not limited to those with an international development focus (for reasons outlined in Section 2.3.1).

Figure 7 - Thematic focus of UK funded research output on Nigeria (2017 – 2019)

Source: Dimensions

(Number of publications per field is indicated*)

*8 research publications were uncategorised.

Abbreviations: **Env Sci** - Environmental Sciences; **Ag Sci** - Agricultural Sciences; **Psych and Cog** - psychology and cognitive studies; **I&C** - Information and computing sciences.

3.3.4 Location of authors and co-authors of publications arising from UK funded research

Publications arising from UK research funding were produced by authors from research institutes in the UK (1,873, 78%), USA (558, 23%) and Nigeria (339, 14%). As with most research, almost all the research outputs (95%) were produced in collaboration. Of the co-authored papers, 11% included researchers from institutions in both Nigeria and the UK. Additionally, more than half of all publications arising from research collaborations (57%) included a co-author from a LMIC research institution, of which 15% were co-authored by those affiliated with research institutions in Nigeria (Figure 8).

UK funding supports some South-South collaboration, with 19% of all research outputs including more than one author from LMIC-based research institution - 184 of which were between authors from a Nigerian and another LMIC country. There is an opportunity for UK research funders to build on this and support more South-South research partnerships and production of research outputs.

Figure 8 - Geographical location of collaborators and co-authors of publications resulting from UK research funding relating to Nigeria (2017 – 2019)*
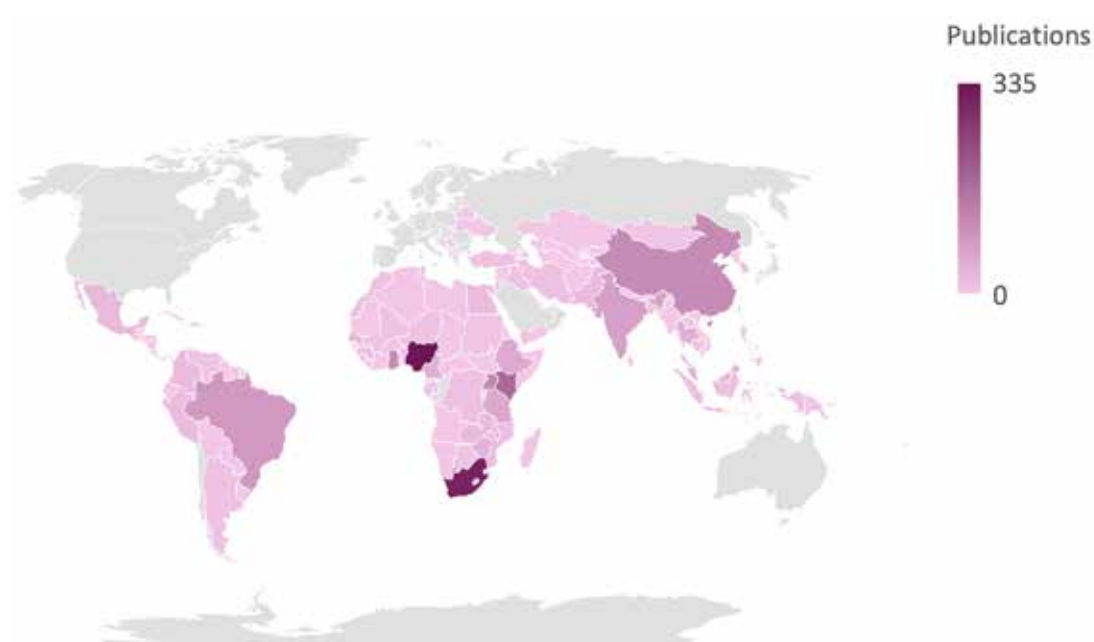
Source: Dimensions

*As some of the publications were co-authored by researchers from institutions in several countries, some publications may be double counted

3.3.5 Top research institutions producing UK funded research output relating to Nigeria

The institutions with the greatest number of publications resulting from UK funding relating to Nigeria were all in the UK (Table 10). While Table 10 summarises the 10 research institutions involved with the greatest number of publications resulting from UK funding relating to Nigeria based on the data from the bibliometric component, Table 11 limits this list of institutions to those based in Nigeria.

