

Terms of Reference for Request for Proposals

for The Fleming Fund Country Grant to Bangladesh

1 Overview of this grant

This is a Request for Proposals (RFP) for the Fleming Fund Country Grant to address critical gaps in surveillance of antimicrobial-resistant bacteria in Bangladesh. It has been created in response to a Request for Support from the Government of Bangladesh (GoB). The grant will be funded by the UK Department of Health and Social Care (DHSC), under its Fleming Fund Grants Programme, which is managed by Mott MacDonald, the Management Agent.

This Fleming Fund Country Grant for Bangladesh will focus on establishing AMR surveillance systems in the human, animal and aquatic sectors. It will also progress and develop work already underway in surveillance of antimicrobial consumption and use. The Grantee will facilitate the development of a national and sector specific surveillance strategy and then support its implementation in the human, animal and aquatic sectors, capacitating reference laboratories and surveillance sites, and developing effective data management systems. The Grantee will also facilitate multisectoral governance of AMR, AMC and AMU surveillance, with a One Health approach.

The Grantee (or Lead Grantee, if a consortium) will be responsible to Mott MacDonald for all aspects of the grant including the management of any sub-grantees in the consortium, and their performance, technical delivery and financial accountability. The Grantee will be expected to sign the Grant Agreement with Mott MacDonald and will be expected to enter into sub-granting arrangements with partners on the same back-to-back terms.

The Grantee will need to work in close coordination with the GoB's National Technical Committee (NTC), as well as Mott MacDonald and other stakeholders, as needed. The Grantee will also be required to harmonise efforts on this Country Grant with other types of grants under the Fleming Fund Grants Programme, namely Regional Grants and the Fleming Fellowship Scheme.

This grant is expected to last 21 months ending no later than September 2021. Grant applications should be in the region of £4-5 million, including all capital, procurement, recurrent costs, and overheads and management costs.

2 Overview of the Fleming Fund

2.1 Introduction

The UK Government has established the Fleming Fund to respond to the global threat of drug-resistant infections due to bacterial Antimicrobial Resistance, also known as AMR. The Fleming Fund will be a critical tool in achieving the resolution of the 68th World Health Assembly, 2015 (WHA A68/20), and in realising the 'Political Declaration of the High-Level Meeting of the United Nations General Assembly (UNGA) on Antimicrobial Resistance, 2016'. These recognise that urgent cross-sectoral rationalisation of antimicrobial use, and prevention and control of infections in humans, animals, food, agriculture, and aquaculture sectors, are key to tackling AMR and call for: innovative research and development; affordable and accessible

antimicrobial medicines and vaccines; improved surveillance and monitoring; increased governance on antimicrobial use; and increased international cooperation to control and prevent AMR.

The Fleming Fund aims to address critical gaps in surveillance of antimicrobial-resistant bacteria in low- and middle-income countries (LMICs) in Asia and Sub-Saharan Africa. Countries in these areas are set to bear the highest burden of drug resistant infections. A Global Action Plan on Antimicrobial Resistance (GAP-AMR) has been developed by the World Health Organization (WHO), which acts as the blueprint for a multi-stakeholder global response to averting a global health crisis caused by AMR.¹

The Fleming Fund comprises a number of workstreams (see www.flemingfund.org for more information). One workstream provides support to the Tripartite Alliance – the Food and Agriculture Organization (FAO), the World Organisation for Animal Health (OIE) and the World Health Organization (WHO) – as part of the OH approach. Through funding to the Tripartite Alliance, the Fleming Fund has contributed to the development of National Action Plans (NAPs) in Sub-Saharan Africa, South and South East Asia, and to the building of the evidence base and guidance for AMR surveillance. This work will be critical for the overall success of the Fleming Fund Grant Programme and underpins the delivery of the portfolio of Country and Regional Grants and the Fleming Fellowship Scheme, as these will target capacity gaps identified in NAPs. The Fleming Fund also funds initiatives in academic institutions to develop guidance on the development of AMR surveillance systems.

The Fleming Fund Grants Programme is the largest stream of financial support available through the wider Fleming Fund. The DHSC has appointed Mott MacDonald as the Fleming Fund Management Agent for the Fleming Fund Grants Programme. Mott MacDonald is a global company with expertise in multi-sectoral international development and fund management. On behalf of the UK Government, Mott MacDonald is responsible for funding allocation and oversight of all investments made across the whole portfolio of grants in different activities and in different countries.

The aim of the Fleming Fund Grants Programme is to improve the ability of recipient countries to diagnose drug-resistant infections, with an emphasis on bacterial infections, and to improve data and surveillance to inform policy and practice at national and international levels. The overall goal is to avert the human and economic burden of AMR.

The geographic focus of the Fleming Fund Grants Programme is 20-24 LMICs from Sub-Saharan Africa, and South and South East Asia, including Bangladesh. It can provide financial support up to 2021 to participating countries via three funding channels:

- Country Grants
- Fleming Fellowship Scheme Grants
- Regional Grants

The Fleming Fund will be independently evaluated by Itad, a specialist evaluation firm appointed by the DHSC for this purpose.

¹ <http://www.who.int/antimicrobial-resistance/global-action-plan/en/>

2.2 Problem statement to be addressed by the Fleming Fund

The main issues to be addressed by Fleming Fund Country Grants are outlined below (*please note*: these are general issues in LMICs with regard to AMR, and may not all be relevant in the case of Bangladesh):

- There are too few microbiologists and laboratory technologists and even fewer with adequate training to undertake the volume of testing required for representative surveillance on AMR.
- There are few health facilities that routinely undertake bacterial culture; still fewer facilities that meet the requirements for accreditation, or who do routine Antimicrobial Susceptibility Testing.
- There is no culture of surveillance for AMR in healthcare delivery
- There is little perceived use of surveillance data at any level
- There is a lack of knowledge on the use and consumption of antimicrobial agents across One Health sectors.
- There is a lack of antimicrobial stewardship.
- Logistical challenges are significant: transporting samples in a safe and secure manner under challenging transport conditions; ensuring a quality assured and sustainable supply chain for reagents and consumables; and ensuring appropriate servicing of equipment are a few examples.
- Surveillance systems (national, regional and global) that do exist are often vertical in nature, are not linked, and are often unwilling to integrate.
- There are weak One Health structures and there is poor inter-sectoral collaboration.
- There is a heterogeneous picture across countries and regions in terms of starting points, political will, capability, and donor interest and engagement.
- There are poorly defined and applied quality assurance standards in laboratory testing.
- There is lack of understanding across all sectors on transmission patterns and drivers such as inappropriate use of antimicrobial drugs.

2.3 Fleming Fund investment areas and outputs

To address the problems above, the Fleming Fund Grants Programme invests in:

- Laboratory infrastructure enhancement;
- Human resource strengthening and workforce reforms;
- Surveillance systems strengthening;
- Building foundations for AMR surveillance data use; and
- Promoting rational use of antimicrobial medicines.

Investment in these areas is expected to achieve the following outputs:

- Improved laboratory skills for bacterial identification and Antimicrobial Susceptibility Testing (AST); and, therefore, improved data quality;
- A strengthened One Health workforce with a range of relevant skills for AMR surveillance;
- Stronger AMR surveillance systems and processes at country and regional levels;
- Higher demand for AMR data at regional, country, subnational and facility levels; and
- Better knowledge of country level patterns of prescribing practice and use of antimicrobials (particularly for bacterial infection) across sectors.

Fleming Fund outputs are expected to contribute to the following country outputs:

- Increase in quality and quantity of AMR and AMU data collected;
- AMR and AMU data shared in country to support evidence-based policy and practice; and
- AMR and AMU data shared internationally to improve and inform the global response, in particular via the WHO GLASS programme for human health AMR data.

The RFPs for Country Grants have been designed to ensure that investments and activities contribute directly to outputs. Grantees are expected to adhere to and demonstrate this alignment and contribution to outputs in their applications.

2.4 Core principles within the Fleming Fund Grants Programme

The Fleming Fund is built on four core principles. In addition, the programme is also committed to evaluation, continued improvement and Value for Money (VfM). The Grantee is expected to demonstrate how they will align with these principles while implementing the grant.

1. **Country Ownership:** The Fleming Fund Grants Programme will work closely with GoB to ensure that activities undertaken through this grant are in line with Bangladesh's National Action Plan on AMR (NAP). The Grantee is expected to plan and implement activities in close consultation with GoB, keeping country priorities and needs in mind, but within limits of the scope as mentioned in this RFP. Unless there are good reasons not to do so, Fleming Fund grants will chiefly invest in the public sector to support development of national public health systems.
2. **One Health:** The Fleming Fund recognises that the problem of AMR is a great danger to human health and cannot be controlled without a OH approach. A specific set of OH investment parameters has also been developed and are summarised below. This approach is aligned with key documents and guidelines from OIE² and FAO³ as well as the Global Action Plan.
 - a. **Collaborative multi-sectoral governance of AMR:** Leadership and resourcing of AMR surveillance and mitigation measures in all sectors that contribute to the emergence of AMR.
 - b. **Integrated AMR and antimicrobial use and consumption surveillance in all sectors:** Surveillance in humans, livestock, aquaculture, crops, food and the environment to produce information that is interpreted by multi-sectoral teams to help understand factors associated with AMR emergence within and between sectors.
 - c. **AMR mitigation policies and programmes prioritised across multiple sectors:** Evidence-based policies and programmes for AMR mitigation measures that are prioritised across the relevant sectors, based on information generated through AMR, AMU and AMC surveillance in all sectors.

The applicants should explicitly propose activities in the application to demonstrate how they will achieve the above.

3. **Alignment of Approach:** The Fleming Fund Grants Programme will seek to invest in areas which complement and build on work done to date. Grant applicants will need to demonstrate that they understand GoB investments and other actors' work in the field of improved laboratory capacity (both within and outside the sphere of AMR surveillance), improved disease surveillance, and the One Health approach. The Fleming Fund Grants Programme will assess grants for duplication of efforts and/or the development of parallel systems. To the extent possible, applicants will need to demonstrate how their proposals add value to existing and planned investments and systems.
4. **Sustainability:** The Fleming Fund Grants Programme will focus assistance on national systems with a view to long-term sustainability. Investment size and scope should, as far as possible, be aligned with national

² OIE Standards, Guideline and Resolution on Antimicrobial resistance and the use of antimicrobial agents;

³ The FAO Action Plan on Antimicrobial Resistance, 2016-2020.

government spending so that systems created with Fleming Fund grants are sustainable within the public health system. We also recognise that the public good of conducting AMR surveillance means medium- to long-term support, and it is expected that countries that demonstrate good performance will have access to additional funds to provide ongoing support. Applicants should explain how they will undertake actions to achieve sustainability on a long-term basis.

2.5 Fleming Fellowship Scheme

The Fleming Fellowship Scheme is part of the broader Fleming Fund Grants Programme and is also managed by Mott MacDonald. Fellowships will provide grants to fund an 18-month programme of structured learning, mentoring and skills development for 9 fellows in Bangladesh (see annex 2). Rather than duplicate basic training, the Fellowships will focus on building advanced skills and leadership to promote the application of best practice in identified 'Beneficiary Institutions'. Beneficiary Institutions are organisations that add strategic value and complementarity to achieve the Fleming Fund's aims in the country, and who are likely to derive sustainable benefit from the Fellowship activities, such as AMR reference laboratories, national epidemiology units, hospitals and/or national drug administration agencies.

The initial focus will be on strengthening the quality of laboratory diagnostic data and the analysis and use of AMR and AMU surveillance data in Beneficiary Institutions. The scheme will support individuals and institutions to build the sustainability of programmes that seek to address AMR. The data they generate will be applied to deliver evidence-based approaches to tackling AMR, for example to improve antimicrobial stewardship.

