

Resource mobilisation
for Antimicrobial
Resistance (AMR):
Getting AMR into plans
and budgets of
government and
development partners

Nigeria country level report

Table of Contents

ABBREVIATIONS AND ACRONYMS	4
1. EXECUTIVE SUMMARY	6
i. Key entry point for AMR in human health	6
ii. Key entry point for AMR in animal health and environment	7
iii. Mobilizing resources for AMR.....	8
iv. Development partners and funders.....	9
2. CONTEXT AND BACKGROUND TO AMR IN NIGERIA	10
i. Development and coordination of the AMR National Action Plan in Nigeria	10
ii. Health sector structure for Nigeria	11
iii. Health policies.....	11
iv. Health policy planning at Federal Ministry of Health	12
v. Agriculture sector in Nigeria	14
vi. Current Policy measures towards Promoting Food Security in Nigeria.....	14
3. AIMS OF COUNTRY CASE STUDY FOR MOBILISING RESOURCES FOR AMR	17
KEY STAKEHOLDER INTERVIEWED IN NIGERIA	17
4. ENTRY POINTS FOR AMR INTO EXISTING PROGRAMS	25
Entry points of existing programs into the AMR NAP pillars	25
Pillar: Education and Awareness	25
Pillar: Surveillance system	26
Pillar: infection prevention and control	28
Pillar: Access to antibiotics and antimicrobial stewardship	30
Pillar: R&D	32
Mobilizing resource needs	32
HEALTH SECTOR STAKEHOLDERS.....	34
i. National Primary Health Care Development Agency (NPHCDA).....	34
ii. Family Health Division within the FMOH	35
iii. Hospital services	36
iv. Infection prevention and control.....	37
v. African Field Epidemiology Network– AFENET	37
vi. National TB program – Public Health division of FMOH	37
vii. Laboratory and surveillance aspects for AMR	38
Nigerian Centers for Disease Control and Prevention (NCDC).....	38
viii. Management of the pharmaceutical supply chain for antimicrobials and vaccines	40
Pharmaceutical services within Food and Drug Authority of the FMOH	40
National Agency for Food and Drug Administration and Control (NAFDAC)	40
Pharmacists Council of Nigeria (PCN).....	41
United Nations Children's Fund - UNICEF	41
ix. Research and Development (R&D)	41
AGRICULTURE SECTOR STAKEHOLDERS	43
i. Federal Ministry of Agriculture and Rural Development (FMARD)	43
ii. Veterinary Council Nigeria	43
iii. National Veterinary Research Institute (NVRI)	44
iv. Food and Agriculture Organisations (FAO)	44
v. Environmental aspects.....	44
5. DEVELOPMENT PARTNERS/ DONORS/ FUNDING FOR AMR WORK	46
Government Financing Of Health Services.....	46
i. Basic Health Care Fund provisions for programs which could directly or indirectly impact AMR	46
Development Partners Background.....	47
i. Department for International Development UK DFID	50

ii.	World Bank.....	50
iii.	United States Agency for International Development (USAID)	52
iv.	United Nations Children's Fund - UNICEF	52
v.	Bill and Melinda Gates Foundation	53
vi.	Global Fund	54
vii.	Japanese International Cooperation Agency	54
viii.	United States Ceneter for Disease Control (US CDC).....	55
ix.	Food and Agriculture Organisations (FAO)	55
ANNEXURE A: THE METHODOLOGY		56
ANNEXURE B: Stakeholders Interviewed.....		57
References		51

ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
AFENET	African Field Epidemiology Network
AIDS	Acquired Immunodeficiency Syndrome
AMR	Antimicrobial Resistance
AMS	Antimicrobial Surveillance
BMGF	Bill & Melinda Gates Foundation
CCS	Country Cooperation Strategy
CHAI	Clinton Health Access Initiative
CHW	Community Health Worker
CPD	Continuous Professional Development
CPS	Country Partnership Strategy
CSO	Civil Society Organization
DFID	Department for International Development
DTC	Drugs & Therapeutics Committee
ECOWAS	Economic Community of West African States
EDL	Essential Drugs List
FAO	Food and Agricultural Organization
FBO	Faith Based Organizations
FDS	Food and Drug Services
FMARD	Federal Ministry of Agriculture and Rural Development
FMEv	Federal Ministry of Environment
FMOH	Federal Ministry of Health
GDP	Gross Domestic Product
GLASS	Global Antimicrobial Resistance Surveillance System
GMP	Good Manufacturing Practices
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HAI	Healthcare associated infections
HIV	Human Immunodeficiency Virus
IDSR	Integrated Disease Surveillance And Response
IHR	International Health Regulations
IPC	Infection Prevention and Control
IMCI	Integrated Child and Maternal Initiative
JICA	Japanese International Cooperation Agency
LGA	Local Government Areas
M&E	Monitoring and Evaluation
NAFDAC	National Agency for Food and Drug Administration and Control
NAP	National Action Plan
NCDC	Nigerian Centers for Disease Control and Prevention
NESREA	National Environmental Standards and Regulation and Enforcement Agency
NFETP	Nigerian Field Epidemiology Training Programme
NGO	Non-Governmental Organization 4
NIPRID	Nigerian National Institute for Pharmaceutical Research and Development
NSHDP	National Strategic Health Development Plan
NSHIP	Nigerian State Health Investment Project
NPHCDA	National Primary Healthcare Development Agency
NVMA	Nigerian Veterinary Medical Association
NVRI	National Veterinary Research Institute
MDDC	Mega Drug Distribution Centres
MSLCN	Medical Science Laboratory Council of Nigeria
ODA	Official development assistance
OIE	World Organisation for Animal Health

PCN	Pharmacist Council of Nigeria
PHC	Primary Health Care
PPMVs	Patent and Proprietary Medicine Vendors
REDDISE	Regional Disease Surveillance Systems Enhancement
SDDC	State Drug Distribution Centres
SDG	Sustainable Development Goals
SPHDA	State PHC Development Agency
UHC	Universal Health Coverage
UNFPA	United National Population Fund
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
WASH	Water Sanitation and Hygiene
WBG	World Bank Group
WHO	World Health Organisation

1. EXECUTIVE SUMMARY

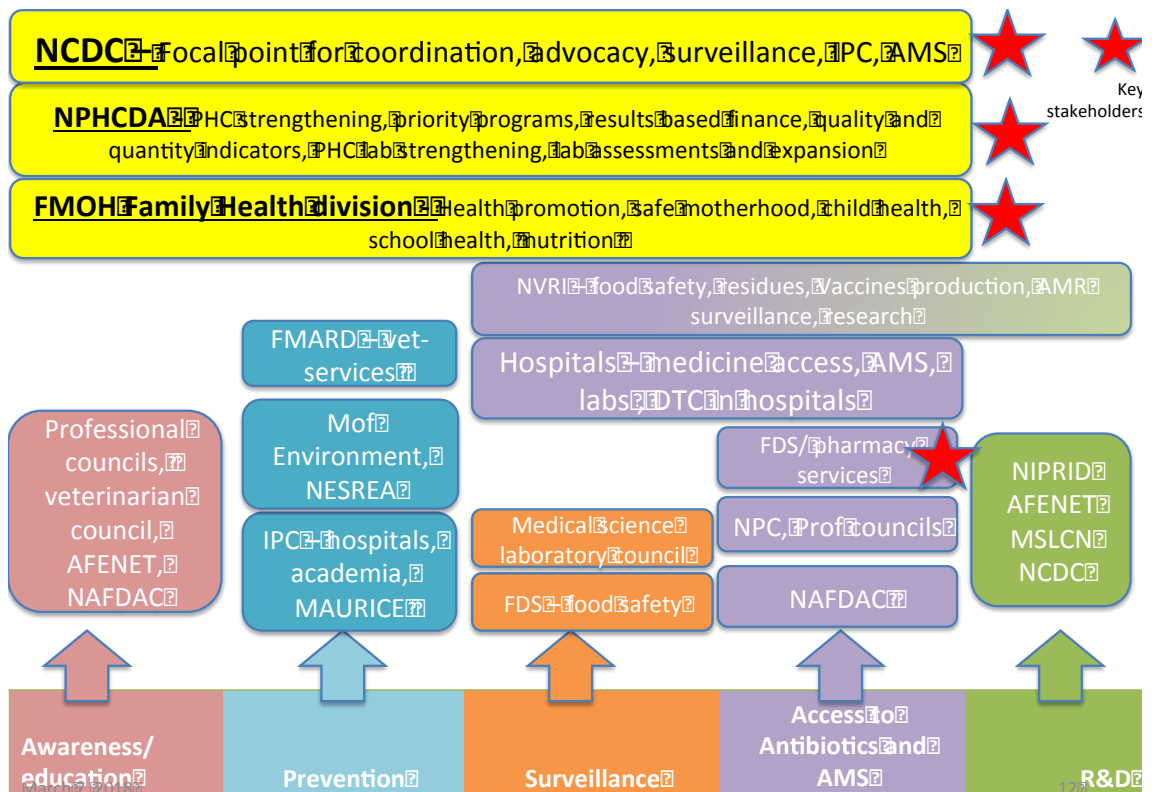
The most significant finding of the case study for integrating antimicrobial resistance (AMR) into existing programs and mobilising resources for funding in Nigeria, is that most of the AMR activities within the Nigerian National Action Plan (NAP) can already be incorporated within existing programs of the Federal Ministry of Health (FMOH), Federal Ministry of Agriculture and Rural Development (FMARD) and their agencies or institutes. Certain programs and initiatives already have an AMR element incorporated or could, with little effort, include some additional AMR actions, however much is already being planned and has started with existing federal funding and existing staffing and other resources including development partner support and is being driven by significant political will from the ministries as well as implementation support from the Nigerian Centers for Disease Control as the focal point.

i. Key entry point for AMR in human health

From a programmatic point of view, proposed AMR activities in the NAP align naturally with some existing programs, which are also priorities of the FMOH and the Nigerian Health Policy. The key stakeholders who should be engaged with to mobilise more AMR actions are also found within these programs as follows (see diagram below):

- Nigerian Centers for Disease Control (NCDC) as the AMR focal point for collaborative efforts to develop the NAP and implementation plans and the key implementation agency for surveillance and infection prevention and control. Much development partner support is already being channelled through them as the key implementation unit and they coordinate the One Health stakeholders activities.
- The National Primary Health Care Development Agency (NPHCDA) through its PHC revitalisation programs, mother and child health and Nigerian State Health Investment Project pay for performance funding initiatives;
- Reproductive, mother, neonatal, child and adolescent health within the family health division of the FMOH in particular the safe motherhood, child health, nutrition, health promotion sub programs focused on school health and water, sanitation and hygiene awareness and education activities and through their education of healthcare workers as part of safe motherhood and child health clinical protocols;
- Food and Drug Services (FDS) through their medicine distribution programs and guidelines and their link with the Pharmacists Council of Nigeria and National Agency for Food and Drug Administration and Control who are registering and controlling the access to antimicrobials in the country.

Figure 1 Key stakeholders for AMR activities against the 5 pillars of the NAP



Other important health stakeholders and programs include:

- Hospital services within the FMOH who are responsible for medicine access, the stewardship of AMR at facility level through the hospital Drugs and Therapeutics Committees (DTC) and the functioning of the hospital laboratories;
- Pharmaceutical supply chain management and drug distribution networks control and regulation through National Agency for Food and Drug Administration and Control (NAFDAC), Pharmacists Council of Nigeria (PCN) and the Food and Drug Services of FMOH;
- Education and awareness activities conducted specifically for AMR within the various health professional councils, African Field Epidemiology Network (AFENET) and NAFDAC also plays a key role.
- Research and development into AMR organisms, new products, and indigenous medicines which is being conducted by Nigerian National Institute for Pharmaceutical Research and Development (NIPRID) and National Veterinary Research Institute (NVRI), Medical Sciences Laboratory Council (MSLCN), AFENET and NCDC.

ii. Key entry point for AMR in animal health and environment

On the agriculture side, there is less awareness and focus on AMR as the policy of the country focuses on crop production and intensification rather than livestock. However due to the significant intensification of production within the poultry, fishing and cattle industries, AMR is becoming an issue of concern although very little resources are available within the Federal Ministry of Agriculture and Rural Development (FMARD) to take significant actions. The key animal health stakeholders who are driving aspects of AMR which need to be prioritised are:

- Veterinary Council of Nigeria and NAFDAC who is focused on education and awareness activities for veterinarians, Para veterinarians and farmers;

- Animal public health prevention, vaccination and biosecurity initiatives through the FMARD veterinarian services and NVRI in terms of provision of vaccines;
- National Environmental Standards and Regulation and Enforcement Agency (NESREA) who has environmental and waste standards which are regulated and inspected on farms and in pharmaceutical companies which contain significant aspects of AMR work;
- AMR surveillance is being conducted in a number of places including state veterinary laboratories for poultry, laboratories within the veterinarian teaching hospitals (9), NVRI's national reference laboratories, private laboratories and then other surveillance is being conducted at NVRI for food safety, residues, vaccine production and effectiveness; and
- Research and development into vaccines and the production of them within the Nigerian Veterinary Research Institute.

iii. Mobilizing resources for AMR

Funding of most of the programs identified as important entry points for AMR are from existing government funds and despite the inadequate release of funds, many programs appear to be able to deliver to the capacity of the existing resources although they may not provide full coverage across the country.

Therefore government funding can be utilized to some degree to support AMS sensitive programs such as:

- awareness through the school health, mother and child health programs,
- IPC through NCDC support and family health and vaccination and hygiene through mother and child health,
- surveillance through the NCDC and its grants and development partners funds
- research and development through the existing agencies involved.

This funding would allow existing coverage to be continued but might not necessarily allow for expansion of coverage of these programs across the country.

There are however AMR sensitive activities where additional funding should be sought to start off new activities and improve AMR specific interventions and these include:

- Provision of vaccinations to prevent communicable diseases once Nigeria graduates to middle income status with GAVI. This will have a substantial impact on the health budget and funding will need to be identified that is sustainable.
- An infection prevention and control implementation program would need to be funded and established once the manual and training curriculum has been completed;
- AMS activities within hospitals would need to be a new funded program with the development of guidelines, tools and implementation model and then rolled out into hospitals through their Drugs and Therapeutics Committees.
- In Veterinary service, funding appears to be severely deficient and many programs are not being driven due to lack of funds and technical expertise within the FMARD. They would therefore require significant amount of support to develop a surveillance system and programs for AMR.
- Medical Science Laboratory Council –funding for the development of laboratory registration standards for quality assurance and antibiotic susceptibility testing and expansion into animal health laboratories in a standardised One-Health approached regulatory framework and to allow them to increase their enforcement and inspection capacity for more laboratories; and Pharmacist Council of Nigeria (PCN) program on Mega Warehouses requires significant funding and resources.

In order to gather more political buy in and ensure that AMR is not seen as a new vertical program, the Nigerian NAP implementation plan section could be reviewed in order to demonstrate how AMR actions can be or are already incorporated into the current policy initiatives and plans and extract out the AMR specific interventions that need to occur. Suggestions have been provided below each AMR pillar in the sections of this report.

iv. Development partners and funders

Most development partners are planning to or are working towards less clinical technical assistance in Nigeria and are working towards more quality assistance and quality improvement roles alongside health system strengthening and performance based financing support programs and sustainability type of projects.