Table 10 - The top 10 research institutions involved in production of research output relating to Nigeria as a result of UK research funding (2017 – 2019)

Rank	Research Institution	No. of publications
1	University of Oxford	281
2	London School of Hygiene & Tropical Medicine	276
3	University College London	189
4	Imperial College London	158
5	King's College London	116
6	University of Cambridge	115
7	University of Edinburgh	104
8	Liverpool School of Tropical Medicine	99
9	University of Liverpool	88
10	University of Leeds	74

Source: Dimensions

*As some of the publications were co-authored by researchers from different institutions, some publications may be double counted

Table 11 - The top 10 Nigerian institutions involved in production of research output relating to Nigeria produced following UK research funding (2017 – 2019)*

Rank	Institution	No. of publications
1	University of Ibadan	57
2	University of Lagos	37
3	Obafemi Awolowo University	36
4	University College Hospital, Ibadan	25
5	Federal Ministry of Health	24
6	University of Nigeria, Nsukka	20
7	Bayero University Kano	19
8	University of Jos	17
9	University of Calabar	15
10	Lagos State University	14

Source: Dimensions

*As some of the publications were co-authored by researchers from different institutions, some publications may be double counted

3.3.6 Open Access

UK research funding during this period demonstrated a commitment to equitable access of research outputs, with more than three-quarters of the publication outputs analysed in this component being open access. Table 12 outlines the distribution of UK funded open access research outputs by open access category. Descriptions of the open access categories are listed in Annex 6.

Table 12 - Total number of UK funded open access research outputs relating to Nigeria published in 2017 - 2019

	No. of publications
Gold	836 (46%)
Hybrid	387 (21%)
Green	371 (20%)
Bronze	222 (12%)
Total Open Access	1,816

Source: Dimensions

3.3.7 Reach and potential impact

Stakeholders provided descriptions of a wide range of outcomes and impacts resulting from UK research funding, varying from saving lives, strengthening institutions and fostering collaboration. A list of these examples is given in Annex 7. Case studies of reach and potential impact have been developed for a selection of these examples (based on shortlisting as described in Section 2.5) to show the national and international reach of the results of UK funding in Nigeria and provide useful examples of the benefits of such funding. These include reducing deaths from postpartum haemorrhage, improving TB diagnosis and access to service, boosting preparedness for infectious disease outbreaks and redesigning tourism policy and practices in Africa (see Annex 1).

3.3.8 South-South networking

From the stakeholder surveys, UK funding was perceived as being generally supportive of South-South networks, with one respondent citing the Collaborative Awards supported by Wellcome as an example. However, the respondent also indicated the need for specific South-South collaborative efforts from UK funders to improve the sustainability of research. To facilitate UK-Nigeria partnerships, both in-country respondents emphasised a need for UK funding to increase engagement with Nigerian institutions to foster collaboration and partnerships. There was also a suggestion that that UK research funding should provide training opportunities to researchers returning to Nigeria from abroad and encourage the Nigerian government to increase national research funding.

3.3.9 Perceptions of UK-funded research

UK funders were seen as key partners by the two in-country respondents surveyed with the most recognisable UK funders across the various stakeholder groups being DFID and Wellcome. The remit of the UK funders was additionally felt to be clear (particularly in comparison with other international funders). However, in-country respondents indicated that UK research funding could focus more on building the capacity of Nigerian researchers and technicians.
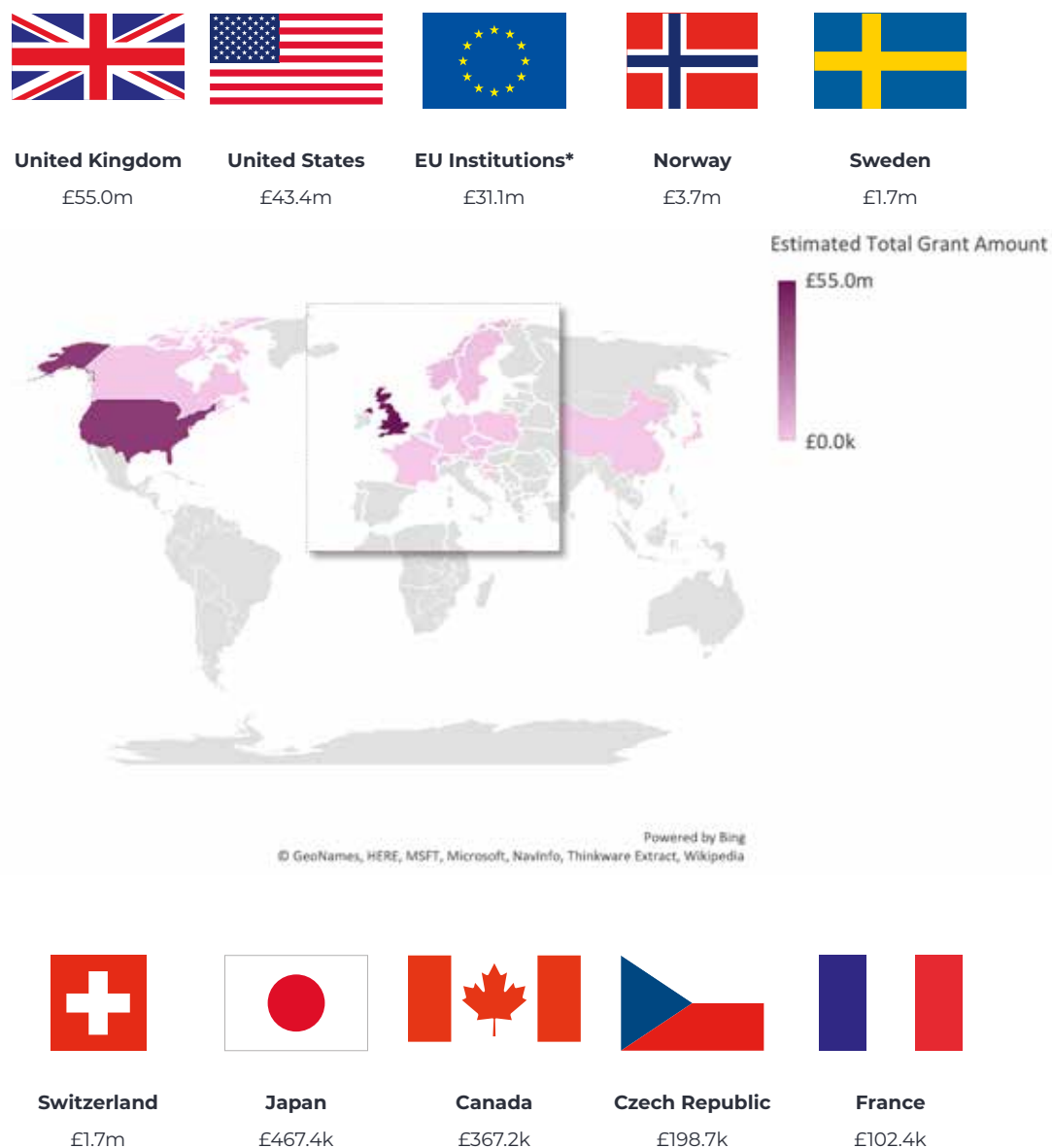
3.4 How does the investment extent and outputs from UK funding, compare to other external funding to Nigeria?