In close discussions with GoB, Mott MacDonald has identified priority areas to be supported through Fellowships and the Beneficiary Institutions under the Fellowship Scheme. Details are attached as annexure 2 to this RFP. Each Fellow will be matched with a 'Host Institution' from a list of institutions which have already been identified by Mott MacDonald.

Mott MacDonald will select Fellows through a separate process. Following selection, each Fellow, together with their Beneficiary and Host Institutions, will develop a budgeted work plan which will be agreed and funded by the Fleming Fund through the Host Institution. Activities will include mentoring, secondments, participation in collaborative projects and specialised training that will support the Fellows within their workplace. These institutions will also support Fellows' workplaces to allow Fellows to implement what they have learned.

We expect this process to run in parallel with the selection of the Grantee for the Country Grant, which will enable the Grantee and the Host Institutions to align their work programmes. However, the Grantee for the Country Grant should not budget for any activities associated with the Fellowship Scheme as these will be managed by the Host Institution.

2.6 Fleming Fund activities in Bangladesh to date

To develop the Country Grant for Bangladesh under the Fleming Fund Grants Programme, Mott MacDonald carried out visits to the country in January 2019, March 2019 and April 2019 to undertake discussions with GoB and other stakeholders. During these visits, Mott MacDonald met senior government officials, external development partners, technical experts, and undertook visits to select AMR surveillance sites and laboratories in both human, animal health and aquaculture sectors, to understand the current AMR and AMU situation in the country, the programmes that are being implemented, and the current human and animal health laboratory infrastructure and capacities for supporting AMR surveillance. The discussions identified

major gaps and needs for strengthening AMR and AMU surveillance in humans and animals which will be supported by the Fleming Fund Country Grant for Bangladesh.

3 The current AMR situation in Bangladesh

3.1 National Action Plan on AMR

There is an approved National Strategy for Antimicrobial Resistance Containment in Bangladesh: 2017—2021. This was developed by a multisectoral “Core Working Group” with the support of WHO. Its objectives are to: establish a multi-sectoral approach to planning, coordination and implementation of ARC antimicrobial resistance containment activities; promote and ensure rational use of antimicrobial agents in human health, livestock and fisheries; promote and strengthen infection prevention and control measures to minimize the emergence and spread of antimicrobial resistance (AMR); promote and strengthen bio-safety and bio-security principles and practices and containment measures; review, update and strengthen regulatory provisions; strengthen surveillance system for AMR containment; promote operational research and education in the area of AMR; and establish advocacy, communication and social mobilization.

The strategy states the importance of effective multisectoral working, whilst anticipating that much of the responsibility of implementation of the strategy will fall on the Ministry of Health and Family Welfare. Multisectoral Planning and coordination arrangements are specified down to upazila (subdistrict) level and membership of all these committees is listed, with brief outline terms of reference. In practice however, none of these coordination arrangements are fully functional. There is interest in tackling AMR from both the Ministry of Health and Family Welfare, and the Ministry of Fisheries and Livestock but as yet they have little experience of working together on the problem.

A National Action Plan (2017 – 2022) has been developed. Most of this takes the form of a roadmap stating activities, output indicators, responsible authorities and timeline.

In the absence of an AMR, AMC and AMU surveillance strategy some fundamental decisions remain outstanding in the human health sector, including the selection of the national reference laboratory, agreement on how AMR data will flow, and final confirmation of the surveillance sites. Although the GLASS 2017/2018 report⁴ indicates that there is designated human health NRL with and several sites assimilated into an AMR network, in fact the final decision has not been ratified and no AMR data has been reported at the national level. The animal and fisheries sectors seem to have made progress towards making these decisions. However, the national reference laboratory(ies) have not been formally agreed at ministerial level and the surveillance strategy needs to be developed. Consideration also needs to be given to how results will be brought together from the different sectors.

3.2 One Health

The One Health Hub Bangladesh (<http://www.onehealthnetwork.asia/node/95>) was launched in 2010 and serves as a networking and coordination hub connecting people, organisations and groups involved in One Health activities in Bangladesh. The Hub, together with the South Asia One Health Network, provides a communication and coordination framework in which projects and cross-sectoral collaboration are

⁴ WHO 2019. Global Antimicrobial Resistance Surveillance System (GLASS) Report: early implementation 2017-2018

supported with facilities for networking, communication and resource sharing. Founding government organisations for the One Health Hub Bangladesh are the Institute of Epidemiology and Disease Control and Research (IEDCR) within the Directorate General of Health Services in the Ministry of Health and Family Welfare, and the Epidemiology Unit in the Department of Livestock Services within the Ministry of Livestock and Fisheries. The Bangladesh One Health Hub is connected to similar One Health Hubs throughout South Asia, as part of the regional One Health Network-South Asia, which supports One Health communication, collaboration, professional networking, projects and training activities across the South Asia region. Under the programme, the One Health Hub South Asia network provided opportunities to develop capacity in human and animal health sectors through offering opportunities to undergo Master of Public Health (MPH) and Master of Veterinary Medicine (MVM) courses conducted by Massey University in two rounds.

An institutional body, the One Health Secretariat, was created in 2017 and formally recognised by all participant ministries (environment, health and livestock). Although it is physically located at IEDCR, the leadership role is assumed by each sector in turn and is currently held by health. The secretariat is currently writing its new strategic framework and it will include, for the first time, AMR. So far, the main activities of the Secretariat have been to support the creation of One Health outbreak investigation teams and promoting One Health through activities such as conferences. A One Health Institute was created at Chattogram Veterinary and Animal Science University (CVASU) last year but is dedicated to research.

3.3 AMR Surveillance – human health

Bangladesh has identified AMR as an important area for public health action and enrolled in GLASS in 2018 but has not yet reported data into GLASS. There is no formal surveillance network yet established, and the country is in the process of identifying laboratories for the AMR surveillance network.

Bangladesh's priority specimens and pathogens are aligned with WHO GLASS recommendations (table 1). However not every site is currently able to collect and analyse all specimens.

Table 1: Priority pathogens for surveillance in human health

GLASS priority Pathogens	Sample	Proposed collection sites
<i>Escherichia coli</i>	Blood, urine	All sites
<i>Klebsiella pneumoniae</i>	Blood, urine	All sites
<i>Acinetobacter baumannii</i>	Blood	All sites
<i>Salmonella spp</i>	Blood, stool	All sites
<i>Shigella spp.</i>	Stool	All sites
<i>Staphylococcus aureus</i>	Blood	All sites
<i>Streptococcus pneumoniae</i>	Blood, CSF	Sites capable of culture to be finalised
<i>Neisseria gonorrhoeae</i>	Urethral swab / cervical swab	Sites capable of culture to be finalised

Some AMR surveillance is being carried out under a five-year project (2016 – 2020) funded by the US Center for Disease Control and Prevention (US-CDC) Atlanta. Under this project, IEDCR is supporting 10 sites to carry out surveillance for AMR. The sites were selected on the basis of their geographic location, their ability to enrol patients and on the availability of a laboratory with the capacity to do culture and AST. Implementation started in 5 sites in March 2017 and 3 others commenced in August 2018. It has yet to begin in the other 2 sites. Of the five sites currently under discussion by GoB to receive future support from the Fleming Fund

(see section 4.3), two of them (Mymensingh and Rangpur Medical Colleges and Hospitals) were in the first wave of the US-CDC project, and two (Dhaka and Khulna Medical Colleges and Hospitals) were in wave two.

The surveillance strategy used in this project includes clinical specimens collected, transported and processed according to protocols developed with the help of US-CDC (Atlanta). However, the selection of cases represents only a miniscule proportion of patients who require bacterial culture. The number of samples and type of specimens collected varies between surveillance sites and not all sites are doing blood cultures. The data being generated by the project has not yet been submitted to the focal point for submission to GLASS.

The project is highly dependent on project facilitators in each of the surveillance sites who are being paid a monthly salary to oversee activities and report results to IEDCR. Other site staff including clinicians, clinical microbiologists, nurses, laboratory technologists, laboratory attendants, and support staff (up to 10-12 in each site) are also paid an honorarium for case identification, processing and sending of samples according to the protocol. This project functions in parallel with routine clinical work and it is doubtful whether these activities will continue once the project finishes due to HR constraints. Some equipment has been provided by the US-CDC for this project although not all of it is fully functional.

US-CDC funding is due to end in March 2020, with the possibility of a no cost extension, so there will be some overlap with the Fleming Fund Country Grant.

3.4 AMR Surveillance – animal health

In the animal health sector there are two main laboratories: Bangladesh Livestock Research Institute (BLRI) the national level research institute, and Central Disease Investigation Laboratory (CDIL) which leads the veterinary laboratory network system under the Department of Livestock Services (DLS). See section 3.8 for more details.

Both laboratories carry out AMR surveillance.

They receive funding and/or support from GoB, international research institutes or grants, iNGOs and UN agencies. The coordination and collaboration between these laboratories were found to be a challenge. The data reported by IEDCR are only for their project requirements whereas data generated by CDIL is shared with DVS.

BLRI has been engaged in a variety of AMR-related projects with the support of GoB and various donors including EcoHealth Alliance USA, International Livestock Research Institute (ILRI-Kenya), and GHSA/US-CDC. Projects include establishing the prevalence of and multidrug resistant foodborne pathogens in the livestock and poultry value chain in Bangladesh, studying the epidemiology and emergence of multidrug resistant *enterobacteriaceae* in free ranging wildlife in Bangladesh, researching spatial and temporal variations of resistant *enterobacterias* in migratory birds and establishing the prevalence of AMR foodborne pathogens in different value chains (fish, poultry, tomatoes).

FAO currently supports sink surveillance of avian influenza in live bird markets. As of last year, FAO supported the additional sampling of caeca at live bird markets for AMR surveillance. Samples for both surveillances are thus carried out by the same DVS staff during a single visit. Samples for AMR surveillance are taken to CDIL for identification of *E.coli*, and AST testing using disc diffusion (15 antibiotics), including screening for ESBL production. Not all samples have been analysed yet.

3.5 AMR Surveillance – aquaculture

There are currently no AMR activities being carried out in the country in aquaculture, although GoB is reported to be developing a National Fish Health Management Strategy which includes AMR surveillance, AMU, and activities to increase awareness on AMR. The strategy is yet to be signed off. WorldFish and FAO have recently started to collaborate with the aquaculture sector to develop surveillance strategies and raise awareness about AMR.

3.6 AMC/AMU Surveillance

The Directorate General of Drug Administration (DGDA) is the national drug regulatory authority which is under the Ministry of Health and Family Welfare. DGDA regulates all activities related to import and export of raw materials, packaging materials, production, sale, pricing, licensing, and registration of all kinds of medicine. The DGDA deals with drugs both in the human as well as the animal health sector.

A task force headed by the DGDA has been constituted to monitor antimicrobial consumption in Bangladesh. Two studies are being carried out at the DGDA supported by WHO for this purpose and the results of these studies will be reported to a specially constituted task force.

The first study aims to monitor the consumption of antimicrobials in Bangladesh and monitors the total production, import, export, distribution and destruction of antimicrobials in Bangladesh. The other study being carried out as a pilot is a point prevalence study on the use of antimicrobials in selective hospital clusters and community (pharmacy based). These studies are supported by WHO which has provided the manpower with space provided in the DGDA. The results of these studies will be submitted to the task force in August 2019. The Fleming Fund proposes to support continued monitoring of AMC and a further point prevalence study(ies).

3.7 Laboratory capacity – human

Clinical microbiology laboratory services in the public sector are mostly available only at the large teaching hospitals and generally are provided by the laboratories of the affiliated medical colleges rather than by the hospitals themselves. It is likely that Fleming Fund support will be targeted towards these laboratories as the affiliated hospitals serve large populations. However, there are many challenges partly because the funding, staffing and administration of the colleges is different from those of the hospitals.