In general most development partners were not aware of AMR and its significance on the international agenda nor in Nigeria, however many of them could identify where AMR components would fit within their existing programs (mainly mother and child health or PHC revitalisation) with minimal resources needed. A few key development partners (Department for International Development - DFID, World Bank, United Nations International Children's Emergency Fund, Bill and Melinda Gates) are reviewing their next period funding strategies and this would be a great opportunity to include and integrate AMR to augment the activities within the FMOH.

The only development partners with significant in country, field level support are UNICEF, the World Bank and DFID through their specific programs and hence they would appear to be the most important for driving AMR activities down to facility level as their networks already exist and are extensive.

There are a number of development partners involved in laboratory strengthening and surveillance systems. Most are focused on laboratory infrastructure, equipment and staff capacity and skill. Much support is being channelled through NCDC as the key program implementation unit.

2. CONTEXT AND BACKGROUND TO AMR IN NIGERIA

Nigeria is a federation of 36 states and the Federal Capital Territory (FCT) that is the most populous country on the African continent with an estimated population of 182 million people, of which the majority are young. Poverty remains the major contributor to the worsening health status of Nigerians with diseases such as tuberculosis, respiratory infections and diarrheal disease, HIV, malaria, bacteraemia and meningitis leading causes of infectious disease morbidity and mortality.

Globally, antimicrobial resistance (AMR) has become a well-recognised public health threat in the recent years and interventions to reduce its burden have been launched worldwide. Like many countries, Nigeria is no exception to the challenges faced due to AMR. The emergence of multidrug-resistant organisms that have led to increased mortality and economic burden has increased almost exponentially.

The budgetary allocation for health is still below the 15% agreed to by the Nigerian government in the 2001 Abuja declaration by African Union countries. Primary health care, the bedrock of the national health system, is insufficiently equipped to meet most Nigerian's needs. Hospitals are under-provisioned and overstretched. The poor tend to use informal sector providers, many of whom provide lower quality services. Thus OOP spending for healthcare services in Nigeria is among the highest in the world.

According to Nigeria's legislation, antimicrobials and other antibacterial should only be dispensed with prescription. However, a combination of factors ranging from a shortage of licensed prescribers, pharmacies and access to quality medicines in some areas, to proliferation of under-regulated patent medicine vendor, drug markets and hawkers in others, means that Nigeria suffers severe access problems whilst simultaneously facing a crisis of irrational drug use. Drug misuse extends to the agricultural sector where antimicrobials are liberally used therapeutically and for growth promotion. All of these drug-use problems are exacerbating resistance and complicating infectious disease management.

i. **Development and coordination of the AMR National Action Plan in Nigeria**

Nigeria's Minister of Health committed to the development of a National Action Plan (NAP) in May 2016 at the World health Assembly meeting. Work was started in January 2017, through an AMR technical working group under the stewardship of the Nigerian Center for Disease Control (NCDC) that was appointed by the minister as the AMR coordination entity. Work was started immediately by NCDC to understand who the key stakeholders in AMR in the country where and the technical working group formed subsequently focused on the outline of a road map for AMR including development of the situation analysis and NAP with the support of a coordinator from the Global Antibiotic Resistance Partnership¹. The Situation Analysis and National Action Plan were published in May 2017 in time for the World Health Assembly meeting.

The coordination functions of NCDC continue for the country through their leadership of the AMR technical working group which manages the network of advocacy and policy experts on AMR and is currently focused on implementation planning and prioritization alongside their specific roles for implementation activities as described under section xxx.

¹ Global Antibiotic Resistance Partnership (GARP) is an AMR program run by the Center for Disease Dynamics, Economics & Policy which is Bill and Melinda Gates Foundation funded.

ii. Health sector structure for Nigeria

As Nigeria is a Federal Republic and the governance structure for health consists of 36 states, 774 Local Governments and the Federal Government. All three areas have responsibility for health, as a concurrent function within their constitution. This means that policies at the Federal level are not necessarily implemented at the sub-national level unless the sub-national government is interested. To compound this problem, there is legislation to ensure that Federal grants to the States cannot be earmarked in any way, not even for health, medicines or specific health related programs. Again, limiting the ability of the Federal government to ensure the implementation and resourcing of any health plan at the state level.

iii. Health policies

The 2016 National Health Policy of Nigeria¹ was published in September 2016 shortly after the enactment of the first National Health Act 2014 for the country and at a time when there was global re-commitment to a new development framework, the Sustainable Development Goals (SDGs), and an increasing global support for the attainment of Universal Health Coverage (UHC). It was also reviewed in light of emergency health challenges yet there is no mention of AMR in the document. It also aligns with Vision 20:2020 which proposes to enhance access to quality and affordable health care through the establishment of at least one general hospital in each of the 774 Local Government Areas (LGAs) and so doing stimulate economic growth and development.

In Nigeria the efforts of government as reflected in their National Health Policy are focused on achieving UHC and sustainable health development, through the strengthening of Primary Health Care (PHC) and providing access to suitable financial risk protection mechanisms. More specifically the strategic areas include:

- Revitalization of Primary Health Care (PHC) specifically for vulnerable groups of mothers and children and governance reform. This is further developed in programs such as “Bringing PHC Under One Roof” and Save One Million Lives initiative². Another key project in integration of PHC systems through reduction of fragmentation of government institutions responsible for the funding, governance and leadership of PHC is the Nigerian State Health Investment Project (NSHIP) run by the World Bank³;
- Renewed commitment to and expansion of the insurance base as part of the National Health Insurance Scheme (NHIS) to expand NHIS to informal sector, Federal Government workers and to more states in the country. This aims to achieve less out-of-pocket expenditure by Nigerians, improve efficiency, access and quality of care and make health care services and goods affordable.

The National Health Policy 2016 has key priority programs that include:

- reproductive, mother, neonatal, child and adolescent health linking into the SDG for reducing infant and maternal mortality of which vaccine preventable diseases as well as other communicable diseases and sepsis are still the leading causes;
- public health emergency preparedness and response;
- The prevention and control of communicable diseases including the routine immunization program expansion⁴.

An additional health –related problem, namely food safety aims to reduce food borne diseases amongst the general population, however the linkage into animal health and livestock production is not made nor is the issue of AMR in food considered.

Key objectives of the communicable diseases programs is to expand routine immunization to achieve 90% coverage rates by 2020 and the reduce malaria, polio, HIV, TB and neglected tropical diseases. Resistance for the key communicable disease is not mentioned besides TB

and access to medicines for treatment is only referred to in relation to vaccines. However AMR and specifically antibiotic and antifungal resistance is a critical part of the management of those key communicable diseases and this may be a good entry point for AMR specific activities.

AMR should also be positioned adequately within public health emergency preparedness and response programme and integrated into the International Health Regulations framework.

Access and availability of medicines in general is not discussed in the National Health Policy however the National Products Supply Chain Management Programme (2016)⁵ outlines all aspects of the product supply chain from access, selection to procurement and distribution. This Programme which falls under the Department of Food and Drug Services of the Federal Ministry of Health (FMOH), was set up to coordinate all activities related to the supply of medicines and other health products of the FMOH.

The National Drug Distribution Guidelines⁶ were introduced in 2010 by the FMOH in order to tackle the uncoordinated drug distribution within the country. Under these Guidelines, state-run State Drug Distribution Centres (SDDCs) and private sector Mega Drug Distribution Centres (MDDCs) will be established in order to control for drug delivery and quality of drugs within every level of health care delivery. These centres will propose to limit drugs sold in the open market by requiring manufacturers and importers to channel manufacturing and imports only through SDDCs and MDDCs.

Nigeria has made appreciable progress in improving her capacity for local manufacturing of medicines and health commodities as four Nigerian pharmaceutical companies have received WHO certification for Good Manufacturing Practice (GMP).⁷

Quality of public sector health facilities is monitored by State Ministries of Health who issue licenses but currently there is no requirement for the private sector to have to comply. NHIS requires health facilities to obtain a certificate of standards but requirements for the certificate are not specified in the act and regulations haven't been passed as yet. These standards are prescribed by the National Council on Health and monitored and enforced by the National Tertiary Health Institutions Standards Committee.

These programs are funded through the Government budget of which the Federal Ministry of Health had a budget of 10 billion Naira to fulfil all these functions.

iv. Health policy planning at Federal Ministry of Health

The first National Strategic Health Development Plan (NSHDP) ran from 2010-2015, but was extended by another year, as the next one was not ready. However implementation was low. The new plan is now in its 3rd stage of development and contains 5 pillars:

1. Promote an enabling environment for attainment of sector goals
2. Equitably Increase coverage with packages of quality essential health care services
3. Strengthen health system for delivery of packages of essential health care services
4. Improve protection for health emergencies and risks
5. Enhance healthcare financial risk protection

There are fifteen priority areas within these 5 pillars and AMR is included in priority area 11: medicines vaccines and other commodities and supplies, which falls under Pillar 3 and is domiciled in the food and drugs department of the ministry. Uninformed drug use leading to

increasing prevalence of antimicrobial resistance was seen among other challenges that impede health products management practices and the health commodities supply chain in the country. The target for interventions in the NSHDP is to increase public awareness and understanding of antimicrobial resistance by 50%, through effective communication, education and training by 2020. This reflects the strategic objective 1 of Nigeria AMR NAP. Furthermore, the activities under this intervention also aim to strengthen AMR surveillance, promote rational use of drugs and antimicrobial stewardship in hospitals.

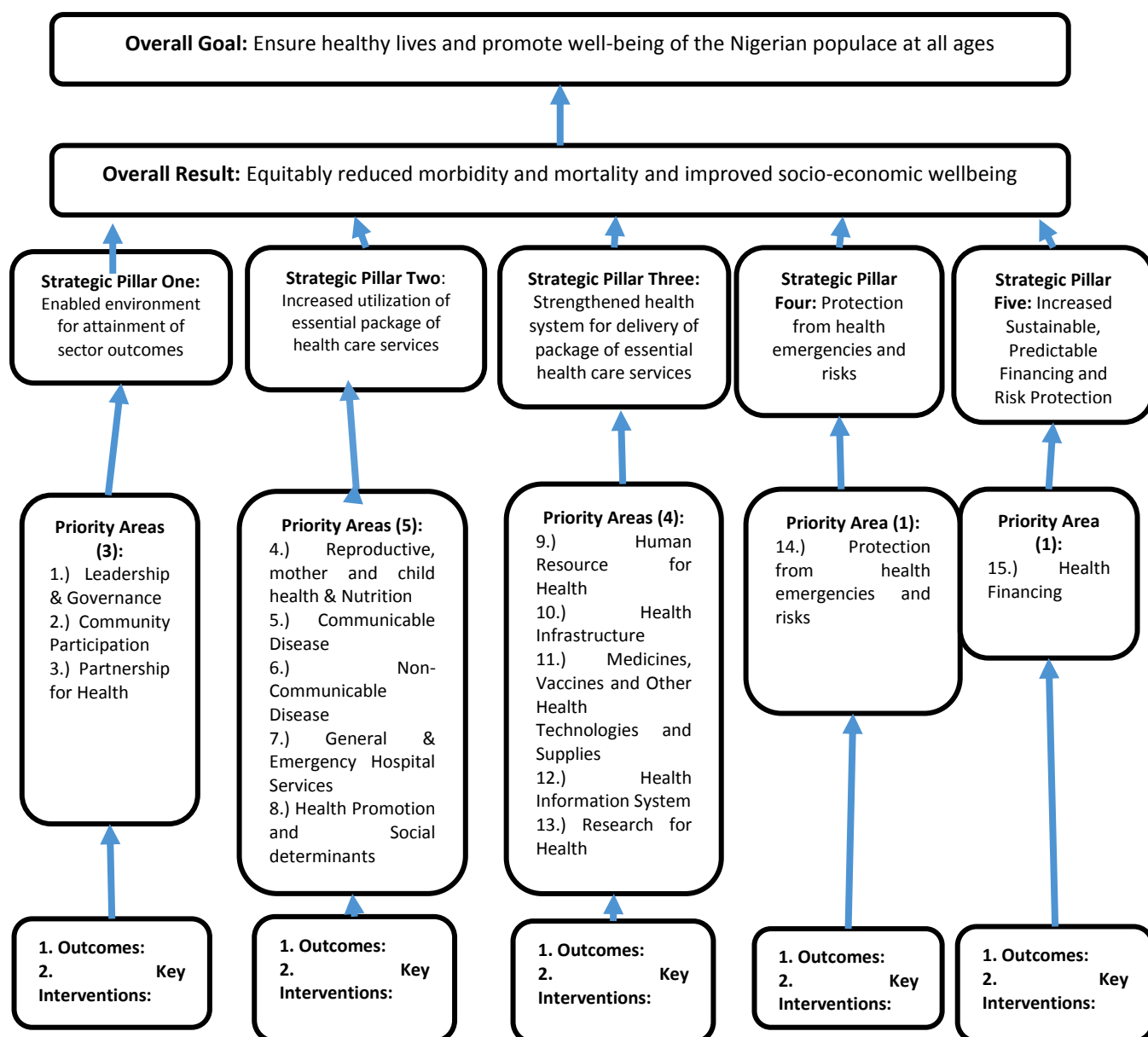
The new plan, NSHDP II from 2017 onwards, has been developed through 3 stages

1. Input from states and agencies which involved consultation with states, academia and Civil societies to agree the framework and priorities
2. Agencies and states then use the framework to develop and cost their own strategic plans.
3. It is currently at the third stage, where these agencies and state plans are being pulled together, harmonised and costed towards developing a budget.

It is not yet certain which of the pillars would incur the largest fund, as there isn't a defined budget as the plan is yet to be costed. In an instance where a particular priority area needs increased budget, it is subject to review and policy discussion by stakeholders. The NSHDP II is an improvement on the first plan with more priority areas and activities that will require increased funding. There is no known shift in program funding as the plan is majorly funded from the Government's yearly budget and by development and investment partners. Due to financial constraints, the working group couldn't complete the process of developing the plan by the June 2017 deadline before the 2018 budget was submitted to the National assembly. It is believed that when the plan is completely developed, provisions for part funding of activities would come from the Ministry's supplementary budget and also from development partners (DPs) as some interventions identified in the plan are already being undertaken by the ministry and development partners. The plan is to be completed by the end of January 2018. Thereafter there will be a wider stakeholder review of the plan through a process called the "Joint Assessment of National strategy" which is run like a special meeting of the National Council on Health. Then it will go to the Federal and National Executive Council for approval and budget allocation.

The development partners currently supporting the development of the plan include World Health Organisation (WHO), United Nations International Children's Emergency Fund (UNICEF), Department for International Development (DFID), European Union, Japanese International Cooperation Agency (JICA), Bill & Melinda Gates Foundation (BMGF). Co ordination of the health sector plan occurs via the Health Partners Co Ordination Committee that is supported by the department of planning in FMOH and contains a sub group for the development partners. In order to drive AMR activities it may be appropriate to have a six monthly or annual review of process on AMR at this this committee.