A total of £215.5m was invested by 58 of the public research funders between 2014/15 and 2018/19 across 284 projects relating to Nigeria – a figure which is reduced to an estimated £138.1m when correcting for research projects with multiple DAC-listed countries of focus. Additionally, a total of 6 private research funders listed on Dimensions invested £176.5m (estimated £100.7m accounting for multiple DAC listed countries of focus) on 122 research projects relating to Nigeria over the same period.

By way of comparison, a total of £95.0m (estimated £56.0m accounting for multiple DAC-listed countries of focus) was invested in 97 research projects relating to Nigeria between 2014/15 and 2018/19 by three funders (both public and private) based in the UK – according to data available on Dimensions. [A breakdown of the top non-UK research funders on Dimensions investing the most funds on projects relating to Nigeria between 2014/15 and 2018/19 can be found in Annex 8.]

Figure 9 ranks the 10 countries that have invested the greatest amount of public research funds on projects relating to Nigeria between 2014/15 and 2018/19 (considering multiple DAC-listed countries of focus). The UK's estimated £55.0m of publicly-funded research relating to Nigeria outranks all other countries. EU institutions have invested an estimated £31.1m-worth of public funds on research relating to Nigeria, controlling for multiple DAC-listed countries of focus (EU investments are recorded separately to individual EU member states in Dimensions).

Figure 9 - Estimated top-10 countries investing the most public funds on research relating to Nigeria - accounting for multiple DAC List countries of focus† (initiated between FY 2014/15 – 2018/19)

United Kingdom	United States	EU Institutions*	Norway	Sweden
£55.0m	£43.4m	£31.1m	£3.7m	£1.7m

Estimated Total Grant Amount

£55.0m

£0.0k

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Switzerland	Japan	Canada	Czech Republic	France
£1.7m	£467.4k	£367.2k	£198.7k	£102.4k

Source: Dimensions

†Made by equally dividing individual grant amounts by that research project's total number of countries of focus.

*The amount indicated for EU institutions does not include funding amounts from individual EU member states

While the results presented in this Section are not a comprehensive overview of the activities of all public research funders globally on projects relating to Nigeria (as a number of funders are not included on the Dimensions database), the findings at the organisational level (Annex 8) remain useful as they give an indication of the range of public research investments that are considered the largest.

It is, however, when these findings are extended to the country level that the significance of missing public research funders becomes more apparent. The results presented in Figure 9 are likely to overestimate the proportion of the contribution to public research investments on projects related to Nigeria of countries that have a greater proportion of their public research funders' data included on the Dimensions database (and a likely underestimation for those countries with a smaller proportion of their public research funders' data on the database).

Despite the clearly-stated limitations with comparing the results of the two Sections, these findings at least begin to help shape our understanding, in practical terms, of the size of UK ODA investments on research relating to Nigeria, how this compares to investments made by other public research funders globally and who the other major research funders are.