The laboratories in the colleges have a limited budget, mainly to cater for teaching, which is therefore very inadequate to cater for the requirements of the patients in the hospitals. All patients except the very poor pay for laboratory tests which currently creates a disincentive for patients (and clinicians) to use those services. The fees generated by these tests go to the treasury and not back to the hospital/laboratory.

The working hours of the laboratories are usually from 0800hrs to 1430hrs and so clinicians are not able to send samples for microbiological examination outside of working hours. Furthermore, the laboratories have constraints of manpower to function effectively for 24 hours. Many clinicians work similar hours (0800-1430) in the public sector hospital and maintain a private practice in the afternoon.

All these factors and others result in only a limited number of specimens being sent to the laboratories and a lack of confidence by clinicians in the ability of public laboratories to deliver actionable reports.

In terms of capacity, in the laboratories assessed by the Fleming Fund the staff have the knowledge and the skills to carry out culture and AST of almost all the GLASS priority pathogens; however, they only do so for

research related work and not on routine clinical specimens. The laboratories do not have any automation, so blood cultures and identification of pathogens and AST are done manually when and if they are done.

Some laboratories are understaffed as there has been a 10-year stop on the hiring of new laboratory technologists which is under deliberation in the High Court. At present, when a technologist retires or leaves s/he is not replaced. The laboratories have the required infrastructure in terms of space, water and electrical supply.

The requisition forms for clinical investigation are on paper and have very few clinical details for correlation. The results are also sent in paper form and are usually picked up by patients or their relatives. Records of all investigations are maintained in registers. None of the laboratories assessed used WHONET for recording data and also did not store data electronically. There are no LIMS in place and no systems to ensure urgent feedback to the wards or treating clinicians.

In some hospitals clinicians rely on the private sector to supplement public laboratory services; in some cases, laboratories located nearby closely align themselves with individual clinicians. The quality of laboratory services in the private sector – hospital, research institution based and stand-alone – is reported to be very variable. However, some are known to be good, and may already be carrying out accurate AST which could contribute to surveillance if the sharing of data were encouraged and facilitated.

3.8 Laboratory capacity – animal

Veterinary diagnostic laboratory services are provided by one Central Disease Investigation Laboratory (CDIL) and nine Field Disease Investigation Laboratories (FDILs). They are all under the Director General DLS, under the Secretary of Livestock. A Livestock Research Institute (LRI) has been established as a separate Directorate outside of DLS and has the mandate to produce a wide variety of animal (including poultry) vaccines. Research is carried out by the Bangladesh Livestock Research Institute (BLRI), which has its own Director General, under the Secretary of Livestock.

This Fleming Fund country Grant will focus on BLRI and some of the CDIL network. Currently, both BLRI and CDIL laboratories are able to process bacterial isolates but their capacity differs considerably. Over the years BLRI has received significantly more funding than CDIL.

Bangladesh Livestock Research Institute

BLRI operates directly under the Ministry of Livestock and Fisheries with its own Director-General reporting directly to the Secretary of the Ministry of Fisheries and Livestock. Its primary mandate is research. Its Animal Health Research Division houses the microbiology laboratory which is a PSL 2, with the best capacity in the animal health sector. This will be further enhanced by investment from US-CDC (due for completion by the time the Fleming Fund Country Grant begins). BLRI is engaged in several AMR-related research projects as outlined in section 3.4, giving it international exposure and recognition, and is the national reference laboratory for the surveillance of diseases of national and international importance. It is the reference laboratory for the South Asian Association for Regional Cooperation (SAARC) regional Peste des Petits Ruminants (PPR) surveillance system. It is also the national reference laboratory for Foot-and-Mouth disease and Avian Influenza. No national AMR reference laboratory has been officially identified in the animal health sector, but BLRI maintains that it effectively has the mandate.

Once refurbishment has finished, biosafety and biosecurity are expected to be of good quality (controlled access, waste management, use of PPE, air shower, etc.). Equipment is likely to be very up to date as well,

with some molecular capability. However, external quality assurance schemes and SOPs may need to be developed to match recently acquired capacity and capability.

Although BLRI receives some funding from GoB, it is also reliant on aid funding for equipment, consumables and staffing. Project supported staff of relevance to AMR include two microbiologist PhDs (funded by US CDC until late 2019) and an epidemiologist. The two permanent scientists have between them a master's degree, doctorate in veterinary medicine and a PhD. Technicians all have at least a BSc in animal husbandry and several hold a master's degree and a doctorate in veterinary medicine. Despite the reliance on project funding, staff turnover is low. BLRI has provided training and support to CDIL.

Central Disease Investigation Laboratory

CDIL operates under the Department of Livestock Services (under the Ministry of Livestock and Fisheries) and sits at the head of a network of nine Field Disease Investigation Laboratories (FDIL) across the country. Its main task is to analyse clinical samples from sick or dead animals, sent by farmers and veterinarians. CDIL has been identified as the main laboratory that will provide leadership and technical support for the field laboratories in the animal health active AMR surveillance network. However, it will have considerable challenges to fulfil this role.

CDIL was built in 1957, with limited refurbishment since. At the time of the Mott MacDonald assessment, the laboratory was in the process of being re-organised to improve its functionality, and minor refurbishment and equipment acquisition were being considered. However, at the moment, the microbiology laboratory is very small and has limited capacity in terms of staff, space, equipment and functionality. Biosafety, and biosecurity are suboptimal. Quality assurance plans, and maintenance contracts are not in place. SOPs for bacterial identification and ASTs need to be developed and training carried out in bench microbiology and ASTs. One of the main challenges, acknowledged by senior management, is the high turn-over of staff, caused by the government transfer system which moves staff to new station every 2 – 3 years.

FAO has supported the implementation of AMR surveillance in live bird markets in Dhaka, targeted at *E.coli*, conducted by CDIL. However, laboratory capacity to handle the throughput of samples still needs to be strengthened.

CDIL has received training from BLRI and icddr,b. It partners with IEDCR on disease investigation teams and has also collaborated with CVASU and Bangladesh Agriculture University (BAU).

Field Disease Investigation Laboratories

Two Field Disease Investigation Laboratories (FDILs) in Feni and Joypurhat have been identified as surveillance sites in the AMR surveillance system to be funded by the Fleming Fund Country Grant. Mott MacDonald carried out a laboratory assessment in Feni FDIL. It had minimal equipment and bacteriology capacity, biosafety and biosecurity were suboptimal, and no AMR surveillance activities were being carried out at the time. Staffing was a concern, for the same reasons as at CDIL.

3.9 Laboratory capacity – aquaculture

Support from this Country Grant to improve laboratory capacity for AMR surveillance will focus on the Fish Inspection and Quality Control Laboratory in Savar (FIQC-Savar). The laboratory heads a network of two field laboratories exclusively involved in testing the quality of fish products for export. It sits under the Department of Fisheries within the Ministry of Fisheries and Livestock.

Tests carried out on shrimp, fish and fish feed include biochemistry, nutritional tests, residue testing and identification of bacteria. Samples are sent by exporters, plus government agencies who occasionally check products for quality testing. Throughput currently stands at about 2,500 samples/year, a decrease since the two other laboratories opened, closer to exporters' locations. As a result, the laboratory's income is not enough to cover its running costs; moreover, there has been no project funding for two years.

The laboratory is ISO accredited for bacterial identification (and IEC 2005). Test bacteria are stored in their -80°C freezer, unlike identified isolates. Staff have never carried out AST and there is a need for epidemiology capacity in the laboratory. The LIMS needs to be improved.

3.10 Antimicrobial Usage:

The pharmaceutical industry in Bangladesh is very well developed, manufacturing almost the total antimicrobial requirement of the local market. The industry also exports medicines to global markets, including Europe.

There are however concerns about the quality of drugs being manufactured by many of these firms, with insufficient laboratory capacity to test the quality of antimicrobials manufactured. There have been instances where pharmaceutical firms have been banned for production of substandard drugs including 14 companies banned from producing antimicrobials in 2017.

Although the vast majority of antimicrobials in use in the human health sector are manufactured in Bangladesh, the majority used in the animal health sector may be procured from outside the country illegally.

The key legislation common to both human and animal drugs are the Drugs Act 1940 and the Drug (Control) Ordinance 1982 that regulate import, export, manufacture, distribution and sale of all drugs. Additionally, the Drug Rules of 1945 and the Bengal Drug Rules of 1946 were promulgated pursuant to the Drugs Act, 1940. The drugs legislation in Bangladesh does not include specific criteria for regulation of veterinary medicinal products or provide for prescription requirements for the same. Even though the definition of drugs under the existing legislation includes drugs for animals, it does not however address the specific legal provisions to regulate usage, import, export, labelling, production, sale, advertisement and prescription of veterinary medicinal products. In addition, there are no specific provisions targeting antimicrobials for use in humans or animals, including an authorization procedure that pays attention to the establishment of acceptable daily intakes (ADIs) and withdrawal periods for veterinary antimicrobials. Furthermore, prescription of drugs, either by human doctors or physicians or by veterinarians, is not regulated within the existing drug legislation other than the prohibition of physicians prescribing unregistered drugs under section 14A of the Drugs (Control) Ordinance 1982. Several years ago, in compliance with international recommendations, Bangladesh placed a legislative blanket ban on the use of antimicrobials as growth promoters in livestock feed. However, the ban eventually led to antimicrobials being purchased off the shelf to be used at unknown concentrations as growth promoters in animals' drinking water. However, the Act and the Ordinance are currently under review, and an updated law merging the 1940 Act and 1982 Ordinance is expected to be passed. Meanwhile the High Court has issued directives to the Government to make the sale of over the counter antimicrobials without prescription illegal in Bangladesh.

Two organizations regulate drugs and pharmacies in Bangladesh. The Directorate General of Drug Administration (DGDA) as mentioned previously in Section 3.4 and the Pharmacy Council of Bangladesh which was established under the Pharmacy Ordinance Act in 1976 to control pharmacy practice in Bangladesh. The National Drug Policy (2005) states that the World Health Organization's current Good

Manufacturing Practices should be strictly followed and that manufacturing units will be regularly inspected by the DDA.

The Chief Veterinary Officer (CVO), through the Director General of Department of Livestock Services (DG DLS) reports anti-microbial usage in animal health to OIE but so far reports have only been submitted three times. The submitted data was only based on import data and did not include local production. At the moment, data on veterinary medicines imports is collected and compiled at the Directorate of Drug Administration and provided to DG DLS for submission to OIE. In addition, it is widely acknowledged that illegally imported drugs are sold on the market but cannot be included in the macro level data submitted to OIE. At present, antimicrobial usage or consumption data is not collected at field level (farm level) on a national scale.

At the same time, there is no effective and reliable monitoring system in place at the DGDA regarding import and production of veterinary medicine. With support from WHO, DGDA is trying to establish a National AMC Monitoring System. Therefore, unless there is a monitoring system in place, DGDA does not have the capacity to collect, analyse and report this data. As there is no legal provision at the moment for reporting, the pharmaceutical industries are not sharing their data with anyone other than the regulator.

Public sector health facilities distribute drugs free of charge. However, outside the public sector in 2015 it was estimated that there were 64,000 licensed pharmacies and 70 000 unlicensed drug stores, selling all types of medicines without prescription, including antimicrobials.

4 Scope of grant

4.1 Duration and phasing of the grant

The grant is expected to start by January 2020, and will last for approximately 21 months, ending no later than September 2021. The grant will be divided into two phases: an inception phase, expected to last up to six months, followed by an implementation phase which will cover the remainder of the grant. The table in Section 4.2 illustrates which objectives and outputs are expected to be delivered in which phase.

Proposals for the grant require a detailed budget and workplan for the inception phase. On the same budget and workplan template (which will be shared separately as a part of the Application Pack) proposals should also include an indicative budget and workplan for the implementation phase and should be detailed to the extent possible.