Figure 3: The Results Framework of the NSHDP II



v. Agriculture sector in Nigeria

The Federal Ministry of Agriculture and Rural Development's (FMARD) core business is agriculture and food security. There is a renewed emphasis on the transformation of the agricultural sector, such that it grows into a vibrant, resilient and productive national economy. With Nigeria projected to become the third most populated country in the world by 2050 (UN Food Programme), ensuring food security and reducing poverty and malnutrition are also imperative⁸.

vi. Current Policy measures towards Promoting Food Security in Nigeria

The FMARD's first major step is the promotion of a culture of "eating what Nigeria grows and growing what Nigeria eats". Numerous development partners (DFID, World Bank Group (WBG), BMGF) are supporting growth in local crop production. In addition fiscal policies include taxes on imported food such as rice and sugar to encourage local production and consumption.

The second major step is a new policy direction for the agricultural sector, as outlined in the “Agriculture Promotion Policy 2016-2020 - also known as the ‘Green Alternative’”⁹.

Of particular importance is the need to improve food availability, access, utilization and stability in the country. Within the Policy are 10 distinct areas which constitute the priority areas of intervention and sustained support by government in the agricultural sector in the coming years. Priority areas where AMR related aspects may be aligned include:

a. Comprehensive livestock development

This is specifically focused on chicken, fish, cattle and dairy production across the entire value chain. Improvements are being directed towards the indiscriminate use of veterinary medicines, fertilizers, herbicides, pesticides and improvement in poor agricultural practices, which can result in biological contamination of foods with moulds, viruses, parasites, prions, and bacteria. Cattle farming is being transformed from nomadic herdsman network to cattle ranches with processes and inputs to improve the extraction of higher value in the form of dairy, meat and leather.

The main policies that are being planned into which AMR interventions or initiatives need to be aligned include:

- Policy to conduct regular, methodology driven livestock surveys and census for evidence based decision making;
- Policy to enhance availability of improved breeds, access to finance and information about improved production methods, markets and prices
- Policy to enhance resistance breeding; promote availability of pest and disease control services, and enhance livestock identification and traceability; zoning and compartmentalization of livestock; disease surveillance system; quarantine services; facilitation of nationwide livestock census;
- Policies to incentivize set-up of modern ranching, abattoir and processing system
- Systems to enhance access to information and knowledge on pest disease and production quality and standards for farmers and vets,

The FMARD is intensifying the promotion and development of fisheries and aquaculture including promoting a freshwater and marine water fish breeding and the utilization of the available dams in the country for intensive fish production. (DFID). The main policy thrusts into which AMR interventions or initiatives need to be aligned include:

- Policy to enhance fish breeding; promote availability of pest and disease control services, and enhance traceability;
- Policy to make fishery/aquaculture inputs available by promoting hatchery development and the standardization of hatchery and fish breeding processes;
- Policy to re-enforce the regulatory framework for fishing activities

b. Agricultural education, research and innovation

The Federal Universities of Agriculture are being reconstituted within the FMARD and positioned to take the lead into solutions to improve the quality of food, food security and safety and improve the countries health status. There is prioritization of agriculture research by the constitution and the Federal Government. Many policies are focusing on food security, import substitution, and job creation and empowering the various agencies to expand their research into these new fields.

c. Water systems and irrigation

Water has been identified within the policy as critical to enhancing agriculture and quality clean water is important for food processing and human health. In terms of policy thrusts

there is only mention of raising awareness on water quality and disease prevention and no detail on antimicrobial residues or micro organisms.

d. Pest and disease control

Pest and disease control is critical for incomes in the crop, livestock and fisheries subsectors and important for human health. Indiscriminate use of agricultural inputs such as fertilizers, herbicides, pesticides, and veterinary medicines, often leads to contamination of food with chemical hazards and poor disease containment and control mechanisms impact on production outputs. However policy thrusts focus on agrochemicals and pesticides only although they do mention testing for agrochemical and pesticide residues in meat but no mention of antimicrobials or AMR organism.

e. Food and nutrition security

Aspects include quality of food and its safety (residues of agrochemicals), food security in terms of adequacy to sustain good health and creating awareness of good eating behaviours. Policy focus areas include awareness about nutritious foods, standard systems for food safety inspections, origin tracking and nutrition labelling.

The third major step is the improvement in the sectors ability to access finance through alternative sources than bank loans.

3. AIMS OF COUNTRY CASE STUDY FOR MOBILISING RESOURCES FOR AMR

With Nigeria having completed the Situation Analysis and National Action Plans on AMR in 2017 (zero draft was prepared by May 2017), the time is upon them to determine the way in which these actions will be implemented and the resources and support they will need to take these actions further. However AMR cannot be positioned as another silo program and it will be necessary to leverage resources from within exiting ministerial and development partner programs, strategic plans and budgets to achieve implementation.

The overall **objectives** of the work conducted in Nigeria on enhancing investment in AMR are:

1. To assist teams working on antimicrobial resistance (AMR) in Nigeria to explore the scope to scale up delivery of AMR activities through identification of entry points within existing programmes and projects and those that are under development.
2. To identify any funders with a real interest in funding AMR related work
3. To understand how development partners view efforts to mobilise resources for AMR in the country i.e. what is most likely to persuade them to engage with the AMR agenda

This is the country report that reflects the work undertaken and provides guidance on the next steps in terms of scaling up activities in AMR through identification of entry points and how to respond to resource mobilization opportunities and the key funders or potential funders to engage with and next steps in relation to these.

KEY STAKEHOLDER INTERVIEWED IN NIGERIA

Table below describes the key documents and stakeholders interviewed:
A full list of the people interviewed is included in the annexure B

Table 1 - Key stakeholders

Animal health	Human health	Environment
<ol style="list-style-type: none"> 1. Federal Ministry of Agriculture and rural development (FMARD) <ol style="list-style-type: none"> 1. Chief Veterinary Officer 2. AMR Focal point 3. Department of Veterinary & Pest Control Services 2. National Veterinary Research Institute (NVRI) – laboratories, vaccines production, research, funding 3. National agency for food and drug administration and control (NAFDAC) – Veterinary Medicines and Allied Products directorate 4. Veterinary Council of Nigeria (VCN) 5. Nigerian National Institute for Pharmaceutical Research and Development (NIPRID) (human 	<ol style="list-style-type: none"> 1. Federal Ministry of Health: <ol style="list-style-type: none"> i. AMR Focal point ii. Department of pharmaceutical services iii. Department of Hospital Services iv. Department of Public Health (TB, Malaria, IPC, National Malaria Elimination Programme) v. Department of Health promotion vi. Department of Family Health vii. Department of Planning and Policy viii. IPC 2. House Committee on Health – deputy chair 3. National agency for food and drug 	<ol style="list-style-type: none"> 1. Federal Ministry of environment AMR Focal point 2. National Environmental Standards and Regulation and Enforcement Agency (NESREA)

and animal)	administration and control (NAFDAC) 4. National Primary Health Care Development Agency (NPHCDA) 5. Pharmacists council of Nigeria (PCN) 6. Medical and Dental council of Nigeria (MDCN)	
FUNDERS – Animal health	FUNDERS – Human Health	FUNDERS –Environment
1. FAO 2. World Bank 3. ECOWAS	1. Nigerian CDC – funder and laboratories/surveillance 2. WHO 3. World Bank 4. JICA 5. UNICEF 6. African Union	1. World bank

4. ENTRY POINTS FOR AMR INTO EXISTING PROGRAMS

Entry points of existing programs into the AMR NAP pillars

Based on all the interviews described in the following sections, entry points for AMR have been identified and mapped against the 5 pillars of the Nigerian AMR NAP. The tables below graphically illustrate these entry points including who the key stakeholders are.

Pillar: Education and Awareness

Significant amount of work is currently undertaken by various divisions in terms of education and awareness, not only for the public but also of the healthcare workers. Specifically, extensive work is done on public awareness within households, public places, businesses and school children on hand hygiene, WASH aspects, how to access health facilities and information on mother and child health. These are already important aspects for AMR and are currently funded and provided by NPHCDA and by Family Health division. Interestingly NESREA and NAFDAC also have avenues for awareness, which should be tapped into. Additional funding would increase the scope and coverage of these services in the community and healthcare facilities.

In terms of education where AMR may be one component, this is focused on mother and child health and protocols via Family Health and NPHCDA. There is also education on mother and child health clinical care for healthcare workers from all disciplines by Family Health and within NPHCDA's train the trainer programs. These all present opportunities for entry of AMR into the mother and child health clinical care and education training programs and the continued use of the existing NPHCDA and Family Health divisions as the delivery vehicles for the training.

There is need for review of the AMR content in the curriculum of the professionals and allied professionals in the tripartite sector

In animal health there is some awareness and education activities being driven within the Veterinary Council mainly for the professionals although it is extended to Para vets and farmers. These would need to be strengthened in order to have a greater impact across the profession and stakeholders.

Funding would be required as follows:

- To expand the scope and coverage for public awareness and school health activities
- To flight a TV national program on AMR
- To expand the scope and coverage for health care worker education on AMR within mother and child health
- Develop and expand awareness and education activities in veterinarian services

These entry points could therefore be reflected in the AMR NAP as follows:

- Strengthen existing public awareness and school health activities incorporating WASH and hand washing through existing programs within NPHCDA and Family health and by adapting programs within NESREA
- Develop a public awareness national television campaign and integrate it within the existing NAFDAC TV programs and channels
- Incorporate AMR clinical activities and prescribing competencies into the education (train the trainer) programs within Mother and Child health which are provided by Family Health and NPHCDA
- Further develop awareness and education activities within veterinarian services and expand to Para veterinarians and farmers
- High level advocacy to policy makers to understand the importance of entry point for AMR into existing programs (already in NAP) and increasing budgetary allocations for AMR activities

Table 2 -AMR entry points for Pillar Awareness and Education

Awareness		Education	
Strategic objective	Org/institution/DP	Strategic objective	Org/institution/DP
Public awareness	NAFDAC TV program on medicines On improved Access to facilities - Health promotion (family health) On improved Access to facilities NSHIP (NPHCDA) Health promotion (NPHCDA) Mothers health – IMCI (NPHCDA) Hygiene – markets, households NESREA	Public education	WASH outbreaks only (family health) Mothers health TTT – ICMI (NPHCDA)
School children	Nutrition (family health) Peer to peer school health (family health) School health – IMCI (NPHCDA)	School children	Peer to peer school health (family health)
healthcare workers	Community workers (Child health) family Health)	healthcare workers	CPD Pharmacists, PPMV (PCN) Doctor CPD (Medical & Dental Council) Community workers (Child health) family Health) skilled birth attendants- Safe motherhood (Family health) Doctors, nurses, CHW - Safe motherhood (Family health) Management, financial, stock management training - NSHIP (NPHCDA) HIV, TB Train the trainer (NPHCDA) Laboratory scientists on AST, Micro QA - MSLC
Veterinarians and para vets	Veterinary council of Nigeria NVRI – extension workers??	Veterinarians and para vets	Veterinary council of Nigeria
Farmers	Veterinary council of Nigeria	Farmers	Veterinary council of Nigeria

Legend:

Government	Agencies	Regulators	Professional Councils	DP	Other
------------	----------	------------	-----------------------	----	-------

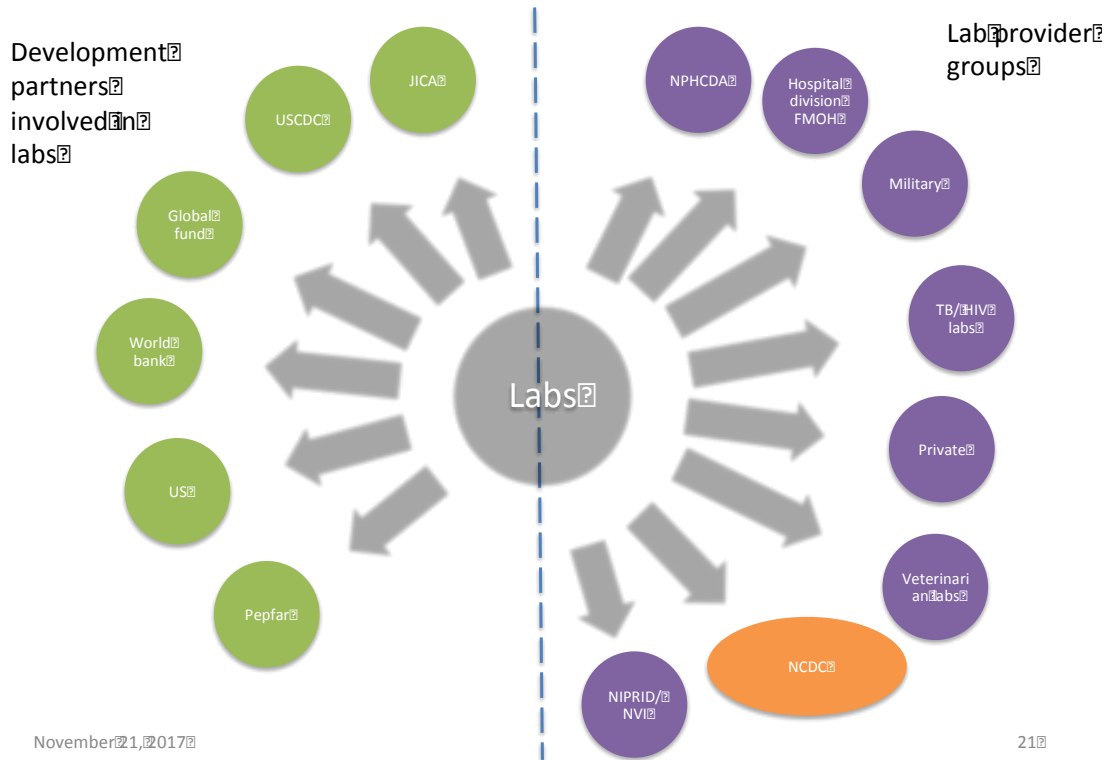
Pillar: Surveillance system

There are multiple stakeholders who are involved in either laboratory strengthening or in AMR surveillance in Nigeria. The figure below is a depiction of the existing stakeholders and demonstrates that there are numerous laboratories falling under various directorates and agencies, performing different types of testing.

The existing laboratory infrastructure, human resources and capacity should be leveraged where possible to create an expanded laboratory services for AMR and could be taken into account when the national AMR surveillance program is developed. In addition the incorporation of the PHC laboratory services may be very significant in supporting clinical diagnostics at the bedside and

informing treatment guidelines for community acquired infections as part of the national surveillance program.

Figure 2 - Laboratory surveillance stakeholders



In addition the Medical Laboratory Science Council of Nigeria (MLSCN) should be called upon to develop standards for laboratory scientists in all laboratories (human and animal) to perform microbiology testing and quality assurance and then they should be asked to train and capacitate the existing staff to these standards.

A significant gap is that no departments or agencies or partners have considered the establishment of a laboratory information system that could harness the existing laboratory testing data occurring into a single database for surveillance and help inform the establishment of the surveillance system. Also not much activity is currently underway to strengthen diagnostic capabilities within hospitals where laboratory tests should be used to support antimicrobial stewardship activities on the ground. In addition, a one-health approach should be taken, in that the veterinary laboratories appear to be of high quality and have reference laboratories in most zones however their capacity may not be considered for integration of laboratory services for AMR.