3.4.1 Perceptions of non-UK funded research

Both in-country stakeholders listed American research funders as being the most prominent, specifically mentioning the Bill & Melinda Gates Foundation, the United States Agency for International Development, the US National Institute of Health, the US Centres for Disease Control, and the Project Management Institute. Among the funders from other countries recognised by the in-country stakeholders were the European and Developing Countries Clinical Trials Partnership, the Canadian government, the Chinese government, the African Academy of Sciences, and the World Bank.

The Nigerian stakeholders also drew parallels between UK and non-UK funding, commenting that whilst research agendas are set bilaterally with Nigeria, partnerships were still often in favour of funders (both UK and non-UK) due to their setting of grant conditions. It was also stated that there is scope for all international research funders to focus more on building research capacity in Nigeria to ensure sustainability of research.

4. Discussion

While only a small proportion of UK funding goes to research related to Nigeria, it makes up a large proportion of research funding for the country, making it key to Nigeria's research ecosystem.

The UK investment in research and innovation in Nigeria between 2014 and 2019 totals £665.4m on 87 projects, reduced to an estimated £77.7m correcting for multiple countries of focus. Research investments are varied – spanning all the SDGs, with strong focus on SDG 3: Good health and well-being, and projects are delivered through complex and diverse funding schemes.

This funding is comparatively less than the UK funds on research related to other countries (such as South Africa and Kenya) and external national research funding into Nigeria is also limited in comparison to other African countries. Between 2014-2019, the UK has invested the greatest amount of public funds, globally, on research relating to Nigeria, followed by the USA and EU – the only funders to have invested more than £5m during this time. The current capacity for research in Nigeria is indicated to be low, with a few strong universities (mainly focused on teaching), few institutions focusing on research and limited numbers of researchers in-country. Private and commercial sector investment into R&D in Nigeria also appears to be limited.

UK-funded research in Nigeria has strong partnerships with Kenyan and South African institutions (in addition to the UK) which could be built on.

Strong institutional collaboration has been a key part of the UK investment with Nigeria, with 114 institutions from 34 countries involved in the 87 research projects related to Nigeria included in the portfolio-level analysis. Within Nigeria, the University of Ibadan was involved in nearly one-quarter of UK-funded projects, but not many other Nigerian institutions were – this indicates that few institutions are capable of competing for external funding.

Strong partnerships with institutions based in the UK, Kenya and South Africa may provide a foundation for further capacity strengthening, necessary to stimulate competition for funding by Nigerian research institutions. There is also an opportunity for Nigeria to take a more leading role in the West African region where it currently has limited research partnerships.

Greater equity in partnerships is needed to promote the sustainability of research collaboration, alignment with national priorities, visibility and impact. The analyses identified greater scope for UK research funding to include in-country researchers in the production of outputs, currently only 15% of outputs including authors based in Nigerian institutions (the relevance of this data may be affected by the multi-national focus of many of the research grants).

There is both great opportunity and need for UK funded research and innovation in Nigeria

With its huge population, large economy and relatively strong education system, opportunities for research and innovation in Nigeria are exciting. The need is also apparent given the conflict and fragility of certain regions and persistence of extreme poverty which need to be addressed to mitigate potential further future risks. Current researcher numbers and investment are, however, low in comparison to other African countries.

A recent UKCDR report analysing UK-funded fellowships and scholarships for Africa has, however, shown that there is strong UK support for individual capacity building for Nigeria. In the analysis of more than 5,000 fellows and scholars from Africa, Nigeria ranked among first among all other nationalities - particularly via the Commonwealth and Chevening scholarships which mainly provide support for master's degree programmes. This individual capacity building could be further built on through deeper research capacity strengthening initiatives.

The outputs from the UK ODA and Wellcome-funded research investments and partnership activities in Nigeria are important, having resulted in 2,393 publications between 2017 and August 2019, with topics related to medical and health sciences being prominently featured. Important and broad national, regional and global reach is also demonstrated from this investment in the range of case studies provided, spanning post-partum haemorrhaging, TB diagnosis, preparedness for infectious disease outbreaks and tourism (Annex 1).

The UK needs to maximise the benefits of its moderate but important investment in Nigeria through improved research capacity strengthening investment, coherence, visibility and equitable partnership. The few stakeholders consulted indicated that the USA was the most recognised national funder in-country. A range of different funding models focused at the researcher (e.g. GCRF) and institution (e.g. DELTAS) levels are available in Nigeria, allowing both bottom-up and top-down development of research priorities. However, in the case of top-down development, alignment with national research priorities is more limited (at the time of the review there was no permanent in-country UK presence related to research, although this is now being developed under the 'new partnership with Africa' and there is no national partnership UK funding with Nigeria, such as the Newton Fund).