Continuation of the grant to implementation will be dependent on Government of Bangladesh giving final approval of the surveillance strategy.

The Grantee will work with GoB to develop a detailed work plan for the implementation phase, including a clear planned activity at each laboratory/surveillance site. The Grantee will also provide a budget, including procurement and renovation costs. This workplan, which needs to be endorsed by GoB, will need to be signed off by Mott MacDonald for release of subsequent funding for implementation. The plan should also include standard indicators to be used to measure success (see Section 9).

4.2 Grant Objectives and Outputs

The objectives and outputs for this Country Grant are summarised as follows, with more detail provided in Section 7. It is expected that applicants will respond to this RFP by developing and proposing activities that are costed, accompanied by appropriate indicators (see Section 9). All inputs must be permitted under the

list of Eligible Funding Items, as outlined in Annex 1. For human health, the Country Grant is intended to support / improve implementation of the WHO GLASS programme and Grantees should refer to the roadmap for GLASS participation produced by the London School of Hygiene and Tropical Medicine (<https://amr.lshhtm.ac.uk/wp-content/uploads/sites/12/2016/11/AMR-Surveillance-Protocol.pdf>).

Table 2: Grant objectives and outputs

Objective/Output	Inception (Initial six months)	Remaining Period
Activities related to project set up, kick off/inception meeting during the inception phase	X	
Objective 1: National and sector specific surveillance strategy finalised, with detailed workplan for the implementation phase	X	
Output 1.1: National AMR surveillance strategy finalised	x	
Output 1.2: Surveillance protocols and sampling strategies developed for human, animal and aquatic sectors	x	
Output 1.3: Surveillance sites assessed and detailed implementation plan developed	x	
Objective 2: Strengthened multisectoral governance of AMR, AMC and AMU surveillance, with a One Health approach	X	X
Output 2.1: The National Technical Committee is functioning as per approved terms of reference	x	x
Output 2.2: The Core Working Group is functioning as per agreed terms of reference	x	x
Output 2.3: Sector Coordinating Committees and Focal Points for AMR surveillance capacitated.	x	x
Objective 3: Strengthened AMR Surveillance System in the human health sector.		X
Output 3.1: AMR, AMC and AMU surveillance data collected, analysed, reported and utilised nationally and internationally		x
Output 3.2: National AMR Reference Laboratory (NRL) (human health) is established and functional		x
Output 3.3: Surveillance sites generating and sharing reliable quality AMR surveillance data		x
Output 3.4: Decision making at the surveillance sites improved with good quality samples sent to laboratories.		x
Output 3.5: Private sector laboratories contribute AMR Data to the national surveillance system		x
Objective 4: Strengthened AMR Surveillance in terrestrial animals.		X
Output 4.1: AMR Surveillance data collected, analysed, reported and utilised nationally and internationally		x
Output 4.2: National AMR Reference Laboratory(ies) (animal health) is/are established and functional.		x
Output 4.3: Increased capacity of selected surveillance laboratories to produce reliable quality bacterial culture, identification and Antimicrobial Susceptibility Testing (AST) results.		x

Objective/Output	Inception (Initial six months)	Remaining Period
Output 4.4: Biosafety and biosecurity measures are being applied within the reference laboratory(ies), surveillance laboratories and at collection sites, and ensure safe transport of samples and isolates.		x
Output 4.5: Good quality samples are regularly sent to reference and surveillance sites laboratories and isolates are regularly sent from surveillance site laboratories to the reference laboratory.		x
Objective 5: Strengthened AMR Surveillance in the aquatic sector.		X
Output 5.1: Increased capacity of FIQC-Savar to produce reliable quality bacterial culture, identification and Antimicrobial Susceptibility Testing (AST) results.		x
Output 5.2: Biosafety and biosecurity measures are being applied at FIQC-Savar and ensure safe transport of samples and isolates.		x
Output 5.3: Data management, quality control and analysis is in place.		x
Objective 6: Strengthened AMC and AMU surveillance in human, animal and aquaculture sectors	X	X
Output 6.1: AMC surveillance (National AMC monitoring) is supported, with delivery of reports biannually to the task force	x	x
Output 6.2: Prescription based studies on AMU are supported, with data collected and analysed for assessing trends	x	x
Output 6.3: Improved capacity of DDA and DLS to produce good quality AMC/AMU data in animal health and aquaculture sectors	x	x

4.3 Selected laboratories

Human health

Five human health surveillance site laboratories have been identified as priority sites to be supported by Fleming Fund Country Grant (Table 1). Of these Mott MacDonald has assessed two sites. Bangladesh is yet to identify a National Reference Laboratory/site for Human Health; this will be finalised during the development of the surveillance strategy (in the inception phase). The Grantee has to provide support (logistics, administrative and technical) to GoB in finalising the NRL for Human Health, which will be in addition to these five sites mentioned below.

Table 3: Human health – proposed surveillance sites

Site	Role	Location	Laboratory assessment
To be determined	National reference laboratory/Site	To be determined	To be done by Grantee
Chattogram Medical College and Hospital	Surveillance site	Chattogram	Completed by MM
Mymensingh Medical College and Hospital	Surveillance site	Mymensingh	Completed by MM

Dhaka Medical College and Hospital	Surveillance site	Dhaka	To be done by Grantee
Rangpur Medical College and Hospital	Surveillance site	Rangpur	To be done by Grantee
Khulna Medical College and Hospital	Surveillance site	Khulna	To be done by Grantee

Animal health

During the positioning activity, Mott Macdonald team identified five laboratories, listed below, which are most likely to be included in the surveillance strategy. However, since the surveillance strategy is not yet finalised, there is a possibility that this list may be changed. For the application purpose, applicants are requested to propose activities and budget keeping these sites in mind. However, the Grantee will undertake assessment only for the sites which are finalised in the surveillance strategy.

Table 4: Animal health – proposed reference laboratories and surveillance sites

Site	Role	Location	Laboratory assessment
Central Disease Investigation Laboratory (CDIL)	AMR National Reference Laboratory	Dhaka City	Completed by MM
Bangladesh Livestock Research Institute (BLRI)	National Reference Laboratory	Savar, Dhaka	Completed by MM
Field Disease Investigation Laboratory – Feni (FDIL-Feni)	Surveillance site	Feni municipality	Completed by MM
Field Disease Investigation Laboratory - (FDIL-Joypurhat)	Surveillance site	Joypurhat municipality	To be done by the Grantee
Poultry Training and Research Centre at CVASU	Surveillance site	Chattogram City	To be done by the Grantee

Aquaculture

During the positioning activity, Mott Macdonald team identified one laboratory for AMR surveillance in the aquatic sector, which is listed below. The Grantee will undertake assessment of this site during the inception phase.

Table 5: Aquaculture – proposed surveillance site

Site	Role	Location	Laboratory assessment
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Fish Inspection and Quality Control Laboratory – Savar (FIQC-Savar)	Surveillance Site	Savar, Dhaka	To be done by the Grantee
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4.4 Funding envelope

Grant applications should be in the region of GBP 4-5 million for the full grant period, including all capital, procurement, overhead and management costs.

The Fleming Fund wishes to see value for money (VfM), and all applicants will be expected to demonstrate their understanding of VfM. The Guidance Notes for the Grant Application Form provide further information on different dimensions to be considered as part of a VfM approach.

4.5 Procurement

4.5.1 Laboratory equipment and consumables

An indicative procurement list of equipment and consumables for the laboratories assessed by the management agent was compiled following visits by the Mott MacDonald team in April 2019 to estimate the level of support required for the laboratories. This list will be included as part of the Application Pack for information purposes.

During the inception phase, the Grantee will need to assess all laboratories not yet covered by Mott MacDonald and verify those assessments that have taken place (see section 4.3) in order to finalise detailed specifications for equipment, consumables and reagents. A procurement plan and budget should be developed by the end of the inception phase. During the implementation phase, the Grantee will be expected to undertake the procurement of laboratory equipment and consumables. The choice of procurement route will be finalised post grant signing, subject to assessment by the International Procurement Agency (IPA), a partner of Mott MacDonald in the Fleming Fund Grants Programme providing advisory services. The Grantee will be expected to work with IPA as necessary to optimise the procurement process.

Highly preferential rates have been secured by the Fleming Fund for the purchase of key laboratory instruments, namely blood culture analysers (BACTEC or BacT/Alert), automated antimicrobial susceptibility testing platforms (Vitek II or BD Phoenix), and MALDI TOF mass spectrometers (Bruker or Vitek MS).

To take advantage of these rates, these instruments will be procured centrally by Mott MacDonald's procurement partner, International Procurement Agency (IPA), who will also co-ordinate delivery.

Where identified and appropriate, blood culture analysers will be supplied to laboratories providing a clinical service, with the final number determined by the laboratory assessments. Automated AST platforms will be supplied bundled together with a mass spectrometry instrument, with the necessary databases and linkage software. Two of these bundles (i.e. two AST platforms linked with two mass spectrometers) will be supplied per country, for use in the human health and animal health AMR reference laboratories. If the reference laboratories do not have sufficient specimen throughput, or do not have the required infrastructure, the instruments may be deployed, with the approval of Mott MacDonald, to alternative sites.

These items will be paid for directly by the Fleming Fund via a grant to IPA. The costs include the instruments, delivery, import duties, installation, basic training, software and first year service contracts. Reagent costs and subsequent service contracts will come from the Country Grant budget and should be factored in to this application. All other laboratory equipment and costs will also come from the Country Grant budget and should also be factored in.

Country suppliers (Biomerieux or Beckton Dickinson) have been preselected by Mott MacDonald. However, purchase and delivery will be co-ordinated by IPA, and the Grantee will need to work with IPA to confirm readiness for delivery. Purchase of additional instruments, if required, should also be done via IPA, with the approval of Mott MacDonald, to secure the highly preferential prices offered to the Fleming Fund.

The Grantee will also be expected to:

- assist with the import and delivery of any equipment procured by IPA;
- work closely with suppliers to ensure that delivery of items is sequenced appropriately;
- maintain an asset register of all items that are defined as assets by the programme;
- regularly monitor the items that have been procured by Fleming Fund Grants Programme throughout the course of the grant to ensure: i) items are being used as intended; and ii) items are being maintained appropriately; and
- report any misuse or misappropriation of assets to Mott MacDonald.

4.5.2 Renovation of laboratories

Laboratories will require varying degrees of refurbishment under this Fleming Fund Country Grant. The Grantee will need to undertake the renovation works and procurement of necessary goods that are required for the renovation of the laboratories (e.g. benches, air-conditioning units, flooring, generators etc.).

The Grantee should undertake relevant detailed site assessments for refurbishment in the inception phase and should include the costs in the budget and proposal for the implementation phase, which will need to be subsequently be agreed and signed off by Mott MacDonald. This process should use the site assessment tool provided by Mott MacDonald, although other tools may be used in addition if further information is required by the Grantee. All applicants should make sure that sufficient personnel costs are included both for sites assessments and subsequently for the design work required for renovation and management of renovation of laboratories, both of which will need to be coordinated very closely with the GoB. Grantees should also explain how they will manage the renovation of laboratories and provide details of any experience undertaking renovation work.

Some laboratories in the human health sector may have received equipment under the US-CDC project (see section 3.3) in which case consideration should be given to whether and how that equipment could be used for continued AMR surveillance under this grant.

For all items procured under renovations, the Grantee will be responsible for:

- maintaining an asset register of all items that are defined as assets by the programme;
- regularly monitoring the items that have been procured by Fleming Fund Grants Programme throughout the course of the grant to ensure: i) items are being used for intended use; and ii) items are being maintained appropriately; and
- reporting any misuse or misappropriation of assets to Mott MacDonald.

As with the laboratory equipment and consumables, the detailed procurement plan and budget will need to be reviewed and agreed by Mott MacDonald and GoB, and the choice of procurement route will be subject to assessment by the IPA.