Additional funds are needed to:

- Ensure clinical diagnostic laboratory capacity at health facility level
- Development of laboratory scientists and laboratory registration standards for quality assurance and antibiotic susceptibility testing,
- To increase the enforcement and inspection capacity of the MLSCN and expand to include animal health laboratories in a single regulatory framework

These entry points could therefore be reflected in the AMR NAP as follows:

- Access the capacity of the microbiology and quality assurance system for the existing laboratories within hospitals, NCDC, PHC's, TB laboratories, military and private laboratories

- Determine key sentinel sites for laboratory surveillance and capacitate laboratories to provide this service
- Establish a laboratory information system to collect all surveillance results electronically
- Assess the capacity for microbiology and quality assurance system for the existing laboratories within veterinarian laboratories
- Determine feasibility of incorporation of animal and human AMR surveillance

Table 3 - AMR entry points for pillar Surveillance

Laboratory capacity		AMR surveillance	
Strategic objective	Org/institution/DP	Strategic objective	Org/institution/DP
Human laboratories for AMR	NCDC, NPHCDA (PHC), National TB laboratories, NIPRID, Hospital medical laboratories, MSLC NAFDAC _ bioequivalence	AMR surveillance	NPHCDA – infectious diseases and towards comprehensive microbiology NCDC NIPRID – respiratory diseases TB laboratories – TB surveillance Hospitals medical laboratories - AMS
Animal Laboratories for AMR	NVRI- food safety laboratory, residues and AMR NVC – AMR laboratories	AMR surveillance	NVRI- food safety laboratory, residues and AMR NVC – AMR laboratories
Registration of laboratory scientists, qualification standards and CPD	Medical Laboratory Science Council		
Registration of laboratory standards against	Medical Laboratory Science Council		

Legend:



Pillar: infection prevention and control

As with the awareness/education pillar, significant activities are already occurring within various divisions to improve WASH, hand hygiene practices both within the community, school children and healthcare workers in facilities. Again the Family Health division, UNICEF and NPHCDA are playing a key role here along with NESREA and the Ministry of Environment who supports the public on hand washing practices and equipment.

NESREA is a key player in terms of standards for sanitation, waste and food safety and inspecting against these standards. They also inspect farms, abattoirs and would be a key stakeholder to work within the incorporation of prevention aspects for AMR into their existing inspection plans. They also have extensive information on compliance that may be used as indicators for progress in prevention for Nigeria.

Infection prevention and control (IPC) is not a substantive program except for mother and child health (again supported by the Family Health division). NSHIP has IPC criteria that PHC should meet and these may be expanded to incorporate hospitals. Immunizations are substantially covered through NPHCDA, UNICEF and child health although coverage and uptake should be improved. Nigeria will be graduating to middle income status and no longer qualify from GAVI vaccine provision - therefore the funding for these vaccinations in the future will be substantial cost.

NCDC in partnership with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) is supporting the drafting of IPC policy and training materials for the country which will address the concerns raised in the Joint External Evaluation and provide for the new cadre of health care workers as IPC practitioners.

Additional funding needed:

- Provision of vaccinations to prevent communicable diseases once Nigeria graduates to middle income status with GAVI. This will have a substantial impact on the health budget and funding will need to be identified that is sustainable.
- An IPC implementation program would need to be funded and established once the manual and training curriculum has been completed

These entry points could therefore be reflected in the AMR NAP as follows:

- Strengthen IPC practices at teaching hospitals through the establishment or strengthening existing IPC committees/teams within existing committees
- Develop an IPC curriculum and career pathway for IPC practitioners
- Develop training materials and manual for IPC (MAURICE)
- Coordinate activities with NPHCDA and family health to promote hand hygiene and vaccination awareness in the community
- Expand the school health program to incorporate knowledge about antibiotics and awareness of the importance of resistance

Table 4 - AMR entry points for pillar prevention

Hand Hygiene practices		IPC		WASH (access to water, sanitation)		Immunizations	
Strategic objective	Org/institution/DP	Strategic objective	Org/institution/DP	Strategic objective	Org/institution/DP	Strategic objective	Org/institution/DP
Public awareness and education	Hand Hygiene (family health) Hand Hygiene days - Ministry of Environment	Aseptic practices	MCH (family health)	Public awareness	Hand Hygiene (family health) UNICEF WASH inspections and awareness Ministry of Environment	New born immunizations	NSHIP program (NPHCDA) Child health (family health) UNICEF
School children – awareness and education	School hygiene program (Family health) ICMI (NPHCDA)	Universal precautions	MCH (family health)	School sanitation practices	School hygiene program (Family health)	Childhood immunizations	NSHIP program (NPHCDA) Child health (family health) UNICEF
Healthcare workers in facilities	NCDC NSHIP program (NPHCDA) HOSPITAL SERVICES	IPC @ PHC level	NSHIP program (NPHCDA) HOSPITAL SERVICES	Water and Sanitation equipment	Ministry of Environment Water aid UNICEF		
		IPC @ hospital level	-----	Sanitation, Waste, food safety standards farms Abattoir sanitation and hygiene	NPSREA inspections Ministry of Environment		

Legend: Government Agencies Regulators Professional Councils DP Other

Pillar: Access to antibiotics and antimicrobial stewardship

In this pillar there is a clear distinction between animals and human, as there appears to be relatively less activity on the animal side with regards to antimicrobial stewardship at farm or veterinarian level. Many of the animal antimicrobial stewardship components may be incorporated into NESREA regulatory and inspection audit standards including antimicrobial use and prescribing, dispensing principles.

On the human side, access to antibiotics is specifically included in the family health and child health program for amoxicillin access in the community, whilst the rest is relating to HIV and TB. However if there is an existing procurement, distribution and stock storage processes for HIV and TB medicines it might be possible to piggyback antimicrobials into that same system to ensure access.

Stock management is a strong focus at PHC level within NPHCDA and inspected as part of good pharmacy practice for pharmacies by the Pharmacy Council – additional capacity on their sides to perform these tasks would improve antibiotics and medicine access in general. This will be reviewed in line with the NSHIP essential drug management programme.

Antimicrobial stewardship specific activities to improve healthcare worker skills and activities at hospital level does require development and expansion – this may occur within the FDA services and complimented by the Pharmacist and Medical Councils CPD programs. At PHC level, the existing NPHCDA and Family Health programs should be leveraged to incorporate Antimicrobial Stewardship aspects for primary care within mother and child programs and clinical pathways.

Of all the pillars for AMR this would probably require the most focus as these are where the AMR specific interventions lie and also where additional funds may be needed:

- Expand the mother and child clinical pathways for PHC to incorporate AMR activities
- Support the establishment of AMS activities within the teaching hospital and general hospital Drugs & Therapeutics Committee (DTC)

These entry points could therefore be reflected in the AMR NAP as follows:

- Establish AMR committee within DTC at all teaching hospitals and general hospital (Hospital services, FDA)
- Integrate rational antibiotic use into the PHC PAC guidelines and monitor compliance to these by staff (NPHCDA)
- Integrate training on antibiotic protocols within PHC training programs for staff competency and inline with the PAC guidelines
- Assess the access to amoxicillin by community health workers for children and review AMR related to this.

Table 5 AMR entry points for Access and AMS

Access to antimicrobials Humans	AMS in Humans	Access to antimicrobials Animals	AMS in animals
<p>Strategic objective</p> <p>Org/institution/DP</p> <p>ICMI, TB, HIV programs of NPHCDA</p> <p>Child health (Family Health) amoxicillin Medical stores (Food and Drug agency FMOH),</p> <p>Family planning commodities, HIV, TB medicines (various development partners)</p> <p>Health promotion of NPHCDA UNICEF</p>	<p>Strategic objective</p> <p>Org/institution/DP</p> <p>Pharmacist council Medical & dental council</p> <p>Skills of healthcare workers</p>	<p>Strategic objective</p> <p>Org/institution/DP</p> <p>Vaccine access</p> <p>Vaccine commercialization (NVRI)</p>	<p>Strategic objective</p> <p>Org/institution/DP</p> <p>*No clearly defined activities occurring</p> <p>AMS @ farm level*</p>
<p>Vaccine access</p>	<p>AMS @ hospital level</p> <p>Clinical meetings @ hospitals (MDC)</p> <p>Child health (Family health)</p> <p>Safe motherhood (Family health)</p> <p>AFENET</p>	<p>Medicine access</p> <p>Registration control - NAFDAC</p>	<p>AMS @ veterinarian level*</p> <p>CPD for vets - Veterinary council AFENET</p>
<p>Stock management</p>	<p>AMS @ PHC level</p> <p>Child health (Family health)</p> <p>Safe motherhood (Family health)</p> <p>NSHIP (NPHCDA)</p> <p>TB, HIV, malaria treatment protocols (NPHCDA)</p> <p>Essential Drug Management Curriculum (NPHCDA)</p> <p>Community Health Practitioners Registration Board of Nigeria</p>		<p>Environmental, waste and hygiene standards on farms</p> <p>NESREA</p>
<p>Access to health facilities</p>	<p>Food safety standards</p> <p>NESREA</p>		<p>Food safety standards</p> <p>NESREA</p>
<p>Regulatory control of access to medicines</p>			
GAPS			
<p>Central govt procurement of medicines including critical antibiotics</p> <p>FDA/ NAFDAC</p>	<p>AMS guidelines and implementation @ hospital level</p> <p>FDA (FMOH)</p>	<p>Access to standardize essential medicine list and vaccines</p> <p>FMARD, NVRI, NAFDAC</p>	<p>AMS guidelines and implementation @ farm level, @ veterinarian level and in food chain</p> <p>Veterinarian services – FMARD, NESREA, VCN</p>

Legend: Government Agencies Regulators Professional Councils DP Other

Pillar: R&D

This pillar appears to be extensively covered with programs already established covering AMR research, new drug and alternative research. Additional research may be needed into AMR processes that reduce AMR or improve behavior change aspects such as hand hygiene or compliance to treatment protocols. AFENET does seem to be a key partner here for expansion of a number of the research activities and the existing strengths of NCDC, NIPRID and NVRI should be supported with additional funding and grants.

Therefore if the NAP activities were to be written they should include the following:

- Map out all R&D activities already occurring within the key institutions
- Develop key priority activities for R&D
- Coordinate the delivery of R&D towards these priorities and therefore also the funding

Table 6 - AMR entry points for pillar R&D

Research and Development	
Strategic objective	Org/institution/DP
AMS organisms	AFENET NCDC MSLC
New drugs/ alternatives	NIPRID NVRI
Processes	AFENET NIPRID

For a detailed mapping of all key implementation activities against the pillars of the AMR NAP this is provided in a separate excel document.

Mobilizing resource needs

Across all health departments and agencies, the priority programs in which AMR may be incorporated in a significant manner is within reproductive, mother, newborn and child health as it contains the key aspects of training/education, prevention, vaccination, IPC, access to antibiotics and rational use especially in terms of pneumonia and diarrhea. Surveillance and IPC are being coordinated within existing funds and resources, some from development partners, within NCDC.

Divisions, institutions and agencies that are therefore the key entry points in driving AMR with their existing resources would be the family health unit, NPHCDA, hospital services and NCDC. The next biggest programs are malaria, HIV and TB. These programs also gather the most significant funding from development partners and hence expansion of AMR within these existing funding programs should be a primary focus for the AMR implementation plan.

Funding of most of the programs identified above are from government funds and despite the inadequate release of funds, many programs appear to be able to deliver to the capacity of the existing resources although they may not provide full coverage across the country. The following key areas were identified where additional funding should be sought to increase coverage, or improve AMR specific interventions to occur:

- NPHCDA – resource time to focus on incorporation of AMR activities;

- Family health – additional funds to support better coverage of work in all areas and expand some programs with AMR specific aspects such as public awareness, school health, and WASH;
- Pharmacist Council of Nigeria (PCN)– additional funds to increase coverage of sanitization of illegal patent and proprietary medicine vendors and training to improve their compliance to dispensing and good drug management practices and license them. Mega Warehouse implementation requires significant additional funding and resources;
- NAFDAC enforcement capacity should be enhanced and this will require funding.
- AFENET – additional funds to provide more skilled field epidemiologists, increase their ability to provide support in facilities and communities, strengthen the R&D aspects in relation to behavioral research and process;
- Medical Science Laboratory Council – additional funding for the development of laboratory scientists and laboratory registration standards for quality assurance and antibiotic susceptibility testing, increase their enforcement and inspection capacity and include animal health laboratories in a standardised One-Health approached regulatory framework
- Provision of vaccinations to prevent communicable diseases once Nigeria graduates to middle income status with GAVI. This will have a substantial impact on the health budget and funding will need to be identified that is sustainable.
- An infection prevention and control implementation program would need to be funded and established once the manual and training curriculum has been completed;
- AMS activities within hospitals would again need to be a funded program with the development of guidelines, tools and implementation model.
- In Veterinary service however, funding appears to be severely deficient and many programs are not being driven due to lack of funds and technical expertise within the FMARD. They would require significant amount of support to develop a surveillance system and programs for AMR.

HEALTH SECTOR STAKEHOLDERS

The following programs, ministry departments and agencies were interviewed and operational activity that are fundamental to the implementation efforts for AMR in Nigeria were identified.

i. National Primary Health Care Development Agency (NPHCDA)

The National Primary Health Care Development Agency is the main independent institution and operational arm of the FMOH focused solely on PHC activities. It includes divisions on:

- PHC systems strengthening which translate FMOH legislation into policies and guidelines for PHC's;
- Community health services including outreach and community health workers advocacy within communities;
- Disease control and immunization;
- Planning research and statistics which is responsible for data collection and M&E; and
- PHC laboratory services.

The NPHCDA funding comes directly from the federal government and was N 17 billion in 2016 almost double the budget for the FMOH head quarters (N10billion) although only about 50% is released for use by the agency. Besides national offices it also has offices in each zone (6) and state (37) and provides the technical support, capacity development for PHC health care workers and guidelines and minimum standards for core services to the State PHC Development Agency (SPHCDA) and Local Government Authorities (LGAs).

Important programs within the NPHCDA which have an AMR focus are:

- PHC systems strengthening through the Nigeria State Health Investment Program (NSHIP) funded by grants and loans from the World Bank which is supporting the establishment of governance structures within 3 states and 1433 PHC clinics. This is a outputs based financing program which pays PHC facilities directly for services provided against the PHC package of care within quality parameters. It involves the management capacity building of PHC staff including training on drug management, quality assurance and financial management. Part of systems strengthening involves referral system establishment within the healthcare network as well as management of patients against guidelines and protocols of care (specific PHC guidelines are being piloted called PAC). A very sophisticated M&E systems monitors quantity of care as well as quality indicators including aspects of AMR such as compliance to hand hygiene, mother and child care guidelines, essential drug management, laboratory services, waste management etc.
- TB, HIV and malaria disease control programs where significant amount of effort is being put towards capacity building of healthcare workers. This includes training of staff to recognise the disease and provide treatment according to protocols and competency training in terms of the nurse prescribers, drug management and stock control of medicines.
- Integrated Child and Maternal Initiative (ICMI) which includes education of mothers, a school health program, healthcare worker capacity building and training aspects in relation to care protocols and treatment guidelines for mothers, new-borns, babies and children;
- Health promotion program focused on hand hygiene, vaccination and awareness of diseases mainly focused on neglected tropical diseases;
- PHC laboratory assessment and strengthening initiative to support laboratories services for decision making and diagnosis of communicable disease (HIV, TB and malaria) as well as the establishment of a comprehensive laboratory system for PHC;

Opportunities for AMR activity incorporation:

NPHCDA processes are being piloted in 3 states and will be expanded to 5, which gives a unique opportunity to embed additional AMR specific aspects into their existing processes and guidelines – specifically antibiotic access and stock management of essential antibiotics, awareness of need for antibiotic treatment alongside diagnostic competency to determine clinical need for antibiotics within the various disease and condition pathways, utilisation of TB, HIV, malaria to exclude non bacterial causes of illness and reduce unnecessary use of antibiotics, awareness generating activities with community on need for antibiotics and their impact on resistance and treatment compliance.