Improved coherence and resulting visibility of UK funded schemes may help to maximise the visibility and impact of UK investment further. The synthesis of the investment in this report provides an excellent basis for further discussion on the development of the UK-Nigerian government relationship under the UK government's new partnership with Africa, announced by the UK Prime Minister mid-2018. This report provides content (especially the case studies presented in Annex 1) that can be used for showcasing the benefits that this UK investment has afforded to date.

UK funding could broaden to further align with Nigerian national priorities

UK funding is seen to be relatively aligned with Nigerian national priorities, however it could be broadened to address more of the priorities outlined in the STI roadmap, which are wider than the breadth of funding in this analysis that focuses on medical and health sciences. In particular, conflict, corruption and fragility are the main reasons poverty is likely to persist and a likely source of global security risk meaning further research into these may be particularly beneficial to Nigeria.

The UK government's new partnerships with Africa has limited but important foundations in Nigeria

The current partnership between the UK and Nigeria, whilst narrow, provides an important foundation for the expansion of future research activities in the country. Expanding the network of UK contacts in Nigeria will be an important first step for improving UK investments and partnerships for research, science and innovation. Lessons can also be learnt from the complementary reports produced alongside this on the UK's more longstanding research investments in Kenya and South Africa.

In conclusion, this report presents an exciting opportunity for growing UK's research investment and collaboration in Nigeria under the government's new partnerships with Africa. From these findings there are clear directions to take in the future towards capacity building, data collection and coherence for research and innovation.

Endnotes

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Annex 1:
Case studies

Annex 2-8 are available in a supporting
document on the UKCDR website

Case Study 1: WOMAN Trial: Reducing deaths from postpartum haemorrhage

The WHO published new guidelines on the use of tranexamic acid for post-partum haemorrhage as a result of the findings from the UK-funded WOMAN trial.

Key Information

UK Funders: Wellcome, DHSC, NIHR

Timeframe: 2010 - 2017

Total UK Funding: £3m

Organisations: WOMAN Trial Collaborators, led by the London School of Hygiene and Tropical Medicine.

Policy Influence: International

Postpartum haemorrhage is the world's leading cause of maternal death. Each year it affects 14 million new mothers and over 100,000 women die because of it. 99% of all maternal deaths take place in Low-and Middle-Income Countries (LMICs). Postpartum haemorrhage affects approximately 5% of all women giving birth and in Nigeria it accounts for around 25% of maternal deaths.

Tranexamic acid (TXA), a blood clot stabiliser discovered in the 1950s, is readily available, costs about £2 a dose, and is commonly used for other bleeding conditions. Prior to the WOMAN Trial, the WHO recommend using TXA in women with severe bleeding only when other treatments had failed.

Towards impact

- Based on the evidence from the WOMAN Trial, the WHO changed its guidelines on tranexamic acid in 2017. The WHO now recommends early use of intravenous TXA within three hours of birth, in addition to standard care, for women diagnosed with postpartum haemorrhage. The WHO also highlights the need for all health systems to recognise that TXA is a life-saving intervention that should be made readily available wherever emergency obstetric care is provided.

Underpinning research

The WOMAN (World Maternal Antifibrinolytic) Trial, which started in 2010, was the first assessment of whether tranexamic acid (TXA) could be used to reduce death from postpartum haemorrhage.

- The WOMAN trial involved approximately 20,000 women from 21 countries, in over 190 hospitals and medical centres. 50% of patients were enrolled from Nigeria and Pakistan - among the countries with the highest number of maternal deaths annually. The investigation combined these results with data from an additional 20,000 patients from the CRASH-2 Trial (TXA use for bleeding trauma patients).

- The trial showed that TXA can prevent almost one in three maternal deaths caused by severe bleeding if given within three hours of birth. Immediate treatment with TXA improves survival after severe postpartum haemorrhage by 70%, however this benefit decreases by 10% with every 15-minute delay up to three hours, after which there is no health benefit.

- A subsequent study assessed the cost-effectiveness of early administration of TXA for post-partum haemorrhage in Nigeria and Pakistan. Through the development of a cost-effectiveness decision model, the study found that early-treatment with TXA is highly cost-effective, in Nigeria generating an average gain of 0.18 QALYs (quality-adjusted life years) at a cost of US$37.12 per patient.