Please note: for this grant all applicants should insert a placeholder budget of GBP £1,500,000 for procurement and renovation related outputs /activities. This can be revised when detailed assessments have been completed by the Grantee in the inception phase to ascertain a more detailed budget for procurement of laboratory equipment, consumables, and renovation of the laboratories.

5 Key partnerships, alignment and coordination

The Country Grant must be delivered in a way which supports the national effort, and which takes account of current capacity levels, absorptive capacity, and alignment with other stakeholders working in Bangladesh. The Grantee must also ensure that activities complement and build on work done to date but at the same time avoid duplication and development of parallel systems.

In the human health sector, the delivery approach and inputs must be closely aligned with national priorities, as stated in the NAP and other related policy and strategy documents. There must also be close alignment where appropriate, with inputs being provided by other development partners supporting AMR/AMU-related activities. This means that the Grantee, in addition to working closely with national stakeholders, must work closely with other development partners involved in AMR during both the inception and implementation phases.

In the animal health sector, the delivery approach and inputs must be aligned with the NAP. Building a relationship with the One Health Partnership could also be useful to contribute to AMR information sharing in this forum.

Much of the success of this grant, in particular Objective 1, depends upon the ability of the Grantee to bring stakeholders from within and between sectors together and facilitate joint working. Close collaboration with a wide range of stakeholders at different levels in the GoB is central to the success of this grant.

The Grantee must particularly bear in mind the need to enable sustainability of AMR surveillance beyond the life of the grant. Applicants are expected to describe concrete strategies to promote the sustainability of outputs in their proposals.

6 Complementing other grants from the Fleming Fund

The Country Grant is expected to work effectively and synergistically with other grants under the Fleming Fund such as other grants under Fleming Fund Grants Programme (the Fleming Fellowship Scheme and Regional Grants), and other Global Grants such as International Reference Centre for AMR. For Global grants, please refer to flemingfund.org for further details.

The Regional Grants Programme will focus on strengthening networking and data sharing on AMR at the regional level. The Grantee is expected to liaise, through Mott MacDonald, with such grants to maximise the sharing of AMR data and learning at the regional and global levels.

It is expected that 9 Fleming Fellowships (4 in the human health sector, 3 in the animal health sector and 2 in aquaculture) will be appointed in Bangladesh. Successful applicants will receive specialised training in AMR epidemiology, AMR and AMU data management and analysis, laboratory quality management, and advanced laboratory technical skills.

Fellows are expected to become technical leaders in AMR and AMU surveillance in Bangladesh, and it is hoped that they may play a role as mentors and active trainers in capacity building activities that will be implemented through this Country Grant. The Grantee is therefore expected to work, wherever possible, in collaboration with the Fleming Fellows.

Indicative terms of reference for all the Fellowships are attached in Annex 2.

7 Detailed Objectives and Outputs

7.1 Objective 1 (inception): National and sector specific surveillance strategy finalised, with detailed workplan for the implementation phase

Output 1.1 National AMR Surveillance strategy finalised

The Grantee will provide support to country stakeholders to further develop and finalise a multisectoral National AMR surveillance strategy, which is already being developed. The surveillance strategy may extend beyond the remit of the current Fleming Fund country grant, for example to include environment and food. The surveillance strategy should confirm / further develop the multisectoral and sector specific organisational structures for overseeing surveillance and carrying out data analysis and reporting, specify how data will flow and be reported, and confirm the selection of reference laboratories and surveillance sites.

Some key issues are as yet unresolved and will need to be finalised in the course of developing the surveillance strategy:

- In the human health sector, a decision needs to be made about the location of the national reference laboratory. GoB may need support to agree and implement a rational and transparent process to identify the best location for the NRL and to ensure, as much as possible, buy-in on the final decision from key stakeholders. Similarly, decisions need to be made about how data will flow including reporting into GLASS, paving the way for output 3.1. The selection of participating laboratories in section 4.3 may need to be revisited.
- The animal health and fisheries sectors may need support in deciding on the list of surveillance site laboratories and the reference laboratory/ies. GoB may wish to share NRL functions between BLRI and CDIL, with each collaborating and performing different reference laboratory functions. BLRI could perform the most complex functions of a reference laboratory such as advanced phenotypic testing, campylobacter testing, maintaining the biorepository, broth dilution, and could perhaps provide EQA and training, whilst CDIL would perform more routine functions and head the network of participating field laboratories. The Grantee may need to work with GoB to ensure clarity of roles and responsibilities.
- GoB is reported to be developing a National Fish Health Management Strategy which includes AMR surveillance, AMU, and activities to increase awareness on AMR. The strategy is not yet signed off. The Grantee is expected to provide support so that this is aligned with the National AMR surveillance strategy.

By the end of the inception phase, we expect final approval of the surveillance strategy by GoB. This will be necessary to move to the implementation phase.

Under this output, the Grantee is expected to undertake the following activities:

- Provide support (including documentation, logistics and administrative) in organising meetings and workshops to facilitate discussions among the relevant sectors to develop the multisectoral National AMR Surveillance Strategy
- Technical assistance provided to GoB to support decision making to select and finalise surveillance sites/reference laboratories

Output 1.2 Surveillance protocols and sampling strategies developed for human, animal and aquatic sectors

All three sectors need to agree their respective surveillance protocols and sampling strategies that will generate representative samples.

In the human health sector, the current country approach is limited to active case-based surveillance of clinical syndromes which has yielded only a limited number of results. In order to increase these numbers and make the surveillance more representative, the Grantee will need to work with the Core Working Group (CWG) and sector specialists to adopt a passive surveillance approach based on routine clinical samples taken as part of good clinical care. This approach has the added benefit of bettering the utilization of microbiology laboratory facilities in participating surveillance sites, creating a demand for laboratory services from clinicians, and improving the use of antimicrobials for patients presenting with suspected bacterial infection. In the human health sector we do not, at this stage, expect development of formal case-based surveillance protocols, as these might restrict access to diagnostic microbiology to patient meeting specific criteria. Instead we expect guidance to be developed to improve utilisation of microbiology laboratories as part of good clinical care, and to ensure that good quality specimens are submitted, along with basic clinical information.

In the animal health sector, the Grantee will need to work with DLS to develop a protocol for surveillance in poultry (broilers and layers). This should initially focus on 1- 4 high density poultry production areas and be aligned with internationally available guidelines and/or the protocol developed by Mott MacDonald in collaboration with Massey University, and which will be provided to the Grantee by Mott MacDonald. It should also be of a scale that is achievable during the life of the grant.

Similarly, in the aquatic sector, the Grantee should work with GoB to support development of an AMR surveillance protocol for selected aquatic species aligned with internationally available guidelines.

By the end of the inception phase we expect that the following will have been achieved:

- Technical assistance provided to human, animal and aquatic sector technical working groups to develop and finalise surveillance protocols, sampling strategies and / or guidance for their respective sectors.
- Surveillance protocols, sampling strategies and guidance agreed for human, animal and aquatic health sectors.

Output 1.3 Surveillance sites assessed and detailed implementation plan developed

The Grantee will work with GoB to undertake a detailed needs assessment of the sites listed above in section 4.3, which have not yet been assessed by Mott MacDonald, using the tool which will be provided by Mott Macdonald. The Grantee will work with GoB to develop a detailed implementation plan for these surveillance sites. This plan should include detailed capacity building, mentorship, supportive supervision activities that

will be undertaken by the Grantee in the implementation phase. In addition, it will also include renovation, procurement and logistics for these sites.

This detailed implementation plan should be in line with the AMR surveillance strategy. The Grantee will then draw up a support plan for the laboratories including renovation, procurement of equipment, reagents and consumables, improvement of biosecurity, and capacity building. This should align with support provided by GoB, and other stakeholders and donors. The Grantee will also include in the plan other areas of capacity building which will be required to implement the surveillance strategy and achieve the outputs, such as safe transport of samples, improved epidemiological knowledge, reporting requirements, data analysis and information management system(s).

By the end of the inception phase we expect that the following will have been achieved:

- All surveillance sites and laboratories visited and assessed using the MA needs assessment tool.
- Support plan for surveillance sites and laboratories including renovation, procurement of equipment, mentorship and capacity building developed.
- Detailed workplan and budget for the implementation phase presented to Mott MacDonald.

7.2 Objective 2 (inception and implementation): Strengthened multisectoral governance of AMR, AMC and AMU surveillance, with a One Health approach

Output 2.1 A National Technical Committee is functioning as per approved terms of reference

The National Technical Committee (NTC), according to the National Strategy for Antimicrobial Resistance Containment, is the highest multisectoral and multidisciplinary executive technical body at directorate level, with members from Drug Administration, Livestock and Fisheries Directorate, senior staff from DGHS, representatives from relevant UN bodies and leaders of relevant professional bodies. It is chaired by the Director General of Health Services and has the Director, Disease Control & Line Director Communicable Disease Control as Member Secretary. The NTC is meant to meet every three months, but in practice it is not functioning as mandated and its membership may not be aligned with the Core Working Group or have sufficient representation from government sectors with a stake in antimicrobial resistance containment. The Grantee will need to provide technical assistance and other support to increase its capacity to provide technical oversight of cross sectoral AMR containment activities. The Grantee will provide support to review of membership of NTC, and also of the ToRs if necessary.

By the end of the grant we expect that the following will have been achieved:

- A ToR developed and approved (if necessary), detailing the role of the NTC and its members.
- Regular meetings are taking place (every three months) with representation from the different sectors.
- NTC has oversight of the implementation progress of the AMR Containment Strategy, including development and implementation of the surveillance strategy, workplans and budgets.
- The Grantee has assisted NTC to identify and implement approaches for encouraging a national budget contribution to AMR surveillance in human, animal and aquatic health sectors.

Output 2.2 The Core Working Group is functioning as per agreed terms of reference

Whilst the Core Working Group (CWG) is currently developing an initial draft of the surveillance strategy for the human health sector, its effective cross sectoral working has yet to be realized and the CWG is not yet fully operational. Also, its membership may need to be reviewed to ensure all sectors are adequately represented and its membership is aligned with the NTC. Its proposed functions, still under discussion, include monitoring and evaluating the implementation of the national strategy, and collecting AMR, AMC and AMU data, analysing it and making recommendations to NTC. The CWG could also be expected to have a role in overseeing implementation of the surveillance strategy. Its technical capacity is limited, the members are overloaded with other duties and there is an issue with staff turnover. As a consequence, the core working group has rarely met as a whole. The Grantee will need to provide technical assistance and other support to increase the capacity of the CWG to provide technical oversight of cross sectoral AMR containment activities.

The core working group is also expected to provide some secretariat support for the National Technical Committee, but again its capacity to do this is very limited. The Grantee will need to provide inputs to enable this function to be fulfilled.

By the end of the grant we expect that the following will have been achieved:

- There is an agreed ToR detailing the role of multi-sectoral CWG and its members.
- CWG is meeting regularly, as per the agreed TOR.
- CWG is providing secretariat support to the NTC as required.
- The CWG has the technical capacity to oversee implementation of the National Strategy and the national surveillance strategy, to review relevant technical reports and documents, to understand data from different sectors, make policy and practice recommendations based on that data, and to recommend priorities for further surveillance and research and policies.

Output 2.3 Sector Coordinating Committees and Focal Points for AMR Surveillance capacitated

The Grantee will provide technical assistance and will build capacities of the relevant officials and committees within each sector – human, animal and aquatic health – so that they can implement and oversee the respective elements of the surveillance strategy in their sectors. Furthermore, the Grantee will assist them in presenting sector specific surveillance results to aid policy making. The Grantee will specifically support Sector Coordinating Committees (SCCs) and sector specific Focal Points for this. Although Focal Points have been identified in each sector, SCCs are not operational, and both will need to receive capacity building, technical support and other inputs by the Grantee.