The NSHIP program has an extensive M&E framework covering 16 domains that can be used to gather AMR specific and non-specific information from the 3 states as a sentinel source of PHC AMR data. These would include antibiotic availability and use/consumption, compliance to treatment protocols, hygiene compliance, laboratory availability and use of diagnostic tests and waste management compliance indicators although there are numerous others which need to be investigated further.

Funding needs

Currently with the additional grants and funds from World Bank for the 3 states it covers and other development partners, the NPHCDA PHC program appears to be funded sufficiently for the 3 states where activities are active. However additional funding will be needed to roll out to more states.

ii. Family Health Division within the FMOH

The family health division within the FMOH understands the need to ensure that AMR is not seen as another vertical program. Their programs are key areas for AMR activity incorporation as they cover a range of care delivery services within health from prevention and promotion to quality care services:

- Health promotion works both within the public and the private sector using multidisciplinary staff to improve access to health services by users. They have the necessary skills to communicate with the public using their health education officers in each state and each LGA and where available in health facilities too.
- Hand washing awareness program to public at critical times such as food preparation etc. Occurs during special events and outbreak situations such as Ebola. Materials for this have been developed and tested within communities for acceptability. There is a WASH committee, which sites within Ministry of Environment and has health representatives; UNICEF who also funds all activities and meetings drives this. Ministry of Environment provides toilets and incinerators to hospitals and conducts house inspections to ensure toilets, sanitation and water is being used appropriately through their environmental health officers in each state. Key development partner is Water Aid and UNICEF;
- School health and hygiene program is focused on school children in conjunction with the Ministry of Education. It focuses on peer to peer education on personal and environmental hygiene practices and supports hygiene practices and wash corners in each classroom and school;
- Safe motherhood program focuses on newborn care, safe aseptic births with skilled birth attendants who are trained and universal precautions. It is done with the support of multiple development partners including UNICEF, United National Population Fund (UNFPA) who provides commodities and supplies and manages the distribution chain), USAID, Mary Stokes, Pathfinder, Clinton Health Access Initiative (CHAI) (service delivery and procurement of commodities).

- Child health and under 5 mortality program – main drive here is amoxicillin access through trained community workers who know how to identify the signs and symptoms of disease, administer the drug appropriately, and refer when needed. This program is sponsored by UNICEF, WHO and Christian Aid;
- Nutrition, guided by the Nutrition policy, which was co developed with the FMARD and linked into a school-feeding program.

Opportunities for AMR activity incorporation:

There are a number of opportunities for expanding on the work being done within Family Health division as well as ensuring AMR aspects form part of various programs:

- Health promotion on AMR and antibiotics use can be facilitated through the health education officers at state, LGA and facility level where available. This may require additional funding to provide adequate coverage of promotion services to the whole country;
- Integration with the WASH program and school health and adolescent health programme sponsored by mainly UNICEF, Ministries of Education and Environment to increase hand, personal and environmental hygiene to reduce spread of infections coupled with awareness days during health calendar;
- Safe motherhood program specifically the aseptic birth and universal precautions link to prevention of infection and compliance to treatment protocols for AMR to ensure correct antibiotic;
- The impact of increasing access to amoxicillin and child mortality related to pneumonia and diarrheal disease. It may also be critical to develop PHC laboratory AMR surveillance capacity at the PHC's in the vicinity of this program to determine impact on AMR resistance.

Funding needs

The current resources within family health, including funding and staff, are insufficient to tackle the activities and provide full coverage across the country for these activities so consideration should be given to increasing capacity within the family health division and its key programs either through additional FMOH funding or through development partners.

iii. Hospital services

Hospital services is the largest division in FMOH, responsible for teaching hospitals, specialist hospitals and Federal Medical Centres whilst the general hospitals are the responsibility of the states. They develop policies and guidance for these hospitals, manage the nursing, national blood transfusion service (NBTS), trauma and cancer programs.

The main government body for the hospitals is the Chair of the Committee for Medical Advisory Councils who would be a key entry point for AMR activities.

Hospital services also oversee the medical laboratories in the teaching hospitals, which apparently all perform sensitivity testing however the level of quality is uncertain.

Funding from government for the university and teaching hospitals is significant ranging from N3-9 billion each and there are approximately 20 plus additional specialist hospitals. In addition there are funding line items for laboratory reagents and equipment.

Opportunities for AMR activity incorporation

Hospital services is a key partner within the teaching hospitals through antimicrobial stewardship and IPC. The interviewees were not certain of existing activities within these aspects and these

would need to be explored more with the division. However the academics within these hospitals should be engaged through the Chair of the Committee for Medical Advisory Councils to establish an antimicrobial stewardship program within each of the 20 teaching hospitals as a start. Thereafter outreach stewardship programs can be rolled out to the other hospitals with the teaching hospital providing guidance and support.

In terms of the laboratory services, these should be linked into the national surveillance program as sentinel sites if they meet the quality assurance criteria to be included.

iv. Infection prevention and control

This aspect seems to be fragmented and “owned” by numerous divisions and organisations within the FMOH, agencies and key universities. Currently there is a project called MAURICE supported by NCDC, Nigerian IPC network and various universities which is aiming to develop an IPC manual and training curriculum for healthcare workers as a new cadre of staff. The diploma program will be open for nurses, doctors and pharmacists to participate and will be aligned to the IPC policy within the hospital services of the FMOH. The project is being supported by NCDC, GIZ, US CDC and Robert Koch Institute.

v. African Field Epidemiology Network– AFENET

AFENET provides field epidemiologists through the Nigerian Field Epidemiology Training Programme (NFELTP) to control outbreaks and provide epidemiological support to communicable diseases divisions within states and public health departments. The NFELTP programme is the first one to have a One-Health approach with its inclusion of the three tracks of Medical, Laboratory and Veterinary. They provide valuable support to many aspects related to AMR including prevention and promotion of IPC practices, immunization, surveillance and research into processes of disease spread and behaviors relating to AMR in health care workers as well as specific disease surveillance and outbreak responses. They are trained through a partnership between the FMOH public health department, FMARD veterinary services University of Ibadan and Ahmadu Bello University and link directly into the NPHCDA operational aspects around outbreak responses. The program is funded partly through the government as all students need to be employed by the government who sponsors their salary whilst they are training and additional funds from CDC which helps provide for operational training and field experience costs. They are a sought after profession in Nigeria as they are able to find high paying jobs within various government and state health departments.

The field epidemiologists are a powerful network of colleagues that may be leveraged for AMR operational activities as well as research into AMR processes, surveillance, outbreak and behavior issues at all levels of the system. It is important to ensure sustainability of the programme with an ongoing Government budgetary line to fund

vi. National TB program – Public Health division of FMOH

The TB program is currently focused on updating its TB strategic Plan 2015 – 2020 with a specific drive towards capacity building for the TB laboratories services including laboratory technician capacity building, equipment, reagents and power sources. Currently tertiary institutions provide support to these laboratories through their government funding but they are separate to the microbiology and HIV laboratories. TB laboratories are in the process of mid term review of their operational plans and have the possibility of incorporating AMR surveillance into their existing laboratory capacity.

vii. Laboratory and surveillance aspects for AMR

Throughout the various discussions with the FMOH division and agencies, laboratory services and surveillance activities have been identified. These were more directly investigated by Mott MacDonald during their country scoping visits for Fleming Fund, however we would like to highlight some key ones that we uncovered during our interviews.

- i. Nigerian CDC is the key driver of the AMR surveillance system, its strategy and operation plan and activities in line with the Global Antimicrobial Resistance Surveillance System (GLASS). It is also gathering grants from various partners to establish a national reference laboratory for AMR surveillance and is the principal implementation unit for this using CDC, JICA and Global Fund;
- ii. Hospital division of FMOH -medical laboratories established within tertiary hospitals which apparently all perform sensitivity testing however the level of quality is uncertain;
- iii. There are 2 TB national reference laboratories and 6 zonal laboratories within tertiary hospitals.
- iv. PHC laboratories under the NPHCDA - The PHC laboratories are being assessed and strengthened as part of the general PHC revitalization program. These could form part of the AMR surveillance sentinel site system for community infection once they are able to provide quality microbiology services;
- v. Microbiology and infectious diseases laboratories within National Institute of Pharmaceutical Research and Development (NIPRID) which were established as HIV, new drug development and pharmacovigilance laboratories are able to provide microbiology and AMR testing. These are funded by Pefpar grants and government budgets. They also conduct surveillance for malaria, TB, HIV and upper respiratory tract infections using their onsite clinic;
- vi. Medical Science Laboratory Council of Nigeria (MSLCN) - register laboratories and medical laboratory scientists against specific training. Their mandate is to standardize laboratory susceptibility testing via guidelines and standard operating procedures and the training of laboratory scientists to apply these testing standards. They are funded by FMOH. There is some overlap with vet laboratories in that they register laboratory scientists but not the laboratories. This is an opportunity for a One Health approach to be taken to ensure consistent susceptibility testing, quality assurance system across all microbiology laboratories in Nigeria.

Nigerian Centers for Disease Control and Prevention (NCDC)

The Centers for Disease Control and Prevention (CDC) office in Nigeria was established in 2001. The office supports the Nigerian federal and state Ministries of Health (MOHs) in the development, implementation, and evaluation of disease response efforts specifically for HIV and Malaria and for programs that contribute to strengthening public health infrastructure and service delivery models in Nigeria such as the routine immunization support and field epidemiologist training program. They are also actively involved in interagency collaboration and response to outbreaks for zoonotic diseases by providing technical expertise to outbreaks when they occur and conducting studies on the prevalence of specific zoonotic diseases.

The office has been actively supporting the AMR NAP development process as the AMR focal point appointed by the Minister at the start of 2017. Besides their fundamental role as leader of the AMR technical working group and their coordination of functions of the various stakeholders towards implementation, within NCDC a smaller core group of individuals focus on implementing NCDC's responsibilities within the NAP.

They are the key driver of the AMR surveillance system strategy through their collaboration with the various laboratory service providers to align the standards and assessment methodology to that of WHO Global Antimicrobial Resistance Surveillance System (WHO GLASS). They are determining the suitable standards for this currently as well as the network of laboratories that will form part of the surveillance system. A few laboratories have been identified that meet the standards and could, through guidance from NCDC, be suitable as part of the sentinel system for AMR surveillance. NCDC is also ensuring sustained quality management systems are in place in these laboratories so reporting is credible.

They are the main drivers of the IPC training guidelines development working group which is supporting the development of training materials for IPC in partnership with GIZ, Robert Koch Institute and US CDC.

Recent activities include the coordination of the antimicrobial stewardship guidelines for hospitals with the Ministry of Health hospital services and collaborative work with environmental management to develop a policy on liquid waste management.

NCDC is also a key participant in the Global Health Security Agenda strategy and plan development program which is scheduled for March 2018 as part of the One Health team set up by the FMOH due to their AMR and zoonotic, epidemic response and preparedness expertise.

Much development partner support is being channelled through NCDC as the key program implementation unit and AMR focal point.

Global Antibiotic Resistance Partnership Nigeria (GARP Nigeria)

Global Antibiotic Resistance Partnership Nigeria supported the NCDC with the development of Nigeria's situation analysis and national action plan documents on AMR. This strengthened the coordinated approach on AMR, bringing the right level of attention to this global health security threat.

With leadership from the NCDC, GARP-Nigeria coordinated the WHO AMR case study interviews that will be crucial in the successful implementation of the strategic objectives of our NAP and ensuring Nigeria's goal of increasing awareness, strengthening surveillance, improving infection prevention and control, promoting rational access to antimicrobials as well as stewardship and finally expanding the much needed research capacity in order to reduce the emergence and spread of resistant organisms.

Opportunities for AMR activity incorporation

The existing laboratory infrastructure, human resources and capacity should be leveraged where possible to create an expanded laboratory services for AMR and could be taken into account when the national AMR surveillance program is developed by NCDC. AMR surveillance system should be integrated into existing Integrated Disease Surveillance and Response (IDSR) system being supported by partners including WHO and NCDC. In addition the incorporation of the PHC laboratory services may be very significant in informing treatment guidelines for community acquired infections as part of the national surveillance program.

The Medical Science laboratory Council of Nigeria should be utilized more effectively to provide standard guidelines on AST and training to laboratory scientist in collaboration with NCDC and in addition the integration of One Health laboratories into a single regulatory platform.

viii. Management of the pharmaceutical supply chain for antimicrobials and vaccines

There are 2 key agencies and a division within FMOH who regulate, control and monitor the pharmaceutical supply chain and ensures access to quality medicines in the country.

Pharmaceutical services within Food and Drug Authority of the FMOH

Food and Drug Authority is responsible for medicines policy and planning for all pharmacists within FMOH. Their policies include the National Medicine Distribution policy and the National Product Supply Chain management programme, National Drug Distribution Guidelines. They are in the process of developing a prescription policy which will include appropriate prescribing and rational use of medicines including antibiotics.

Pharmaceutical services is the AMR focal point and responsible for the essential medicines list and for treatment guidelines which is then provided to NPHCDA and the Hospital Services division for implementation. Essential medicines list and treatment guidelines have been developed by the FMOH Expert Committee on Essential Medicines, who use evidence of effectiveness and cost to include medicines on the list. A grave concern is that the Essential Medicine List doesn't include ampicillin on it (apparently on the basis that it is no longer effective), however this is being reviewed for inclusion for neonatal sepsis treatment. The Committee have approved dispersible amoxicillin for sale by Patent and Proprietary Medicine Vendors (PPMV), which is being enforced by the Pharmacist Council. Interestingly carbapenems are not included in the list of antibiotics and imipemem only listed under TB in tertiary hospitals.

The Essential Medicines List should inform procurement at state level however again this is dependent on the states budgets and priorities and FMOH was not able to distribute the lists due to lack of funds so only 2 zones have been covered with the updated lists so far.

National Agency for Food and Drug Administration and Control (NAFDAC)

NAFDAC regulates the quality of all products for animal and human use in the country including antibiotics, feeds and vaccines, biological and alternative medicines as well as the manufacturers in country and internationally who supply products to the country. Sixty percent of the local pharmaceutical manufacturers produce antibiotics including penicillin, sulphonamides and imidazole classes. Only 6 of the manufacturers (out of the 188 in total) are registered and certified with Good Manufacturing Practices (GMP) and there is an on-going initiative to strengthen local pharmacy and improve the quality of the manufactured products. The quantity of antimicrobials coming into the country can be measured through NAFDAC but this only register the legitimate supply chain imports and does not take into account any illegal imports. PMG-MAN collects data from local manufacturers on their production and this can be sourced going forwards, as well as information from the central medical stores on orders to facilities.

NAFDAC has its own laboratory, which performs quality assurance and bioequivalence assays on all medicines to remove substandard products from the market. Their initiative "scratch and tag" on boxes allows patients to identify that the product they have bought is genuine. However, there is need to increase awareness on this initiative.