Evidence of impact

Policy documents
- WHO updates recommendation on intravenous tranexamic acid for the treatment of postpartum haemorrhage (WHO 2017) [Hyperlink]

- WHO recommendation on Tranexamic Acid for the treatment of postpartum haemorrhage (WHO 2017) [Hyperlink]

- Updated WHO Recommendation on Tranexamic Acid for Treatment of Postpartum Haemorrhage (WHO 2017) [Hyperlink]

Selected publications
- WOMAN Trial Collaborators (2017) 'Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial', The Lancet, 389(10084). [Hyperlink]

- Gayet-Ageron, A. et al. (2017) 'Effect of treatment delay on the effectiveness and safety of antifibrinolytics in acute severe haemorrhage: a meta-analysis of individual patient-level data from 40,138 bleeding patients', The Lancet, 391(10116). [Hyperlink]

- The Lancet (2017) 'WOMAN: reducing maternal deaths with tranexamic acid', The Lancet, 389(10084). [Hyperlink]

- The CRASH-2 Collaborators (2011) 'The importance of early treatment with tranexamic acid in bleeding trauma patients: an exploratory analysis of the CRASH-2 randomised controlled trial', The Lancet, 377(9771).[Hyperlink]

- Bernadette, L. et al. (2018) 'Tranexamic acid for treatment of women with post-partum haemorrhage in Nigeria and Pakistan: a cost-effectiveness analysis of data from the WOMAN Trial', The Lancet: Global Health, 6(2). [Hyperlink]

- Brenner, A. et al. (2018) 'The impact of early outcome events on the effect of tranexamic acid in post-partum haemorrhage: an exploratory subgroup analysis of the WOMAN trial', BMC Pregnancy Childbirth, 18 (1): 215. [Hyperlink]

Other resources
- BBC News Health website, 'Health Check: Drug hope to prevent haemorrhage in new mothers' [Hyperlink]

- WOMAN Trial website [Hyperlink]

- Innovation stops women dying from severe blood loss after childbirth (Wellcome, 2017) [Hyperlink]

- WHO change guidelines on averting maternal deaths after WOMAN trial results (Wellcome, 2017) [Hyperlink]

- Every minute counts when using lifesaving drug to treat bleeding after trauma or childbirth (LSHTM, 2017) [Hyperlink]

Case Study 2: Improving Tuberculosis diagnosis and access to TB services

Changes in national and international TB policy leading to improvements in access to TB services in LMICs have been informed by UK-funded research into TB diagnosis in Nigeria.

Key Information

UK Funder: DFID, ESRC

Timeframe: 2008 – 2012

Total UK Funding: £237,584

Organisations: University of Warwick, Liverpool School of Tropical Medicine, Nigeria Tuberculosis and Leprosy Control Programme

Policy Influence: National, International

Tuberculosis (TB) is a contagious airborne disease that, in 2016, resulted in 10.4 million new cases and 1.7 million deaths. It is estimated that there is an additional gap of 3 million undetected or missed cases. Increasing case detection is an international priority.

Smear microscopy is the main test used for TB diagnosis. They are inexpensive but with low sensitivity. As a result, the WHO had previously specified that at least two out of three smears, with at least 10 bacilli, had to yield a positive result in order to be considered smear-positive. For patients, this required multiple visits to health centres.

Towards impact

DFID/ESRC-funded research into TB diagnostics and access to TB services has found that same-day TB diagnosis by microscopy is as effective as former, lengthier methods and could improve access to TB services for low-income households.

- At an international level, this research influenced policy changes at the WHO. In 2005, the WHO published guidance for National TB Control Programmes for addressing barriers to access to TB services for low-income households. In 2007, the WHO revised its definition for smear-positive TB (at least one acid fast bacilli in one sample). In 2011, the WHO published a policy endorsing same-day diagnosis of TB by microscopy.

- Several countries (including Nigeria, Somalia, and Tanzania), as well as several international organisations (e.g. Médecins Sans Frontieres), are already implementing same-day diagnosis.

- The Nigerian National Strategic Plan for Tuberculosis (2015) also included community-based approaches, with the aim of increasing case notification, based on studies since 2009.

Underpinning research

- Research in Ethiopia, Malawi and Nigeria looked at the costs of accessing TB services. In Malawi, the team found that low-income patients were spending 344% of their monthly income accessing TB services, with similar results in Ethiopia and Nigeria. Many patients stopped attending services before getting a diagnosis.

- Between 2007-2013, studies in seven countries, including Nigeria, sought to improve smear microscopy tests for TB diagnosis. They showed that the majority of patients are diagnosed in two smears. They found that one positive smear, with few bacilli, is sufficient for a positive diagnosis. Diagnosis can be reached in one day to the same level of performance.

- Studies since 2009 have looked into ways of engaging community health extension workers (HEWs) to facilitate TB diagnosis. HEWs were trained to identify symptoms of TB, collect and prepare smears, and transport them to diagnostic labs. In Nigeria, the new approach led to a 70% increase in case detection.