By the end of the grant we expect that the following will have been achieved:

- Sector Coordinating Committees are constituted and made functional with agreed ToRs and appropriate membership.
- Sector level Focal Points for AMR Surveillance are capacitated to carry out their roles.
- The sector specific surveillance results are analysed and presented for review by a multi-sectoral committee of technical experts within the CWG to assist in policy making.

7.3 Objective 3 (implementation): Strengthened AMR surveillance system in the human health sector.

Output 3.1 AMR, AMC and AMU surveillance data collected, analysed, reported and utilised nationally and internationally

The Grantee will provide assistance to strengthen data co-ordinating centre for human health, as identified in the national surveillance strategy. The centre will perform the functions as listed below, with assistance from the Grantee, which will provide support to address gaps in technical, hardware and software, and other areas.

By the end of the grant we expect that the following will have been achieved:

- There is leadership and coordination of AMR and AMU surveillance data management.
- Formal analysis of AMR and AMU data is carried out including analysis of risk factors.
- Epidemiologists and designated staff at surveillance sites are trained to analyse AMR data collected from surveillance sites and the National AMR Reference Laboratory (human health), as appropriate.
- Quality checks are regularly carried out on the data received from surveillance sites.
- Gaps in the quality addressed through technical assistance, mentorship and capacity building
- Feedback is given on nationally collated resistance data on priority pathogens to the surveillance sites through quarterly and annual reports.
- A report is produced and shared showing the results from analysis of the AMR surveillance data with the Core Working Group and other stakeholders.
- Surveillance data is being reported into GLASS.

Output 3.2 National AMR Reference Laboratory (NRL) (human health) is established and functional.

The National Reference Laboratory will have been identified during the inception phase. The primary functions will be to promote good microbiological laboratory practice within the surveillance network and other laboratories, and to serve as a resource and coordination point to harmonize laboratory testing and to collaborate with laboratories from other sectors. The Grantee will support renovation, information technology, equipment procurement and training at the selected NRL as needed.

By the end of the grant we expect that the following will have been achieved:

- The NRL undertakes supportive supervision of the surveillance sites.
- The NRL provides technical support and training for the laboratory workforce to generate quality-assured AMR data at surveillance sites (pathogen isolation, identification, AST and data entry using WHONET).
- The NRL has updated relevant laboratory guidelines and quality documents and disseminated them to surveillance sites.
- The NRL is enrolled into an EQA programme, and in turn has established a national EQAS for other sentinel surveillance site laboratories.

- The NRL provides confirmatory testing of organism and susceptibility, plus additional phenotypic characterisation of the mechanisms of AMR for unusual resistance patterns for isolates referred by surveillance sites.
- There is a sustainable and bio-secure means of transporting QC and EQA strains from the reference laboratory to surveillance sites, and for referred isolates from the surveillance sites to the reference laboratory.
- A secure biorepository of isolates has been established. This includes procurement of necessary equipment (freezers or lyophilisation equipment), developing protocols for sample storage (including SOPs for determining which isolates are stored), establishing an inventory system, and developing protocols for accessing and using archived materials.
- A collection of routine and extended⁵ QC ATCC reference strains is maintained at the NRL.
- The NRL is equipped to reach Biosafety Level 2⁶. The Grantee will aid in this by the procurement of equipment, training, controlling laboratory access etc.

Output 3.3 Surveillance sites generating and sharing reliable quality AMR surveillance data

On the basis of the laboratory assessments carried out during the inception phase, the Grantee will support renovation, information technology, equipment procurement and training at the laboratories as needed. The Grantee will need to develop and support the implementation of equipment maintenance contracts in each laboratory. As the sites vary in capability, the level and type of support offered is expected to vary between them.

By the end of the grant we expect that the following will have been achieved:

- Surveillance site laboratories are producing high quality bacteriology results, which are reported to the referring clinicians in a timely manner.
- Laboratories have appropriate Quality Management Systems in place, including:
 - Certification and maintenance of equipment
 - IQC and EQA materials provided at each site
 - Laboratories are participating in the national EQA programme established by NRL and achieving satisfactory results.
- Surveillance site laboratories are equipped to a standard level (Biosafety level 2). The laboratories are equipped with appropriate safety equipment. Biosafety cabinets are operational, maintained and being used by staff appropriately
- Bacterial culture and AST are performed using a validated international method (EUCAST or CLSI, including use of approved reagents / antimicrobial disks) at all surveillance sites.
- Basic clinical and demographic data is collected and linked with laboratory data, with due regard to patient anonymity / confidentiality.
- Surveillance sites are reporting regular (minimum monthly) epidemiological and laboratory AMR data.

⁵ Following EUCAST or CLSI international standard

⁶ Biosafety in Microbiological and Biomedical Laboratories 5th Edition – HHS Publication No. (CDC) 21-1112 – Revised December 2009

Output 3.4 Decision making at the surveillance sites improved with good quality samples sent to laboratories.

At present only a very small number of samples from patients suffering from infections are being sent to the microbiology laboratory for culture and AST. Ongoing engagement with clinical staff will be necessary across all sites to ensure appropriate sampling of patients, collection of basic patient data, and appropriate response to culture results. This is critical for establishing a sustainable, passive surveillance programme.

Laboratories will need to report results in a timely manner in order to inform patient care, and clinical staff should also be responding to culture results appropriately. Use of the clinical microbiology laboratories should be integrated into standard good clinical care of patients: as guidance, patients being treated for sepsis or severe infection (i.e. receiving intravenous antimicrobials) should have at least one set of blood cultures taken, plus additional samples as per presenting syndrome, and specimen forms should collect basic data regarding clinical presentation and antimicrobial treatment.

The Grantee will work with the surveillance sites so that training of medical/nursing/paramedical staff is conducted on proper collection, storage and transport of clinical samples for microbiological examination.

The Grantee may also need to support the establishment or better functioning of hospital AMR stewardship structures encouraging clinical and laboratory staff to use locally generated data to inform their practice and local prescribing policies etc.

Clinical and laboratory data should be captured and linked through an integrated electronic system (either Laboratory Information Management Systems (LIMS) or WHONET). Laboratories will need to report results in a timely manner in order to aid patient care, and the Grantee should develop systems to ensure real-time feedback of critical results (e.g. Gram stain, CSF cell counts, AST results) to clinicians, for example IT systems, telephone or WhatsApp communication.

By the end of the grant we expect that the following will have been achieved:

- Increased number of good quality samples are sent to the laboratory, with acceptable contamination rates and essential data recorded on the request form.
- Results are communicated to clinicians in a timely manner.
- Clinicians and pharmacists at the surveillance sites demonstrate an improved understanding of laboratory results and incorporate bacteriology results into their practice.
- Data generated at the site is analysed locally and used to inform hospital level decisions on training, infection control, stewardship and drug policies.

Output 3.5 Private sector laboratories contribute AMR data to the National Surveillance System

Most health care delivery (approximately 60%), is through the private sector and includes some laboratories which are known to be collecting good quality AMR data in large quantities. It is envisaged that inclusion of surveillance sites from this sector in the surveillance strategy may be essential for aggregation of more accurate and representative data.

The Grantee will provide the necessary support to GoB to engage with the private sector including consultation meetings and other strategies to encourage sites to participate in the national surveillance effort. The Grantee may also provide support to GoB to assess proposed sites and available data, as appropriate.

Under the terms of the Fleming Fund the Grantee cannot provide equipment or reagents for the private sector. However, the Grantee may assist these sites in submission of good quality data by including them in training and other capacity building activities provided to government and by providing the necessary software.

By the end of the grant we expect that the following will have been achieved:

- technical assistance provided to GoB in developing and finalising a mechanism of data collection from the private sector.
- some larger and more important private sector sites are submitting surveillance data to the national AMR surveillance system.
- participating private sector sites are involved in feedback and reporting initiatives alongside the government sector.

7.4 Objective 4 (implementation): Strengthened AMR Surveillance in terrestrial animals.

Output 4.1 AMR Surveillance data collected, analysed, reported and utilised nationally and internationally

DLS as the coordinating institute of the AMR surveillance programme of animal health sector, requires additional support to strengthen its AMR surveillance data collection, analysis and reporting capacity. In addition, the surveillance laboratories also require further support to improve their capacity to record and report the AMR surveillance data collected by them.

Although there is currently no information system for reporting AMR data there is an information system for control and prevention of animal diseases – Bangladesh Animal Health Intelligence System. Its main goal is to collect and analyse data and make clinical decisions based on these. It is a locally developed system, under supervision of DLS, to which modules can be added as needed and it could potentially be used to manage AMR data.

By the end of the grant, we expect that the following will have been achieved:

- There is leadership and coordination of AMR and AMU surveillance data management within DLS.
- A functional Laboratory Information Management System (LIMS) established and operational
- Regular quality checks are carried out on AMR surveillance data reported from surveillance sites
- Results for all samples tested under the AMR surveillance programme are uploaded to fit for purpose software, with laboratory results accurately matched to demographic and epidemiological details for each sample
- Quarterly and annual reports of surveillance results shared with the Sector Coordinating Committee, the Core Working Group, surveillance sites and other stakeholders.
- There is formal analysis of AMR and AMU data carried out, including analysis of risk factors where data is available.
- Epidemiologists and / or designated staff are trained to analyse AMR data collected from surveillance sites and the National AMR Reference Laboratory(ies) (animal health), as appropriate.

- Feedback is given on resistance patterns for priority antibiotics in the priority bacteria to the surveillance sites through quarterly and annual reports.
- A report is produced and shared showing the results from analysis of the AMR surveillance data with the Core Working Group and other stakeholders.

Output 4.2 National AMR Reference Laboratory(ies) (animal health) is/are established and functional.

The national reference laboratory(ies) should promote good laboratory practices within the surveillance network and serve as a resource and coordination point to harmonise laboratory testing. Whilst BLRI can be expected to have reasonable capacity and could play a role in building the capacity of other laboratories, microbiology capacity in CDIL has limited capacity. Although CDIL has some experience of AMR surveillance (sampling and culture of *E.coli*), challenges include lack of space, limited staff capacity and equipment.

The Grantee, jointly with GoB, should undertake activities to strengthen the laboratory/ies' functionality as reference laboratory/ies in terms of infrastructure, human resources, capacity building, data management and analysis. This will include providing suitable data storing equipment and software to increase their technical capacity to operate as the overall coordinating bodies for AMR surveillance in AH sector. If the decision is made to share the NRL function between BLRI and CDIL, it will be important that the Grantee assists in developing and maintaining a clear and cooperative working arrangement, including data management and flow, between the two laboratories that draws on their respective strengths and makes a significant impact on the capacity of CDIL.

Activities listed here may be shared between the laboratories, subject to further decisions being made during inception on the roles of the different laboratories in the surveillance system.

By the end of the grant, we expect that the following will have been achieved:

- NRL/NRLs are supported with appropriate renovation, procurement and capacity building, as required
- Confirmatory testing and AST are carried out on a predetermined proportion of isolates, sent by the laboratories in the surveillance network as part of EQA
- The NRL is able to perform advance phenotyping (confirmation of mechanism, MIC testing) for isolates with equivocal or unusual AST profiles.
- The reference laboratory(ies) participate in an External quality assurance system (EQAS).
- An EQAS scheme is provided to all surveillance site laboratories.
- A secure biorepository of isolates has been established. This includes procurement of necessary equipment (freezers or lyophilisation equipment), developing protocols for sample storage (including SOPs for determining which isolates are stored), establishing an inventory system, and developing protocols for accessing and using archived materials.
- Quality management systems are in place.
- Maintenance contracts are in place, and a plan is in place to ensure their sustainability beyond the life of the grant.
- SOPs for culture, identification and AST of all the bacteria to be included in the Bangladesh AMR surveillance programme are developed and are disseminated to the surveillance sites.

- NRLs are providing technical assistance and supportive mentorship to the surveillance sites, with assistance from the Grantee.