Post marketing surveillance is a dual responsibility between NAFDAC and the suppliers. A national surveillance survey is required to determine the extent of the poor quality, illegal and counterfeit products on the market, which can inform further policy and regulatory reforms in the industry.

There is a bigger strategy to enhance local manufacturers alongside a NEPAD roadmap for pharmaceutical manufacture in Africa. However there are concerns that the local manufacturers do not have the capacity to manufacturer for the Nigerian health sector.

Since 2013 the same regulatory processes have been applied to veterinary medicines including feeds in Nigeria.

NAFDAC also has its own TV programs on a few different channels, which discuss medicine awareness into which AMR fits with extensive social media exposure.

Pharmacists Council of Nigeria (PCN)

The Pharmacists Council is responsible for the registration, training and professional practice of pharmacists in Nigeria. They register the pharmacies (20 000), warehouses and regulate the Proprietary Patent Medicine Vendors, (PPMV) (64 000). Due to the proliferation of PPMV's which are unregistered and therefore not compliant with Good Pharmacy Practices in terms of management, storage, cold chain and dispensing of medicines they have begun a program to sanitize the drug market by shutting down unlicensed vendors. This program was mandated to them by the National Health Assembly and has the legal support of the police and is in line with the National Drug Distribution Guidelines. The program is unique in that besides shutting down illegal vendors, they encourage them to come to the PCN receive training on good medicine management practices and are supported to get fully licensed as a PPMV thereby maintaining access to medicines for the community whilst enforcing compliance and regulations to good medicine practices. So far 200 – 300 illegal practices have been shut down this year.

PCN have plans to also enforce the establishment of Mega Drug Distribution Centres within the informal medicines markets in the cities however this will require a national task force to get their buy in to being part of this process and will need additional funding from government to achieve this.

Their funding is primarily from government and revenues from registration of pharmacists and vendors with some development partners' support from CHAI, MSH for curricula and CPD training for pharmacists and for the PPMV's.

United Nations Children's Fund - UNICEF

UNICEF, as part of its safe motherhood and child health programs, purchase routine vaccinations on behalf of the FMOH and distributes them to health facilities within its programmes through its strong network of teams in all states with the NPHCDA is the implementing arm..

As Nigeria is about to graduate to middle income status this will mean they will no longer be able to receive sponsored vaccines and will need to find funding for this activity – given its critical importance to prevention of communicable disease and the size of the population this will have a substantial impact on the health budget.

ix. Research and Development (R&D)

There is a significant amount of activities on the research and development (R&D) front in relation to new drug development including antimicrobials, anti-malarias, anti TB and HIV and on research into alternative or indigenous products or recipes of products that may act in a supportive or treatment manner for bacterial infections. This research does not appear to be coordinated or leveraged off significantly however there is funding from the government to support the various institutions that conduct the research and some funds from development partners for grants on specific aspects of R&D.

The key institutions are:

- National Institute of Pharmaceutical Research and Development (NIPRID) – novel drug research, traditional medicines and natural products, TB, malaria, *C difficile*, and *pseudomonas*. They have capacity to identify the products conducted in vitro studies and

clinical trials at which point they hand the recipe over to the pharmaceutical manufacturers for production. They have already developed a sickle cell therapy which was distributed locally Niprisan.

- African Field Epidemiology Network– AFENET- network of field epidemiologists conduct wide range of research into infectious disease organisms both in humans and animals and process of prevention and behaviours through industry knowledge and perception studies of AMR use.
- Medical Science Laboratory Council of Nigeria conducts specific research into AMR for some organisms, and on quality of susceptibility tests in laboratories
- NCDC – research on responses to infectious diseases outbreaks, AMR and IPC

Opportunities for AMR activity incorporation

Due to the extensive R&D activities already occurring in Nigeria, it would make sense to formulate a R&D strategy which takes into account the various research underway, opportunities to expand to support AMR activities and gaps in the market, share resources or skills and develop the R&D aspects further including gathering the findings to support this activity.

AGRICULTURE SECTOR STAKEHOLDERS

The following programs, ministry departments, and agencies are fundamental to the implementation efforts for AMR in Nigeria.

i. Federal Ministry of Agriculture and Rural Development (FMARD)

As per the Agriculture Promotion Policy, the FMARD is focused on crop production activities where there is no antimicrobial use that is currently known about. However the veterinary services division of FMARD does feel that due to the intensification of fishing and poultry in terms of eggs and meat and cattle industry, concerns on AMR these should be added to the policy.

Currently the FMARD veterinary services are focused on enhancing their residue and surveillance programmes, which will assist with identifying the extent of the AMR problem in livestock. This data they hope will help motivate for additional funding to be provided to the veterinary services division to maintain surveillance systems and implement AMR activities. Their current funding is only from government and only 30-40% is released every annum.

FMARD also provide training to farmers using integrated extension workers who are mainly focused on crop production. There is an opportunity to leverage off the private extension workers to incentive vaccinations and AMR activities to farmers. A World Bank program funded these extension workers in the past but since that funding has finished these activities are no longer occurring.

USAID is running a project called African Sustainability Livestock 2050 (ASL2050), which aims to help countries create comprehensive long term policies to reduce risks of increased livestock growth on the environment, public health, and livelihoods. ASL2050 has a component that focuses on the impacts of animal disease on livestock systems in order to ensure safety from epidemic and pandemic threats.

Other development partners include Food and Agricultural Organization (FAO) and African Union.

The biggest risks for AMR from the FMARD perspective are poultry and fishing industries due to their intensive nature.

One idea presented as the idea of a key regulatory lever that might be an option to improve rational antimicrobial use in farms is insurance for farmers when they experience losses due to disease, provided that they have followed the vaccination, biosecurity and rational antimicrobial use guidelines. Another lever would be the provision of vaccinations at cost price to reduce the need for imported products which are more expensive or incentives for farmers to purchase these vaccinations in terms of market access for their products or export opportunities.

ii. Veterinary Council Nigeria

The Veterinary Council of Nigeria (VCN) is an agency of government responsible for standards of training and veterinary practices and quality of veterinary services. They accredit the veterinary schools following the OIE recommendations, which includes veterinary paraprofessionals and all key professionals responsible for controlling antimicrobial use. Their main activities revolve around registering the practices of veterinarians and Para veterinarians of which rational use of medicines is a requirement. They are also responsible for the removal of unregistered practitioners who peddle drugs to farmers and at markets.

Their capacity building activities include seminars on AMR which are mandatory for vets to attend and are open to Para veterinarians too. No regular training is provided to farmers as they are difficult to engage with easily. A new cadre of community animal health workers is being established with DFID funding to assist vets and Para vets in the rural areas to support livestock production and farmers.

Their main funding comes from renewals of veterinarian practice licenses, registration of the professionals and CPD course that they offer.

The VCN also has its own system of laboratories includes private sector laboratories, 2 state veterinarian laboratories and 9 laboratories within the teaching faculties include one designated as a National Reference Laboratory.

Opportunity

- Align the self-audits from farmers with biosecurity and hygiene requirement of AMR and enhance the collection and reporting of this data in addition to the water quality and food safety indicators already collected.

iii. National Veterinary Research Institute (NVRI)

The National Veterinary Research Institute (NVRI) is primarily responsible for vaccine production and research into animal diseases and outbreak surveillance. They perform residue testing for abattoirs on antimicrobial residues however no specific AMR testing is being conducted. They are in the process of scaling up a food safety laboratory that has an AMR component focused on antibiotic susceptibility testing for sick animals from samples from farmers, salmonella surveillance and ESBL enteric infections. In the future it will monitor AMR in food products and develop phytomedicines to reduce infections to be added to feeds. This has been agreed within the new strategy for the NVRI. They also plan to commercialize their vaccine production facility to increase production to meet the needs of the livestock industry in Nigeria.

Key funder is government and grants plus technical support from FAO.

iv. Food and Agriculture Organisations (FAO)

The Food and Agricultural Organization (FAO) in Nigeria is mainly focused on crop production whilst the livestock division is mainly run from their Ghana offices. They were involved with the JEE which provided a strong recommendation to encourage One-Health working and governance to do more to strengthen livestock surveillance which is currently not within the policy framework of the FMARD. Major livestock sector from their perspective is poultry as there is a small pig production industry and fewer antibiotics are used with sheep goats and cattle.

v. Environmental aspects

Many of the environmental aspects relating to AMR are overlapping functions across three main organizations – Ministry of Environment, NESREA and Family Health division (health promotion) within FMOH

Ministry of Environment

The ministry controls environmental pollution, waste and sanitation. Their key activity is domestic sanitation and they conduct inspections in houses, works places and markets to ensure sanitation and hygiene measures are applied. They also provide toilets and incinerators to hospitals but don't provide management of the cleaning of these facilities or the maintenance thereof. Their main partners are UNICEF and Water Aid whom they work closely with in relation to hand hygiene and sanitation in communities. They provide most of their interventions through seed funding to states of 25% and then remaining funds come from the state who run their "clean states" interventions as business to make money out of.

National Environmental, Standards Regulation and Enforcement Agency (NESREA)

NESREA develops and enforces regulations on keeping a clean and safe environment through 33 regulations dealing with issues such as waste and sanitation, food safety from an industry point of view and water quality. It's primary focus is on industry and ensuring their compliance to these regulations which includes the pharmaceutical manufacturers effluent and waste management and farmers discharge of waste into the environment.

The large scale farmers conduct a 3 yearly self- audit to evaluate their impact on the environment and all farmers are sanctioned if they submit an audit that upon inspection is found not to be true. The small scale farmers submit environment management plans and risk assessments only.

NESREA provide awareness activities on hygiene in place such as markets, households and schools.

They are in the process of development health care risk waste management guidelines for health facility.

The also have an extensive M&E set of data including water quality testing and analysis results including chemical and microbe residues as well as food safety results from food inspection in producers and restaurants.

5. DEVELOPMENT PARTNERS/ DONORS/ FUNDING FOR AMR WORK

Government Financing Of Health Services

Health in Nigeria is financed through various sources and mechanisms; these include households (out of pocket payments as well as health insurance and taxation) which makes up around 69% of all health funds, allocations by federal, state or local governments for health (this makes up around 24%), development partners funding (4%) and as part of the National Health Insurance Scheme from companies within the formal sector (3%)¹⁰. Various policies and plans address healthcare financing however, despite the variety of financing sources, the level of health spending is relatively low with only 3.7% of general government spending going to health (contrary to the Abuja declaration of 15%), and 0.7% of Gross Domestic product. The prioritization of funding is on primary health care and vulnerable groups and to increase efficiency by reallocating resources to prevention and promotion rather than higher levels of care^{11, 12}.

The National Health Policy requires that the following funding principles are followed to fund the policy implementation:

- Governments at all levels shall earmark and allocate at least 15% of their annual budgets (in line with the Abuja target) for the implementation of the National Health Policy
- The Federal Government shall allocate at least 1% of the Consolidated Revenue Fund for the establishment of the Basic Health Care Provision Fund, as provided for in the National Health Act 2014
- To ensure accountability, development partners shall sign a compact for the implementation of the National Health Policy and the National Health Strategic Plan, in line with the provisions of the Paris Declaration on Aid Effectiveness and the Busan Partnership for Effective Development Co-operations
- Stakeholders, especially civil society organisations, shall advocate in the executive and the legislative arms of government at all levels on the need to increase allocations to health to meet 15% of the total budget as per Abuja Declaration
- Government shall encourage private sector participation in the implementation of the National Health Policy, including investment in health

i. Basic Health Care Fund provisions for programs which could directly or indirectly impact AMR

Though the *National Health Act 2014* has made provisions for a Basic Health Care Fund, accountability is a challenge as there is weak institutional capacity in public financial management and expenditure tracking at all levels of government and the provision in the Act has not been activated as yet. The Federal Government shall allocate at least 1% of the Consolidated Revenue Fund for the establishment of the Basic Health Care Provision Fund, as provided for in the National Health Act 2014¹³. The Fund will receive further provision from international donor partners and other sources.

The funds will be used to finance the following:

- 50% for provision of basic minimum package of health services in PHC and secondary health care facilities through NHIS;
- 20% for provision of essential drugs, vaccines and consumable for PHC facilities;

- 15% for provision of maintenance of health infrastructure, equipment and transport for eligible primary care facilities;
- 10% for the development of human resources for primary health care; and
- 5% for emergency medical treatment is useful in ensuring that all accident victims are attended to.

The National Primary Health Care Development Agency will disburse the funds through State and Federal PHC Boards for distribution to Local Government and Area Council Health Authorities. Criteria to qualify for a block grant include:

- States or local government to put in not less than 25% of total cost of projects
- Apply the funds in accordance with the stated intent; and
- Implement the national health policy, norms and standards and guidelines as prescribed by the National Council on Health.

Recommendation

Whilst the Basic Health Care Fund is being established, FMOH, in particular the departments and agencies identified as key entry points for AMR activities should maintain their existing funding levels (i.e. they should not decrease). In addition the government should increase the release of allocated budgets to these departments and agencies to allow them to increase coverage of their services.

A significant funding concern will be the provision of routine vaccinations, which will become a FMOH funding requirement once Nigeria graduates from GAVI. This will have a significant impact on the health budget and feasibility and cost benefits analysis will need to occur to support this. This aspect is critical for AMR prevention as well as general public health benefits.

Development Partners Background

Development co-operation was minimal before 1999 in Nigeria but has grown in line with Nigerians democratic transition. In 2006 a Paris Club Debt Deal, in which Nigeria repaid \$12 billion, led to donors writing off \$18 billion. Despite Nigeria's prominence in Africa, total official development assistance (ODA) is small compared to other African countries.

Nigeria has a Country Partnership Strategy (CPS) which is aligned with the country's seven point agenda and the vision 20:2020 and priorities identified by the earlier administration, have been endorsed by the current administration. The new Nigeria CPS covers the period FY2014-FY2017 and introduces a change in the country's borrowing status. Nigeria was declared creditworthy for IBRD financing in FY2013 and officially entered blend status in FY2014.

The CPS was prepared in partnership with the Department for International Development (DFID), the United States Agency for International Development (USAID) and the African Development Bank (AfDB) and focused on three broad themes:

- *promoting diversified growth and job creation* by reforming the power sector, enhancing agricultural productivity, and increasing access to finance;
- *improving the quality and efficiency of social service delivery* at the state level to promote social inclusion; and
- *strengthening governance and public sector management*, with gender equity and conflict sensitivity as essential elements of governance.

The overarching objective of the CPS is to support the government's goals of laying the foundation for socially and regionally inclusive growth with a specific focus on reducing poverty and increasing shared prosperity. One engagement area within the CPS focuses on coverage and quality of health services. There is a CPS to increase access and utilization of quality health services by addresses infectious disease burden and quality of care.