Evidence of impact

Policy documents
- WHO Options for National Control Programmes (2005) [Hyperlink]

- STOP TB, TB & Poverty Sub Group, Patient Costing Tool [Hyperlink]

- Priorities in Operational Research to Improve TB Care and Control, WHO, 2011 [Hyperlink]

- Revised WHO policy statement on same-day diagnosis of TB by microscopy, WHO, 2007 [Hyperlink]

- WHO Policy: Same-day diagnosis of tuberculosis by microscopy, WHO, 2011 [Hyperlink]

- Nigerian National Strategic Plan for Tuberculosis 2015-2020 [Hyperlink]

Selection of publications:
- Yassin, M and Cuevas, L (2003) 'How many sputum smears are necessary for case finding in pulmonary tuberculosis', Tropical medicine and International Health, 8(10), 927-32. [Hyperlink]

- Lawson, L et al. (2006) 'Microbiological validation of smear microscopy after sputum digestion with bleach: A step closer to a one-stop diagnosis of pulmonary tuberculosis', Tuberculosis, 8691, 34-40. [Hyperlink]

- Kemp, J et al. (2007) 'Can Malawi's poor afford free TB services? Patient and household costs associated with a TB diagnosis in Lilongwe', Bulletin of the World Health Organisation, 85, 580-5. [Hyperlink]

- Cuevas, L (2011) 'A multi-country non-inferiority cluster randomised trial of frontloaded smear microscopy for the diagnosis of pulmonary tuberculosis', PLoS Med. [Hyperlink]

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- Davis, J et al. (2013) 'Diagnostic accuracy of same-day microscopy versus standard microscopy for pulmonary tuberculosis: a systematic review and meta-analysis', Lancet Infect. Dis, 13, 147-54. [Hyperlink]

- Yassin, M et al. (2013) 'Innovative community-based approaches double tuberculosis case notification and improved treatment outcome in southern Ethiopia', PLos ONE 8, e63174. [Hyperlink]

Other resources:
- REF case study [Hyperlink]

Case Study 3: Boosting preparedness for infectious disease outbreaks

The PANDORA-ID-NET Consortium is enhancing the capacity of African regions to detect and respond to infectious disease outbreaks through a 'one health' approach encompassing human and animal medicine.

Key Information

UK Funder: DHSC (through EDCTP)

Timeframe: 2018 - 2022

Total UK Funding: £5m

Organisations: Fondation Congolaise pour la Recherche Médicale, and partners (including Nigeria Centre for Disease Control and Irrua Specialist Teaching Hospital in Nigeria).

Policy Influence: National, local

The 2014-16 Ebola outbreak claimed the lives of at least 11,000 people. Africa has since experienced multiple other outbreaks (including yellow fever, plague, and Ebola-related viral infections) and the risk of entirely new infections remains. As a result of the rich ecological systems present in Central and East Africa, the region is particularly vulnerable to outbreaks of zoonotic infections.

Towards impact

The PANDORA-ID-NET Consortium (Pan-African Network for Rapid Research, Response, Relief and Preparedness for Infectious Diseases Epidemics) is working in partnership with national governments and public health bodies to promote infectious disease control and outbreak preparedness.

● PANDORA-ID-NET was called into action following a formal request from the Ministry of Health in the Republic of Congo for help with control of an Ebola outbreak in 2018. The consortium provided advice on local surveillance activities and diagnostic tools, and organised trainings on rapid reviewing of research proposals in emergency situations. Together with the African Coalition for Epidemic Research, Response and Training (ALERRT), they drafted Procedures for Evaluation of Clinical Research Protocols in cases of emergency.

● In 2019, PANDORA-ID-NET supported mobile laboratory deployment, for onsite clinical diagnosis, to Lassa fever hotspots in Nigeria. Led by the Irrua Specialist Teaching Hospital, a local member institution, they also supported theoretical and practical training workshops on establishing mobile laboratories in Edo state.

- In the long term, both organisations will work to ensure that African regions are prepared to prevent, respond to, and minimise the impact of infectious disease outbreaks. This includes drafting data sharing principles which has the potential to advance wider scientific and public health aims.

Underpinning research

- PANDORA-ID-NET's work is focused on pathogens with epidemic potential. They use a multidisciplinary 'one health' approach, to address the potential for transmission of infection through animal and environmental reservoirs.

- The consortia have a large capacity strengthening component and aims to develop and enhance laboratory, public health and clinical trial capacities for the rapid investigation of outbreaks.

Evidence of impact

Policy documents
- Tackling infectious disease in sub-Saharan Africa' (2018), EDCTP, pp.64-65 for Accelerating research in emergency situations' and 'Boosting preparedness for infectious disease outbreaks' [Hyperlink]

Selected publications
- Zumla A, Dar O, Kock R, Muturi M, Ntoumi F, Kaleebu P, Eusebio M, Mfinanga S, Bates M, Mwaba P, Ansumana R, Khan M, Alagaili AN, Cotten M, Azhar EI, Maeurer M, Ippolito G, Petersen E. 'Taking forward a 'ONE HEALTH' approach for turning the tide against The Middle East Respiratory Syndrome Coronavirus and other zoonotic pathogens with epidemic potential', International Journal of infectious diseases (2016), 47:5-9. [Hyperlink]