Output 4.3 Increased capacity of selected surveillance laboratories to produce reliable quality bacterial culture, identification and Antimicrobial Susceptibility Testing (AST) results.

The role of the selected animal health sector laboratories, under the supervision and guidance from NRL(s), is to support the AMR surveillance system by delivering standardised, comparable and validated data on AMR. The two FDILs have no experience in ASTs and very limited capacity to culture and identify bacteria, their equipment is basic. Considerable support will be required to enable them to produce reliable culture, identification and AST results. As a minimum the grantee will need to address quality assurance, development and implementation of SOPs, deliver training in basic microbiology technics, and ensure supervision. In addition, as per the findings of the assessments undertaken in the inception phase, the Grantee will provide equipment support, renovation, and logistics support.

By the end of the grant, we expect that the following will have been achieved:

- Necessary equipment has been installed, calibrated and serviced, and the working environments enable staff to reliably process bacteriological samples.
- Bacteriology laboratory staff produce reliable culture, identification and AST results for *Escherichia coli*, as assessed by a relevant external quality assessment programme and by records of appropriate internal quality control.
- Quality management systems are in place.
- Equipment maintenance contracts are in place, and a plan is in place to ensure their sustainability beyond the life of the grant.
- SOPs for culture, identification and AST of all the bacteria included in the AMR surveillance programme have been updated and are being used.
- All laboratories maintain records of AMR diagnostic results and regularly report results to DLS.

Output 4.4 Biosafety and biosecurity measures are being applied within the reference laboratory(ies), surveillance laboratories and at collection sites, and ensure safe transport of samples and isolates.

All the laboratories in the AH AMR active surveillance network, with the possible exception of BLRI, require significant improvements to biosecurity and biosafety, covering all the aspects, from access control to sample collection and transport and safe disposal of waste material.

By the end of the grant, we expect that the following will have been achieved:

- Appropriate training conducted and monitoring systems for biosafety and biosecurity have been established including staff wearing personal protective equipment while conducting testing.
- Functioning biosafety and biosecurity systems, including SOPs, are in place at all laboratories.
- Staff have the capacity to collect and transport samples in a biosafe and biosecure manner.
- All biosafety cabinets being regularly maintained and calibrated, and staff trained in their use.
- All sites have good bio-disposal practices in place.

Output 4.5 Good quality samples are regularly sent to reference and surveillance sites laboratories and isolates are regularly sent from surveillance site laboratories to the reference laboratory.

Work during the inception period will inform the design and scale of the active surveillance to be undertaken. At the moment, staff from FDILs do not contribute to active surveillance activities and hardly ever send samples or isolates to an NRL for confirmation. They therefore need to be trained in sampling for AMR surveillance, as well as safe transport of samples and isolates; SOPs should be developed for these activities.

By the end of the grant, we expect that the following will have been achieved:

- The minimum required number of samples (as decided during surveillance strategy design) are sent to the laboratories for diagnostic testing, as defined in surveillance strategy
- Samples are labelled appropriately, transported in a safe manner, and are accompanied by epidemiological and demographic information
- Appropriate isolates are forwarded from surveillance laboratories to designated NRL(s) for confirmation and archiving
- Relevant staff from surveillance laboratories are trained to develop sampling plans based on the surveillance strategy and field workers have the capacity to collect good quality samples

7.5 Objective 5 (implementation): Strengthened AMR Surveillance in the aquatic sector.

Output 5.1 Increased capacity of FIQC-Savar to produce reliable quality bacterial culture, identification and Antimicrobial Susceptibility Testing (AST) results.

The laboratory assessment undertaken by Mott Macdonald suggested that FIQC-Savar currently has the capacity to undertake AMR surveillance in aquatic species, although quality and actual capacity will need to be assessed by the Grantee during inception. Although the laboratory can culture and identify bacteria, ASTs have never been carried out. Since the laboratory is ISO-accredited for a number of procedures it is expected to be able to pick up basic AST methods, and carry them out to a good standard. The Grantee will undertake activities to strengthen functioning of FIQC-Savar- such as by providing equipment support, renovation, capacity building and technical assistance.

By the end of the grant we expect that the following will have been achieved:

- SOPs for culture, identification and AST (disc diffusion) of all the bacteria included in the AMR surveillance programme have been updated and are being used.
- Microbiology technicians from FIQC-Savar have the capacity to undertake culture, identification and AST, as appropriate.
- Necessary equipment has been calibrated and serviced.
- Bacteriology laboratory staff produce reliable culture, identification and AST results for the agreed bacteria as assessed by a relevant external quality assessment programme (FIQC-Savar is participating in an international EQAS) and by records of appropriate internal quality control.
- The laboratory maintains records of AMR diagnostic results using a fit-for purpose software.
- Quality management systems are in place.

- Maintenance contracts are in place, and a plan is in place to ensure their sustainability beyond the life of the grant.
- Isolates are transferred to NRL (as identified in AH) periodically according to local SOPs at acceptable biosafety standards, from the surveillance site (FIQC -Savar).

Output 5.2 Biosafety and biosecurity measures are being applied at FIQC-Savar and ensure safe transport of samples and isolates.

FIQC – Savar appears to have good biosecurity and biosafety in place although this will need to be assessed in detail during inception, and minor refurbishment and maintenance may be necessary. Similarly, SOPs may need to be updated.

By the end of the grant, we expect that the following will have been achieved:

- The laboratory is equipped with appropriate safety equipment and staff are wearing personal protective equipment while conducting testing.
- Functioning Biosafety and Biosecurity systems, including SOPs, are in place.
- Appropriate training has been conducted and monitoring systems for biosafety and biosecurity have been established.
- Biosafety cabinets are operational, maintained and being used by staff appropriately
- Staff have the capacity to collect and transport samples in a biosafe and bio secure manner.
- All waste is disposed of in a biosafe manner.

Output 5.3 Data management, quality control and analysis is in place.

The laboratory will require specific support to strengthen its AMR surveillance data collection, analysis and reporting capacity.

By the end of the grant, we expect that the following will have been achieved:

- There is leadership and coordination of AMR and AMU surveillance data management.
- A functional Laboratory Information Management System (LIMS) established and operational.
- Regular data quality checks are carried out.
- Results for all samples tested under the surveillance programme are uploaded to fit for purpose software, with laboratory results accurately matched to demographic and epidemiological details for each sample
- Quarterly and annual reports of surveillance results shared with the Sector Coordinating Committee, the Core Working Group, surveillance sites and other stakeholders.
- There is formal analysis of AMR and AMU data carried, out including analysis of risk factors.
- Epidemiologists and / or designated staff are trained to analyse and interpret AMR data.
- A report is produced and shared showing the results from analysis of the AMR surveillance data with the Core Working Group and other stakeholders.

7.6 Objective 6 (inception and implementation): Strengthened AMC and AMU surveillance in human, animal and aquaculture sectors

Output 6.1 AMC surveillance (National AMC monitoring) is supported, with delivery of reports biannually to the task force

A specially constituted task force has been set up to monitor AMC in both the human and animal health sectors. Data for this is being collected and analysed at the DGDA with assistance from WHO. A report on AMC will be prepared and presented to the task force in August 2019. The Grantee will provide necessary assistance to the DGDA and align with the support being provided by the WHO to enable the continuous monitoring of AMC.

By the end of the grant we expect that the following will have been achieved:

- Data on AMC including manufacture, import, export, distribution and destruction is provided regularly (at a frequency to be determined by the DGDA) to the task force.

Output 6.2 Prescription based studies on AMU are supported, with data collected and analysed for assessing trends.

A point prevalence study is being conducted at the DGDA with support from the WHO. The study aims to determine antimicrobial usage across selected hospitals and in the community (pharmacy based) in Bangladesh. It would be necessary to conduct similar studies at regular frequency to ascertain AMU trends in antimicrobial usage. The Grantee will provide necessary assistance to the DGDA and align with the support being provided by the WHO to conduct further such studies to assess trends and efficacy of any guidelines/legislation (at local/ regional/ national level) on antimicrobial usage.

By the end of the grant we expect that the following will have been achieved:

- Technical assistance and support provided in data collection, and analysis on antimicrobial usage both in hospitals and in the community.
- Data is provided to the task force.

Output 6.3 Improved capacity of DDA and DLS to produce good quality AMC/AMU data in animal health and aquaculture sectors

As a robust AMC monitoring system is yet to be developed and field level antimicrobial usage in the animal and health sector requires to be intensively studied due to current enforcement challenges, there should be a carefully planned AMC/AMU data collection system linking DDA and DLS that eventually helps with AMU reporting to OIE as well. It will be necessary to conduct the study at regular frequency to ascertain AMU trends in antimicrobial usage. However, the Grantee should aim to conduct one initial survey during the Country Grant, in order to inform how to conduct future surveys. The Grantee will provide technical, administrative, budgetary and logistics support and assistance to DLS and DDA to undertake field level surveys. In addition, the Grantee will support DLS and DDA to analyse data to understand the antimicrobial usage patterns across the animal production systems including aquaculture. Further support may be provided in dissemination of survey results, as appropriate.

By the end of the grant, we expect that the following will have been achieved:

- Sources providing data on AMC in animal production sectors have been identified and recorded
- Data reporting to DDA on AMU in animal health (poultry) sector is established
- An AMC data collection, analysis and reporting system linking DLS and DDA is developed
- Antimicrobial usage patterns across animal production systems identified and recorded

8 Grantee Roles and Responsibilities

The main role of the Grantee – or Lead Grantee if the successful applicant is a consortium – will be to plan and implement the outputs and deliver the six objectives listed in Section 7. The Grantee will be responsible for providing the expert technical assistance and high-quality support needed to achieve agreed results. The Lead Grantee will also be responsible for financial management and controls for the grant as a whole (including the contributions of sub-grantees if applicable), and for monitoring and reporting to Mott MacDonald. Reporting of financial expenditure against budgeted activities is a requirement of the grant and Grantee(s) will need to show evidence of sufficient capabilities to undertake these responsibilities.

9 Measuring success

Country Grants are ultimately expected to generate results that can be tracked using a standard set of indicators that will monitor progress and achievements within and across Country Grants. A copy of the full list of indicators will be shared in the Application Pack. However, Mott MacDonald recognises that the suggested indicators may not all be applicable. Therefore, applicants are expected to select from the standard indicator set only where appropriate.

In summary, while the completion and level of attainment for all activities requires monitoring, the type/level of activity will determine the monitoring method. When developing the application, applicants should:

- Select from the proposed indicators for activities, where appropriate; or
- Identify targets and timeframe completion for 'process' type activities (i.e. where indicators provided are not applicable / too advanced).

A mix of these options is also appropriate depending on application content. In the revised and updated workplan to be submitted to Mott MacDonald at the end of the inception phase, prior to implementation, the Grantee will be expected to revisit/confirm the monitoring plan which will then be agreed with Mott MacDonald.

In addition to measuring grant performance against the objectives and outputs stated above, the grant will also be monitored on the implementation of, and adherence to, the Fleming Fund core principles described in Section 2.4, and practical implications for this will be discussed with the successful applicant.

10 Application requirements

10.1 Grant Eligibility Criteria

Potential grant applicants must satisfy the following eligibility criteria before applications will be assessed in detail. Applicants:

- Must demonstrate that they are competent organisations responding to this call for proposals.
- Must have an appropriate track-record in supporting laboratory capacity development, surveillance, capacity building and OH.
- Must have experience of programme implementation in Bangladesh.
- Must demonstrate that they are registered to work within the country, including the provision of essential documents such as articles of incorporation.
- Must demonstrate an understanding of the MoU process with the Government of Bangladesh.
- Must be prepared to accept the Grant Agreement terms.
- Must be able to provide the same information and assurances for all sub-grantees, where the application is from a consortium.
- Should be able to provide all information required for due diligence checks, including clear evidence of financial standing and systems of financial management and control.
- Should be able to provide evidence of suitability in the form of references from clients and donors for previous work undertaken within the last three years.
- Can be a single organisation or consortium, though the latter must clearly identify a Lead Grantee with the appropriate governance and coordination mechanisms to manage sub-grantees.
- Can be:
 - National institutes – such as a university or research institutes;
 - Non-governmental organisations (NGOs);
 - UN Agencies;
 - Private companies; or
 - Government-owned enterprises or institutions provided they can establish that they are (i) legally and financially autonomous, (ii) operate under commercial law, and (iii) are not dependent agencies of national governments.
- In line with UK Government financial transparency requirements any for-profit organisations will be asked to declare profit levels.