The WHO has begun its third Country Cooperation Strategy (CCSIII) in Nigeria that covers 2014 through 2019. The focus of CCSIII is to specify elements where WHO and other development and donor partners contribution are most beneficial in view of the core needs of the FMOH and other government departments. There are five strategic objectives of CCSIII:

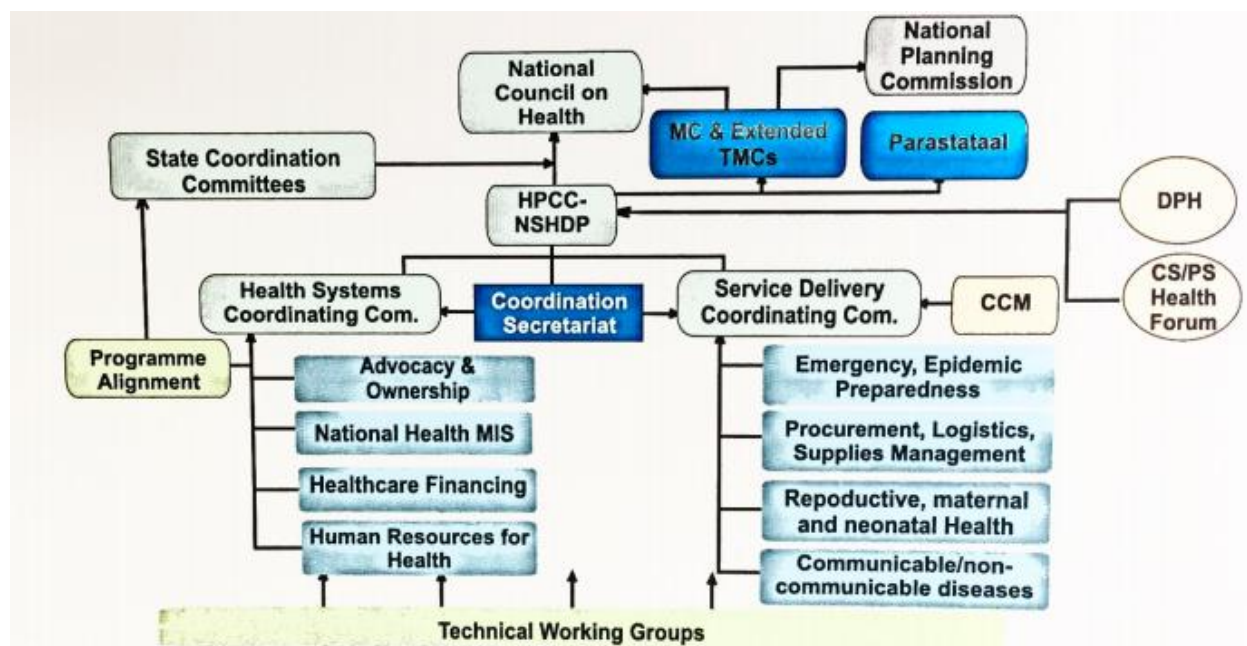
- Strengthen health systems based on the primary health care approach
- Promote health and scale up priority interventions through the life-course
- Scale up evidence-based priority interventions for communicable and non-communicable diseases towards universal health coverage
- Scale up national capacity for preparedness for and response to public health emergencies including polio eradication and crisis management
- Promote partnership coordination and resource mobilization in alignment with national, regional and global priorities

The key health development partners of Nigeria include USAID, the US government, DFID, the EU Delegation, DFATD, the Japan International Cooperation Agency, Germany, Italy, Spain, Norway, Russia, the Korea Foundation, the World Bank, AfDB, the US CDC, NORAD, United nation Foundation, the BMGF, the Global Fund to fight AIDS Tuberculosis and Maria (GFATM), and the GAVI Alliance. International and national NGOs that play an important role in Nigeria's health sector include Save the Children, Management Science for Health, capacity Plus, CHAI, the Population Council, the Malaria Consortium, the Health Reform Foundation of Nigeria, the Association for Reproductive and Family Health, and the Society for Family Health¹⁴.

Aid coordination is led by the Health Partners Coordination Committee and its technical arm, the Development Partners in Health Group. The National Planning Commission is responsible for coordinating all development assistance in Nigeria. Other coordination structures within the health sector include:

- Country Coordinating Mechanism for the Global Fund for HIV, TB and Malaria
- The Development Partners' Group on HIV/AIDS, Nigeria
- The AIDS Tuberculosis and Malaria Task Force
- The Interagency Coordinating Committee on Polio Eradication and Immunization
- The Reproductive Health Commodity Security Steering Committee
- The Core Technical Committee on Integrated, Maternal, Newborn and Child Health
- The Presidential Task Force on Polio Eradication
- The Saving One Million Lives Steering Committee

Figure 4 - Proposed Revised Health Sector Coordination Mechanism



Source: A Review of Coordination and Aid Harmonization in the Nigerian Health Sector: Summary Report, MFOH & PATHS2, Abuja, July 2012

CCM = Country Coordination Mechanism (linked to Global fund for Malaria, AIDS and Tuberculosis)

DPH = Development Partners in Health, also referred to as DPG (Development Partners' Group)

HPCC – NSHDP = Health partners Coordination Committee – National Strategic health development Plan

CS/PS = Civil Society and Private Sector

The development partners we were able to source information or interview are reflected in the table below against the most relevant of the four pillars of the AMR NAP where their work aligns:

Table 7 - Key AMR Development Partner Activity by AMR NAP Pillar

Education & Awareness	Partners	Prevention	Partners	Surveillance	Partners	Stewardship	Partners
Awareness	MSH, WHO, DfiD, Unicef	Hand Hygiene	DfiD, WHO	Laboratory Capacity	BMGF, JICA, GF, USAID	Access	BMGF, GF, USAID
Education	Unicef, DfiD, BMGF, MSH, WHO, USCDC, GF, CHAI	IPC	World Bank, Unicef, BMGF, USCDC, GF, DfiD	AMR Surveillance	World Bank, BMGF, USAID	Stewardship	No DP's specifically
		WASH	DFID, BMGF, Unicef, JICA				
		MCH	DfiD, UNFPA, WHO, CHAI, Unicef				
Agriculture DfiD, BMGF, USAID							

i. Department for International Development UK DFID

Since 1999, DFID's work has evolved from largely technical support to one, which support champions of change, key reforms, more government accountability and pressures to make government more responsive. They are helping government to improve incentives for business and investment which is extending into increasing incomes and economic growth to shift the focus to agricultural and away from dependency on oil. They are also working to make government budgeting and spending more efficient. The vast majority of their funds are spent on programs in health and then governance followed by wealth creation and education with half of these programs having a research component to them.

In health their main focus is on malaria, maternal mortality, nutrition and education which have had challenging outcomes. Their budget for FY 2017/2018 was £292m which is split across the following programmes, most of which will be ending in 2018:

- North East Nigeria Transition to Development Programme which focuses on markets and value chains for poor people in the North East including poultry production as a means to food security, humanitarian assistance in nutrition, water, shelters and emergency support including strengthening government planning and risk management (£300m) (implemented by Palladium);
- Health programs relating to maternal deaths, improving maternal and newborn child health in Northern Nigeria (£270m). They also provide family planning commodities (£24m) and a child development grant of £56,5m to improve the education of mothers to provide their young children with a balanced and health diet;
- WASH programme to improve access to safe sanitation facilities, hygiene education and safe reliable water supply (£96m);
- Neglected tropical diseases program (£15,4m);
- Women for health programme which improve the quality and quantity of female health workers in northern Nigeria (£30m)

They work very closely with private service providers, non profit development agencies and multilateral agencies including UNICEF, World Bank. Within Nigerian organizations they work closely with the National Planning Commission, Ministry of Finance, and Ministry of Health.

They are currently in the process of reviewing their strategy for the next phase of programmes and are likely to shift their focus more towards primary health care, how the private sector can contribute to increasing access and efficiency to health care services, provide technical support on the efficiencies of procurement for the FMOH and provide support to health financing programs in line with the national health insurance and funding schemes. Whilst they have not considered AMR aspects in their strategy planning process these may be incorporated and hence an opportunity exists to ensure that there is some funding for gaps in existing programs to support AMR specific and non specific work.

ii. World Bank

The World Bank Group's support for Nigeria is structured around three strategic priorities:

- Promoting diversified growth and job creation by reforming the power sector, enhancing agricultural productivity and increasing access to finance
- Improving the quality and efficiency of social service delivery at the state level to promote social inclusion
- Strengthening governance and public sector management with gender equity and conflict sensitivity as essential elements of governance

The World Bank Group's collaboration with the Federal Republic of Nigeria received a boost on April 24th 2013 with the Board of Executive Directors endorsing a new Country Partnership Strategy (CPS) that includes support for a bold and ambitious program of development targets and interventions for the next four years to 2017.

"The new strategy is a joint product, developed in close consultation with the Government of Nigeria under the Country Assistance Framework, a strategic platform developed by Nigeria's partners to coordinate interventions and leverage resources to deliver strong results and development solutions," said Marie Françoise Marie-Nelly, World Bank Country Director for Nigeria. "It reflects Nigeria's development aspirations and commits the World Bank Group to working hand-in-hand to unleash Nigeria's potential for the benefit of all Nigerians."

There are four key interventions currently underway in Nigeria in health, most of these projects are changing the ethos within the health sector to focus away from shifting funding inputs such as drugs, commodities, hiring more health workers, and reimbursing activity costs only, to paying for results and improved health outcomes for patients:

- i. Nigeria States Health Investment Project (NSHIP) which started in 2012 and is a results based financing, primary health care systems and service delivery strengthening project to increase the delivery and use of high impact maternal and child health interventions at primary health levels (1433 clinics) in 3 states. The program pays PHC facilities directly for services provided against the PHC package of care when they meet quality parameters linked to child and maternal health as well as strengthening governance and management systems. The fund is decentralised to the facility and 50% of the funds goes towards personnel and the other 50% towards performance based incentives. The facility gets to decide how to spend the money in order to deliver the quality service to the patients.
The money for NSHIP is provided mainly by the World Bank (\$150m initially and another \$150m) but also some donors such as Bill and Melinda Gates foundation and Global Fund in the form of a mixture of loans and grants. It is allowing the States to take the money they would have spent before on health and use it in a different disbursement system thereby allowing them to test out the sustainability of the system. A very sophisticated M&E systems monitors quantity of care as well as quality indicators including aspects of AMR such as compliance to hand hygiene, mother and child care guidelines, essential drug management, laboratory services, waste management etc.
- i. Saving One Million Lives (SOML) project builds on experience from NSHIP and uses some of the results based financing methods to allow all states to participate in a disbursement linked indicators payment system which incentivize states to improve the coverage and quality of maternal and child health at primary health level. The states are evaluated based on household surveys. It is a \$500m (\$1,5m dollar per state) project from the World Bank International Development Association credit.
- ii. Vertical interventions in terms of polio eradication, nutrition, routine immunizations program and malaria.
- iii. REDDISE - West Africa Regional Disease Surveillance Capacity Strengthening Project. The World Bank will help the Economic Community of West African States (ECOWAS) to improve the region's disease surveillance and response system across 15 member countries with a new grant of \$10 million through the Africa Catalytic Growth Fund. The project will help countries to establish or upgrade their disease surveillance capacity and adopt the Integrated Disease Surveillance and Response Strategy laid down by the World Health Organization and the Africa Regional Office (WHO/AFRO). The project will also offer masters-level training in disease surveillance for district health staff, and on-the-job training in laboratory techniques and disease surveillance for health workers at the frontline. They are working with JICA and NCDC is the program implementation unit for this.

- iv. In the pipeline is a project to assist the government to start off their Basic Health Care Provision Fund by assisting them to get a grant of \$20m from Global Fund and one from Bill and Melinda Gates Foundation of \$2m. This is new and is only now starting to get traction.

On the agricultural side, the World Bank is busy with some key projects to improve and expand the agricultural sector in line with the FMPRD's policy however there are none that relate to livestock except avian influenza control and animal health preparedness project which was completed in 2011.

World Bank is in the process of completing its next 10 -year strategy in which the REDDISE project is a key focal point into which AMR is integrated as well as AMR sensitive programs such as mother and child health, immunisation and NSHIP. This also is an opportunity to ensure that some of Nigeria's AMR activities may be funded.

iii. United States Agency for International Development (USAID)

The primary goal of U.S. assistance in Nigeria is to support the country's development as a stable democracy while reducing extreme poverty. USAID has planned almost \$420m in aid to Nigeria of which the vast majority is for health services, to reduce extreme poverty and improve the quality of life for Nigeria's most vulnerable communities through improved governance at the federal, state, and local levels; reduced corruption; a strengthened private sector as a source of job creation; and improved quality of social service delivery. They also continue to provide life-saving humanitarian assistance and transitional programs for stabilization in North east regions.

Their key health programs in Nigeria are delivered through sub grantees and cover the following key priorities:

- Preventing child and maternal deaths including family planning, ending preventable maternal and child health and malaria;
- Controlling HIV/Aids epidemic mainly through the key implement PEPFAR
- Combating infectious diseases through the emergency pandemic threats program to strengthen health systems to detect outbreaks, mitigate transmission and prevent epidemics. This includes TB and neglected tropical diseases;

iv. United Nations Children's Fund - UNICEF

UNICEF has the largest team of development partners in Nigeria with 9 field offices and teams in all states. Their primary aim is to support a comprehensive health care system both through systematic technical assistance focus on child health as well as provision of strategic direction and support to ensure quality of care is provided to the child.

They provide vertical program support for children's health in terms of vaccination coverage for polio as well as routine vaccinations and include the logistics of vaccine procurement and distribution on behalf of the government, new-born care, integrated communicable disease management for HIV, TB and the three killer programs of malaria, diarrhoea and pneumonia.

They have been involved in guidelines development for treatment of children including AMR aspects relating to infectious diseases and algorithm based treatment programs with rational drug use components. These form part of the PACK's guidelines for NPHCDA and clinical competency development aspects for primary health care staff. They also help develop capacity around WASH in health facilities.

They work very closely with NPHCDA and the PHC departments in the states and LGA's to assist with the development of work plans for child health.

UNICEF collects extensive indicators as part of a mother and child dashboard and is using this data to identify the areas in the country where the most specific support is required in order to drive improvements. This data should be reviewed for an AMR specific or non-specific indication. They also participate in the perinatal and maternal death surveillance reviews and audits using these data.

Their 5-year program is about to end and a new strategy is being planned to start in 2018, which presents an opportunity for the incorporation of AMR specific and non specific aspects into their service delivery packages. They are a key development partner due to their extensive on the ground network, health systems focus, programmatic and technical expertise and clinical quality focus which integrates well with the revitalisation of primary health care drive and the attainment of the childhood millennium development goals.

v. Bill and Melinda Gates Foundation

The foundation has over 100 grants and works in Nigeria to achieve the 20:2020 goals:

- Eradicate polio: Along with the World Health Organization and UNICEF, as well as at the country level, with the National Primary Health Care Development Agency and state governments, to ensure regular vaccinations and immunizations. These come in the form of grants (\$721k) to NPHCDA to assess immunization coverage and improve vaccinations in high priority states and grants to UNICEF of \$15m;
- Improve family health: They are focused on reducing preventable deaths in maternal and child health; invest in programs that provide prenatal through to postnatal care, as well as childhood immunization programs (funding part of grant in Nigeria, Kenya and Tanzania of \$3,4m). They also address common healthcare challenges, including pneumonia, diarrheal diseases, and neglected tropical diseases, as well as access to clean water and proper sanitation and hygiene. Funding also goes towards purchase of family planning commodities for the country to the value of \$1,6m;
- Strengthening healthcare systems: This includes bolstering primary healthcare and ways to integrate healthcare services to ensure a strong system for Nigeria's (\$17,5m plus \$2m). There is also a substantial grant (\$4,79m) to support the Private Sector Health Alliance of Nigeria (PHN) to improve approaches to quality care in public and private facilities in some states;
- Improve nutrition: They partner with the Dangote Foundation and others to address severe malnutrition and improve overall childhood nutrition especially in northern areas;
- eHealth and information systems which will assist the government to map out reference data to improve resource planning, policy and decision making and emergency preparedness and responses to the value of \$1,5m. They have also granted \$9,55m to CDC Foundation to support immunization data systems to ensure high quality data for strategic planning and program evaluation. They also support CHAI to improve vaccine stock visibility and stock availability in three states and local government areas to the value of \$589k;
- Laboratory and surveillance support including emergency response through a grant to NCDC for meningitis outbreak to the value of \$790m and field and laboratory activities for environmental surveillance of \$13,7m;
- Increase agricultural productivity: They are helping smallholder farmers increase the yield of important crops such as yams, cassava, sorghum, cowpeas, and rice as part of a multi country grant of \$10m, as well as the productivity of their livestock specifically supporting the dairy value chain with a grant for \$3,8m. This is achieved by providing farmers with better tools, seeds, and systems and also by supporting research and policies that help improve the lives of smallholder farmers over the long term;

- Enhance access to financial services: Programs support the government's aims to ensure that women, smallholder farmers, and other marginalized populations have access to the country's financial system, which can help them save, spend, and plan for the future more effectively.