- Iroezindu, MO, Unigwe, US, Okwara, CC, Ozoh, GA, Ndu, AC, Ohanu, ME, Nwoko, UO, Okoroafor, UW, Ejimudo, E, Tobin, EA, Asogun, DA. 'Lessons learnt from the management of a case of Lassa fever and follow-up of nosocomial primary contacts in Nigeria during Ebola virus disease outbreak in West Africa', Trop Med Int Health (2015), Nov;20(11):1424-1430. [Hyperlink]

Resources
- PANDORA Website [Hyperlink]

- Pan-African network for rapid research, response, relief and preparedness for infectious disease epidemics (UNZA-UCLMS) [Hyperlink]

- Research and clinical management of patients in PRD epidemics in sub-Saharan Africa (ERA Learn) [Hyperlink]

- ALERRT Website, information on data sharing draft principles [Hyperlink]

- EDCTP news article [Hyperlink]

- GLOPID-R website [Hyperlink]

Case Study 4: Redesigning tourism policy and practices in Africa
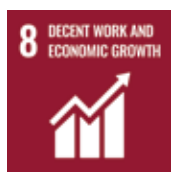
UK Researchers have changed national tourism policy and workforce training practices in African countries through identifying opportunities for developing capacity in the workforce.

Key Information

UK Funder: ESRC

Timeframe: 2007 - 2008

Total UK Funding: £69,840

Organisations: University of Brighton, World Bank, United Nations World Tourism Organisation (UNWTO)

Policy Influence: International

Africa has become one of the fastest growing destinations for tourism in the world. However, policy and planning have often been slow to respond to this change particularly in terms of human resource and challenges of development.

Towards impact

● As a result of the research team's document 'Capacity Building/Train-the-Trainers Programme' (2009) and previous work to re-evaluate Nigeria's Technical and Vocational Education and Training (TVET) schemes, in partnership with the Nigeria Board of Technical Education (NBTE) ('Leisure, Tourism and Hospitality Curriculum Review', 2004), a new national curriculum was introduced. This included industry and employment-centred leisure, tourism and hospitality teaching materials. NBTE conducted an evaluation of the material and concluded that impact had spread beyond Nigeria with further adoption in other Economic Community of West African States (ECOWAS) members.

● Governmental guidelines for ecotourism development were identified with a particular focus on 'Best Available Practices/Technologies' in relation to coastal tourism. The research group were part of a wider consortium who worked together in the development of the Collaborative Actions for Sustainable Tourism (COAST) initiative focused on the sub-Saharan coastline.

Underpinning research

- Focused on post-conflict and emerging economies, research findings showed that traditional approaches to tourism policy and strategic planning for human and physical resource were insufficient. However, the project demonstrated potential opportunities as well as challenges for the rapidly growing ecotourism and volunteer tourism sector. Overall, it revealed the importance of the development of a tourism network and peer-to-peer capacity building with the wider aim of developing the workforce and also alleviating poverty in the African continent.

- Researchers used a novel participatory methodology, Rapid Situation Analysis (RSA), which was used to generate knowledge on the ways in which tourism could contribute to local development. Specific activities included workshops, interviews, collaborative community mapping and public consultations. This showed the importance on focusing more on those who experience tourism as opposed to those who benefit from it.

- Above all, the research activities embedded local indigenous voices into the policy making process.

Evidence of impact

Policy documents:
- 'Leisure and Tourism Management National Diploma Curriculum and Course Specifications' (2004), National Board for Technical Education, UNESCO-Nigeria Project [Hyperlink]

Selected publications
- Burns, P. (1999) 'Paradoxes in planning: tourism elitism or brutalism?', Annals of Tourism Research, 26(2), pp.329-349.

- Clifton, J. and Benson, A.M. (2006) 'Planning for sustainable ecotourism: the case for research ecotourism in developing country destinations', Journal of Sustainable Tourism, 14(3), pp.238-254.

- Novelli, M., Morgan, N. and Nibigira, C., (2012) Tourism in a post-conflict situation of fragility. Annals of Tourism Research. 39(3), pp.1446-1469. [Hyperlink]

- Novelli, M., Schmitz, B and Spencer, T. (2006) 'Networks, clusters and innovation in tourism: a UK experience', Tourism Management, 27 (6), pp.1141-1152

Other resources
- COAST (2012) Quarterly newsletter, Edition 1, October 2012 [Hyperlink]

- COAST (2013) Third Quarterly newsletter, June 2013. [Hyperlink]

- KAZAURE (2012) Impact Evaluation Study of the UNESCO-Nigeria TVE Revitalisation Project [Hyperlink]

- COAST, 'Sustainable Coastal Tourism in Nigeria: Lessons from Badagry' [Hyperlink]

- REF Case Study [Hyperlink]