10.2 How to apply

Prospective applicants must express their interest to receive the official Application Pack as per the timelines mentioned below in section 10.5. This is done by writing to flemingfundSA@mottmac.com, and should include the organisation's name, the name, phone number and email address of the main focal point.

In addition, there will be an **Applicant Information Session (AIS) in Dhaka**. Please see section 10.5 for the date of AIS. The details of the venue will be shared with applicants who have registered their interest in writing. Dial-in details will also be available for those who have registered interest after this point.

Ahead of the AIS, an example Application Pack will be shared with prospective applicants and will include an application form, budget and monitoring template, and Guidance Notes in order to orientate applicants to the process. Following the AIS, the official Application Pack will be sent out to prospective Grantees who have registered.

To apply, please complete the application form and the budget and monitoring template, in line with the Guidance Notes.

Note the key requirements set out at the beginning of the Country Grant application form:

- Your submission should be returned by the deadline indicated in the RFP.

- When submitting the application document, press “Reply All” from the Application Pack automated email that you will receive with the application documents attached. Do not send it to us from a new email, and do not modify the Subject-line. Only “Reply All” emails will register the documents in our system.
- Keep file sizes as low as possible - there is a 9MB size limit to each individual email that can be received by the grant submission software. You can submit documents by sending multiple emails attaching submission documents to each one. Please follow the instruction (above) using “Reply All” to the original email.
- Applicants should observe the word limit indicated for each question. Additional words outside the limit will be disregarded.
- All documents included as part of the proposal must be submitted in Word, Excel, and PDF format (body font: Calibri 11pt). Do not send through as zipped files.
- You should include a covering letter, signed by the person authorised to represent your organisation for the submission of this proposal.

Proposals that do not satisfy these criteria may not be accepted and may be returned.

10.3 Evaluation criteria

The Application Pack will include the application form, indicating the scoring and weighting for each section of the application. The Application Pack will also contain Guidance Notes explaining what we are looking for in terms of a good quality response for each question, including approach to Value for Money (VfM).

We emphasise that the ultimate purpose of these investments is to help to further strengthen and transform Bangladesh's approach to AMR prevention and control in line with its own Strategic Plan. We will therefore be giving preference to those applications that have:

- A clear, well-articulated, practical and feasible approach to addressing the most important strategic bottlenecks and gaps in Bangladesh's existing system.
- Drawing upon past lessons from Bangladesh's own experience with AMR control and therefore contributing to the sustainable strengthening and transformation of Bangladesh's already relatively good system of AMR control Technical capacity to address the different aspects of AMR covered by this Country Grant.
- Key team members proposed by the Grantee and partners- with required management and/or technical experience and skills to deliver the project activities.
- Clearly laid out project management plan, consortium management plan (if proposed) and clear operational plan.
- Ability and preparedness to bring stakeholders together in an effective and productive working arrangement, promoting a OH approach.
- Demonstrate value for money which includes concepts such as total overall costs over the life of an activity and is not simply lowest cost.
- Ability to work effectively across multiple sectors.
- Ability to operate in Bangladesh.

10.4 Restrictions/limitations

Any conflict of interest, or potential conflict of interest, should be declared to Mott MacDonald when applicants are registering their interest to apply for the grant. If a conflict of interest, or potential conflict of interest, arises after that point the prospective Grantee must clearly declare this in their proposal.

10.5 Key dates

- Publication of RFP: **20 June 2019**.
- Deadline for registering interest to attend the Applicant Information Session: **1700 BDST (GMT+6) on 3 July 2019**
- Applicant Information Session (AIS): **4 July, Dhaka**.
- Deadline for registering to apply for the grant: **1700 BDST (GMT+6) on 8 July 2019**.
- Application submission deadline: **1700 BDST (GMT +6) on 08 August 2019**.
- Anticipated start of grant: **January 2020**.

10.6 Contact details and support information

Any questions on the Request for Proposals should be sent to flemingfundSA@mottmac.com. Mott MacDonald will endeavour to respond to queries within three working days.

Annex 1: Eligible funding items

Laboratory Infrastructure Enhancement

- Infrastructure: renovation, redecoration, electricity and water supply, environmental controls, waste and waste disposal.
- Equipment: appropriate equipment for the level of capability; biosafety and biosecurity equipment; automated culture and identification platforms; IT equipment.
- Reagents, durables & consumables: appropriate media, reagents, culture plates, etc; glassware; sample collection consumables.
- Transport and logistics: vehicles or contracted services for transport of goods, and people; safe and secure transport of specimens and samples; logistical support for surveys.

Human Resource Strengthening and Workforce Reforms

- Training: clinical, veterinary, agricultural and One Health surveillance protocols; biosafety and biosecurity; microbiology, laboratory science and laboratory management; epidemiology and surveillance; genomics; IT training.
- Long-term support: ongoing and refresher training according to the competency and capabilities framework; Fleming Fellowship Scheme.

Surveillance System Strengthening

- Governance: support for AMR Coordination Committees & working groups; operational planning; cross-sectorial meetings and strategy reviews; evaluation(s).
- Quality assurance and control: site visits and audits, laboratory twinning / mentoring.
- Data: transfer and storage; safety and security; analysis software and training.
- Recurrent costs: utilities, maintenance of equipment, upkeep of laboratory space, small maintenance, personnel costs.

Building Foundations for Surveillance Data Use

- Support to build demand for AMR data: general awareness among prescribers, dispensers and agricultural consumers (i.e. farm workers, agribusiness); publication charges; workforce training.
- Evidence based strategy, policy and practice change: data / information sharing conferences, meetings and initiatives; conference attendance; IT platforms for data sharing and awareness / transparency.

Rational use of Antimicrobial Medicines

- AMU/C surveillance: development of strategies for AMU/C surveillance; use of AMU data for appropriate prescribing / informing stewardship programmes.

Annex 2: Possible Fleming Fellowships in Bangladesh

Sector	Fellowship	Beneficiary Institution	Understanding AMR	Surveillance expertise	Diagnostic training	Laboratory quality management systems	Data collection, analysis and use	OH information sharing	Collaborative project
1. Human	Laboratory fellowship	Mymensingh Medical College and Hospital			Identification by mass spectrometry Advanced AST including by microbroth dilution	Benchmark guidelines SOPs Quality control External quality assurance ISO accreditation – preparatory activities		Discuss AMR and AMU surveillance results and understanding of AMR epidemiology in humans with counterparts with counterparts in AH and aqua	To be discussed at the time of agreeing on the Fellowship workplans
2. Human	Laboratory fellowship	Chattogram Medical College and Hospital			Identification by mass spectrometry Advanced AST including by microbroth dilution	Benchmark guidelines SOPs Quality control External quality assurance ISO accreditation – preparatory activities		Discuss AMR and AMU surveillance results and understanding of AMR epidemiology in humans with counterparts with counterparts in AH and aqua	To be discussed at the time of agreeing on the Fellowship workplans

Sector	Fellowship	Beneficiary Institution	Understanding AMR	Surveillance expertise	Diagnostic training	Laboratory quality management systems	Data collection, analysis and use	OH information sharing	Collaborative project
3. Human	AMR surveillance	CDC	<p>Integrate results from AMR surveillance with research results to understand the priority AMR patterns and their epidemiology</p> <p>Keep up to date with all the available information on AMR and AMU in Bangladesh</p>	Contribute to designing future AMR surveillance			<p>Analyse AMR data</p> <p>Understand data biases</p> <p>Interpret AMR results in consultation with microbiologist and AMU data</p>	<p>Discuss AMR and AMU surveillance results and understanding of AMR epidemiology in humans with counterparts with counterparts in AH and aqua</p>	<p>To be discussed at the time of agreeing on the Fellowship workplans</p>
4. Human	AMU/C Surveillance Fellowship	DGDA					<p>Design and implementation of AMU data collection in hospital and other healthcare set-tings</p> <p>Analysis and interpretation of AMU data and assessment of antimicrobial prescribing practices in the context of data on AMR</p> <p>Support appropriate antimicrobial use by clinicians.</p>	<p>Contribute to communities of practice involving the human and animal health sectors</p> <p>Contribute to One Health workshops, conferences, meetings or other activities focusing on advancing antimicrobial surveillance and prudent antimicrobial use</p>	<p>To be discussed at the time of agreeing on the Fellowship workplans</p>

Sector	Fellowship	Beneficiary Institution	Understanding AMR	Surveillance expertise	Diagnostic training	Laboratory quality management systems	Data collection, analysis and use	OH information sharing	Collaborative project
5. Animal	Laboratory fellowship	Central Disease Investigation Laboratory (CDIL)			AST using disc diffusion	Bench top Guidelines, Quality control, ATCC strains, External quality assurance-preparatory activities, ISO accreditation		Discuss AMR and AMU surveillance results and understanding of AMR epidemiology in animals with counterparts in HH, Aqua.	To be discussed at the time of agreeing on the Fellowship workplans
6. Animal	AMR Surveillance fellowship	Department of Livestock Services (DLS)	Integrate results from AMR surveillance with research results to understand the priority AMR patterns and their epidemiology, Keep up to date with all the available information on AMR and AMU	Contribute to designing future targeted AMR surveillance			Analyse AMR surveillance data, Understand data biases. Interpret AMR results in consultation with microbiologist and AMU data	Discuss AMR and AMU surveillance results and understanding of AMR epidemiology in animals with counterparts in HH, Aqua.	To be discussed at the time of agreeing on the Fellowship workplans
7. Animal	AMC/AMU fellowship	Department of Livestock Services (DLS)		Contribute to designing future AMC/AMU surveillance			Analyse and interpret AMU and AMC surveillance. For example: analysis of data from veterinary drug importers	Discuss AMR and AMU surveillance results and understanding of AMR epidemiology in animals with counterparts in HH, Aqua	To be discussed at the time of agreeing on the Fellowship workplans

Sector	Fellowship	Beneficiary Institution	Understanding AMR	Surveillance expertise	Diagnostic training	Laboratory quality management systems	Data collection, analysis and use	OH information sharing	Collaborative project
8. Aquaculture	Laboratory fellowship (advanced AST and Quality Management)	Fish Inspection and Quality Control Laboratory – Savar (FICQ-Savar)			AST using disc diffusion	Bench top Guidelines, Quality control, ATCC strains, External quality assurance-preparatory activities, ISO accreditation		Discuss AMR and AMU surveillance results and understanding of AMR epidemiology in fish/shrimp with counterparts in HH, AH.	To be discussed at the time of agreeing on the Fellowship workplans
9. Aquaculture	AMR Surveillance fellowship (data analysis & interpretation)	Fish Inspection and Quality Control Laboratory - Savar (FIQC-Savar)	Integrate results from AMR surveillance with research results to understand the priority AMR patterns and their epidemiology. Keep up to date with all the available information on AMR and AMU	Contribute to designing future targeted AMR surveillance			Analyse AMR surveillance data, understand data biases, interpret AMR results in consultation with microbiologist and AMU data	Discuss AMR and AMU surveillance results and understanding of AMR epidemiology in fish/shrimp with counterparts in HH, AH.	To be discussed at the time of agreeing on the Fellowship workplans