Their investment and funding model is collaborative with the grantee and partner organizations within countries or through supporting other development partners such as WHO, UNICEF to develop proposals that align with the foundations strategic priorities, focus and capabilities. An important part of this process is reaching agreement on what success will look like for the investment. This is done through an outcome investment approach where partners are given the flexibility in how they achieve results, and are not required to report on all of their activities. Instead, the foundation focuses on purposefully measuring the most critical metrics of progress. Once strategic priorities are identified the foundation may ask for direct solicitation for the work or issues out a request for proposal for larger work.

The foundation is in the process of reviewing their strategy for the next few years and given the significant projects in Nigeria that they are working on it would be a good opportunity to align AMR within their family health and health systems strengthening activities as well as the eHealth and laboratory surveillance aspects.

vi. Global Fund

Nigeria is one of the biggest Global Fund investments where it focuses on malaria, TB and HIV. Their investments to date within Nigeria amount to over \$1,87billion. Some of their recent grants include:

- Reproductive and family health association
- Expansion of the prevention of mother to child transmission centers of excellence
- Promoting the effective participation of civil society organizations in the national response to HIV/Aids
- Program for the expansion of anti-retroviral therapy
- Scaling up the roll back malaria in 12 states and improving malaria case management through provision of combination therapy and training of healthcare providers
- Scaling up DOTS expansion
- Scaling up comprehensive HIV and AID treatment, care and support

vii. Japanese International Cooperation Agency

Priority areas for Japanese International Cooperation Agency (JICA) in Ghana include:

(1) Improvement of core infrastructure

Japan started to consider a resumption of loan extension to Nigeria in 2009. Japan contributing to the reinforcement of the power supply and its stable distribution. Transportation and other sectors are also a focus. In these areas, Japan provides aid to improve infrastructure, which in turn leads to the sustainable economic growth of Nigeria.

(2) Further social development especially in the urban areas

In the Federal Capital Territory and Lagos peripheral areas, Japan is providing support mainly towards the improvement in the quality of social services. In these areas, inadequate water supply infrastructure and insufficiency of appropriate medical care services especially in maternal, newborn and child health sector, polio and laboratory services have been posing problems for people's daily lives. To address these problems, the Japanese Government is improving water supply and medical care service provision through constructing new facilities and promoting transfer of technical skills and knowledge. Improvement of living and business environment is also expected as a result of this support.

There is also a technical cooperation project to build a biosafety laboratory in Gaduwa for NCDC and enhance surveillance capacity for communicable disease such as yellow fever, meningitis, VHF and cholera at a cost of \$20m to be completed by 2020. Then they will be extending their technical assistance to the 10 zonal NCDC laboratories plus some of the public health laboratories to enhance diagnostic capacity at a cost of \$1,2- 1,4 m per annum until 2021. They will focus on technical assistance to surveillance systems and not in laboratory information systems. The Japanese will be sending their in country experts to provide this technical assistance to Nigeria.

JICA has criteria for funding which includes:

- No counterpart funding is needed by the country
- Small amounts around \$0,5m are only provided
- No technical assistance is required from FMOH
- The FMOH must pay for running costs such as staff, reagents and electricity. JICA will pay for equipment where needed.

viii. United States Center for Disease Control (US CDC)

The US CDC country mission sees AMR as slightly to the side of core CDC activities however it is a spin off from their other action packages. Their overall funding in Nigeria is still quite low and they don't have a laboratory funding line as yet. Their main support is to HIV and TB and meningitis outbreak response to understand susceptibility patterns for appropriate treatment and this has had spill over effects to other infectious disease such as yellow fever and flu. They believe the focus should be on the GADUWA laboratory to maintain quality and invest in staff rather than generating surveillance data across the country from various laboratories and the quality of these laboratories is not good. There are also close parallels in the laboratory models for TB and AMR, which should be explored more deeply.

They are also providing technical support to IPC through the curriculum development process at the University of Lagos training programmes (supported by Exxon Mobil). Little activity going on around one health, even though CDC support it. They believe that the entry point for AMR should be within the JEE.

ix. Food and Agriculture Organisations (FAO)

The Food and Agricultural Organization (FAO) office in Nigeria is mainly focused on crop production (where antibiotics are NOT used) whilst their office in Ghana focuses on livestock production. They believe the major livestock sector is poultry as the Poultry Farmers Association of Nigeria are big players and antibiotic abuse is widespread. This would require FMARD and NAFDAC to regulate and enforce specifically biosafety regulations and control of antibiotics and hence would require the FMARD to develop more capacity both federally and in the states and the extension workers to be reactivated.

One-Health integration has started although they have not in the past done much with WHO. FAO was involved from the JEE which provided a strong recommendation to encourage one health working and governance to do more to strengthen livestock surveillance. FAO was very actively engaged in supporting the government food safety policy over the last 2 years that is a good multisectoral policy document, however almost no implementation has occurred, as the budget is inactive.

ANNEXURE A: THE METHODOLOGY

The methodology followed was a stepwise approach to teasing out entry points and funders:

Stage 1. Review the NAP to identify entry points and AMR activities and whether plans are (partially) funded or not.

Few, if any, NAPs from LMICs have explicitly recognized the interrelatedness of priority activities with other programs and projects. Therefore, the first task involved determining opportunities where countries *can* integrate AMR activities with other programs and projects.

Aim: The aim of this stage is to find out which stakeholders/Ministries/development partners are involved in AMR; what AMR activities can be integrated into existing priority programs and plans; and which of these activities are funded.

Stage 2. Identify existing or potential funders.

Aim: The aim of this stage was to list (and if necessary prioritize) funders to interview. “Existing or potential funders” could include:

- Bodies (government, development partners, professional councils etc.) that already fund activities that are labelled as “AMR activities”
- Bodies that fund activities that are highly relevant to AMR but which may not have that label – these will most probably link to priority programs such as HIV, TB, malaria, Mother and Child health, surveillance, pharmaceutical supply chain strengthening
- Any organisation that has shown a firm interest in AMR but is not yet funding any activities
- Any other obvious omissions: big players that are active in areas relevant to AMR that have not been included above.

Stage 3. Discussions with (potential) funders and key entry programs and agencies.

The consultants visit Nigeria from the 30th October – 3rd November and conducted interviews and discussions with the potential funders and key stakeholders in AMR.

Aim: The aims of the meetings was to:

- To discuss the broad range of AMR activities to create awareness of the need for AMR support
- To identify what AMR specific or AMS sensitive activities are already funded and how long this is likely to last
- To establish what scope there is to adjust current activities so that they are more relevant to AMR.
- To establish how likely or not the body is to fund additional AMR activities.

Stage 4. Describing next steps and reporting back to country key stakeholders

Aim: To provide the teams working on antimicrobial resistance (AMR) in the country with feedback on how to scale up delivery of AMR activities through entry points into existing programmes and projects and how to access the necessary funds to do so from existing and potential funders.

ANNEXURE B: Stakeholders Interviewed

With leadership from the NCDC, GARP-Nigeria coordinated the WHO/CDDEP AMR case study interviews.

Nigeria's key stakeholders, influencers and potential funders for AMR			
S/n	Ministries/Agencies	Names	Address
1	Federal Ministry of Agriculture and Rural Development (FMARD)	Dr Gideon Mshelbwala	Director and Chief Vet Officer, Dept. of Vet and Pest Control Services. FMARD
		Dr Dooshima Kwange	AMR Focal lead, Quality Assurance and Standards Division, Federal Department of Veterinary & Pest Control Services, FMARD
		Dr Alabi Olaniran	Ministerial CODEX committee Chairman. FMARD
2	National Veterinary Research Institute (NVRI)	Dr Alex Jambalang	NVRI, Vom, Plateau State Nigeria
3	National Primary Health Care Development Agency (NPHCDA)	Dr. Jibril Mohammed, Pharm Mohammed Abubakar	Plot 68/682 Port-Harcourt Crescent, Off Gimbiya Street Area 11, Garki Abuja.
4	National Agency for Food Drug Administration and Control (NAFDAC)	Dr Monica Eimunjeze	Director, Drug Evaluation & Research Directorate.
		Dr Bukar Usman	Head of Veterinary medicines and Allied product Directorate of NAFDAC, Lagos.
5	Pharmacists Council of Nigeria (PCN)	Pharm. Moji Aizobu	Plot 7/9 Industrial Layout, Idu, P.M.B. 415 Garki, Abuja, Nigeria
6	Federal Ministry of Health (FMOH)	Mrs Ladidi Aiyegbusi	Department of Health promotions
		Dr Okwudili Okechukwu, Mr Aligu Abubakar	Department of Health Planning Research and Statistics
		Mr Emeka Elom	Department of Public Health
		Mrs Ladidi Aiyegbusi	Department of Family Health
			Department of Hospital Services
			Department of pharmaceutical services

7	National Institute of Pharmaceutical Research and Development (NIPRID)	Dr Mercy Aboh	The DG/CEO, NIPRID, Industrial Layout, Idu, P.M.B 21, Garki, Abuja, Nigeria
8	Medical and Dental Council of Nigeria (MDCN)	Dr Nnaemeka Nwakanma Dr Henry Okwuokenye	Plot 1102, Cadastral zone B11, off Oladipo Diya Road Kaura District,,P.M.B 458, Garki, Abuja, Federal Capital Territory
9	African Field Epidemiology Network (AFENET)	Dr Mohammed Mahmoud	50 Hallie Selassie Street, Asokoro, Abuja
10	World bank	Dr Ayodeji Odutolu	Plot 433 Yakubu Gowon Crescent Abuja, Nigeria.
11	Food and Agriculture Organization of the United Nations (FAO)	The Asst. FAO Representative Mr Ahmed Matane	Old CBN Building, No 4 Zaria Crescent, Off Samuel Ladoke Akintola Boulevard, Garki 2, Abuja
12	Economic Community of West African states (ECOWAS)	Dr Mohammed Faoud	Directorate of agriculture and Rural Development River Plate House CBD, Abuja
13	Japan International Cooperation Agency (JICA)	Ms Teragaki Yuriya, Project formulation Advisor	3rd Floor Oakland Centre, Plot 2940, Aguiyi Ironsi Street, Maitama Abuja.
14	African Union Scientific, Technical and Research Commission (AU-STRC)	Dr. Eng. Ahmed HAMDY, Country Representative /Executive Director	African Union Scientific, Technical and Research Commission, Plot 114 Yakubu Gowon Crescent, Asokoro, Abuja - Nigeria.
15	United Nations International Children's Fund (UNICEF)	Dr Sanjana Bhadarawaj, Chief of Health, UNICEF	Old CBN building, Area 11, Abuja.
16	Department for International Development (DFID)	Dr Chris Lewis, Senior Health Advisor	British High Commission
17	House Committee on Health	Deputy Chairman, Usman Mohammed	Three Arms Zone, National Assembly Complex, Abuja

18	Veterinary Council of Nigeria (VCN)	Registrar - Dr Josiah Kantyok	Maitama, Abuja.
19	US-CDC	Country Representative, Dr. Mahesh Swaminathan	US-EMBASSY, Abuja
20	National Environmental Standards and Regulation and Enforcement Agency (NESREA)	Mr Aremu Abdullahi	NESREA, Abuja
21	Medical Laboratory Science Council of Nigeria (MLSCN)	Dr David Ogbolu	Plot 1166, Muhammad N. Umar lane, Durumi Phase II, Garki, Abuja
22	NCDC	CEO, Dr Chikwe Iheakweazu	Nigeria Centre for Disease Control, Jabi
23	GARP-Nigeria	Country Coordinator Estelle Mbadiwe	Ducit Blue Solutions, 18 John Kadiya Close, Asokoro, Abuja

References

- ¹ Federal Ministry of Health; National health Policy 2016: Promoting the Health of Nigerians to Accelerate Socio-economic Development, September 2016
- ² Program for results to Support the Saving One Million Lives Initiative: Technical Assessment Report, March 31 2015
- ³ Oluwole Odutolu, Nnenna Ihebuzor, Ritgak Tilley-Gyado, Valentina Martufi, Michael Ajuluchukwu, Olalekan Olubajo, Bolanle Banigbe, Opeyemi Fadeyibi, Rabiya Abdullhai & Ado J. G. Muhammad (2016) Putting Institutions at the Center of Primary Health Care Reforms: Experience from Implementation in Three States in Nigeria, *Health Systems & Reform*, 2:4, 290-301, DOI: 10.1080/23288604.2016.1234863
- ⁴ Federal Ministry of Health; Comprehensive EPI multi-year Plan 2011 – 2015, National PHC Development Agency, May 2011
- ⁵ Federal Ministry of Health; Nigeria Supply Chain Policy for Pharmaceuticals and Other Healthcare products, Department of Food and Drug Services, February 2016
- ⁶ Federal Ministry of Health; National Drug Distribution Guidelines, 2nd edition 2012.
- ⁷ Federal Ministry of Health; National Quality Assurance Policy for Medicines and Other Health Products; August 2015
- ⁸ Food And The Future By Chief Audu Ogbah, OFR, Honorable Minister of Agriculture and Rural Development At The Convocation Lecture Delivered at the Federal University of Agriculture, Abeokuta Ogun State, Nigeria on 19th October, 2017
- ⁹ Federal Ministry of Agriculture and Rural Development. Agriculture Promotion Policy (APP) 2016-2020; Building on the Successes of the ATA, closing key gaps. Policy and Strategy document. June 21, 2016.
- ¹⁰ Uzochukwa BSG, Ughasori MD et al. Health Care financing in Nigeria: Implications for achieving Universal Health Coverage; *Nigerian Journal of Clinical Practice*, Jul – Aug 2015, vol 18, issue 4.
- ¹¹ Federal Republic of Nigeria. Health Financing Policy Zero Draft 2006.
- ¹² Federal Republic of Nigeria. National Health Policy; Promoting the Health of Nigerians to Accelerate Socio-economic Development. 2016
- ¹³ Nigerian National Health Act, Act no 8 of 2014
- ¹⁴ WHO Regional Office for Africa. WHO Country Cooperation Strategy 2014-2019 - Nigeria. 2014.