

TERMS OF REFERENCE FOR INDIVIDUAL CONSULTANTS AND CONTRACTORS

Title: International Consultant Biomedical Engineer	Funding Code:	Type of engagement <input checked="" type="checkbox"/> Consultant (international) <input type="checkbox"/> Individual Contractor Part-Time <input type="checkbox"/> Individual Contractor Full-Time	Duty Station: Freetown, Sierra Leone (including travel to districts)
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Background

Medical equipment is a vital component in the delivery of quality care within hospitals. With support from multiple donors, the Ministry of Health and Sanitation (MoHS) has procured and distributed various medical equipment for maternal, neonatal and child health care such as infant warmers, oxygen concentrators, infant incubators, monitors, CPAP machines, infusion pumps and ventilators, across the country. This was largely achieved with the Foreign, Commonwealth and Development Office (FCDO) Saving Lives Programme funding procurement of most of the equipment for the 16 Special Care Baby units (SCBUs). Additional equipment for MNCH has been procured with support of other donors including the Islamic Development Bank (IsDB). However, the return on investment for such equipment is often below optimum due to poor management and maintenance coupled with over-utilization and inappropriate use resulting in frequent breakdowns. In Sierra Leone, preventive maintenance and repair of broken equipment continues to be a major challenge.

Over the last two years, UNICEF alongside other stakeholders have been working with MoHS to strengthen capacity for maintenance of medical equipment. Over this period, UNICEF engaged an International Biomedical Engineer to support MoHS in establishment of a management system for medical equipment (including inventory of equipment, preventive maintenance and repair and maintenance of damaged medical equipment). The Consultant was seconded to the MoHS and has worked closely with the Health Systems Strengthening (HSS) Programme Manager and Directors of Hospital and Ambulance Services, and Reproductive and Child Health (RCH) respectively to develop the policy on management and maintenance of medical equipment and devices, standard operating procedures (SOPs) and training manuals. These efforts were aimed at strengthening the system/building capacity of MoHS biomedical technicians to conduct regular preventive maintenance and repair non-functional/damaged medical equipment. However, significant additional support is still required given that biomedical engineering and management of medical equipment is relatively a new field in Sierra Leone, in-country technical capacity is extremely limited and there is a continued need to deepen the gains achieved over the last 2 years

Following the unprecedented surge in oxygen demand during the COVID-19 pandemic, 3 Pressure Swing Adsorption (PSA) Oxygen plants have been installed across the country and in 2023, installation of an additional 7 plants is planned to address gaps in oxygen availability. Moreover, demand for oxygen is expected to grow due to more optimal use for MNCH in hospitals, and the envisaged expansion/decentralization of hypoxemia diagnosis and management to prioritized Peripheral Health Units (PHUs) in the country. The successful installation, commissioning and operationalization of these oxygen plants requires uninterrupted technical assistance from a Biomedical Engineer with highly specialized knowledge and skillset. Long term operations and sustainability of these plants will require establishment of local capacity for operation, preventive maintenance and repair which must be built with the support of a Biomedical Engineer.

Based on the above, the MoHS has requested for continued technical assistance with an expansion of activities supported by the Consultant Biomedical Engineer. These are vital to continue building the capacity

and system for managing and maintaining medical equipment in Sierra Leone, as well as optimal operation and long-term sustainability of the PSA oxygen plants in the country.

Purpose and Objectives

The purpose of this consultancy is to further strengthen and improve overall capacity for maintenance of medical equipment and to support installation, commissioning, operationalization and long-term sustainability of PSA oxygen plants in Sierra Leone. This is expected to contribute towards improving the quality of care within health facilities ultimately reducing the mortality and morbidity of mothers, newborns and children.

Specific objectives include

- Provision of technical support to MoHS for continued strengthening of the medical equipment maintenance system including the establishment of the proposed MoHS Directorate for Hospital Equipment Maintenance and Related Services
- Support of in-country human capacity development in biomedical engineering/maintenance and repair of medical equipment; building on gains made over the last two years
- Support installation of oxygen plants and improvement their functionality including strengthening in-country capacity for maintenance of the same

Methodology and Technical Approach:

Under the overall guidance of the Director of Reproductive and Child Health of the MoHS, the UNICEF Chief of Health and Nutrition and direct supervision of UNICEF Health Specialist, the Biomedical Engineer will provide technical guidance and capacity building support to the MoHS and UNICEF in establishing a sustainable maintenance and repair system for biomedical equipment in Sierra Leone. The Consultant will also provide support and oversight for the implementation of the Oxygen PSA plants including installation, commissioning, operationalization and building capacity for maintenance of the same. The Consultant is expected to work closely with the HSS Manager and Director of Hospital and Ambulance Services of the MoHS.

Specific Tasks for the Consultant

1. Strengthening operation, management and functional capacity of health facility maintenance units
 - Continued capacity building of maintenance unit managers and staff at district and health facilities through training workshops, on-the-job training, mentoring, coaching and supportive supervision
 - Strengthen and institutionalize use of the Computerized Maintenance Management System (CMMS) for inventory and work order management in collaboration with MoHS Health Systems Strengthening Unit and the Directorate of Policy, Planning and Information (DPPI)
2. Institutionalization of Inspection and Preventive Maintenance (IPM) and Corrective Maintenance (CM) programme at district and health facility level
 - Support implementation of routine IPM and CM activities across target hospitals with a focus on strengthening performance capacity of hospital biomedical teams
 - In collaboration with MoHS and hospital maintenance teams carry out regular biomedical equipment preventive maintenance, inspections for safety and utilization and serviceability

- Develop required tools, guidelines, manuals, SOPs to further strengthen IPM and CM implementation
3. Operationalization of 10 medical oxygen plants at various facilities
 - Provide necessary technical oversight in the installation process of 7 new oxygen plants in collaboration with the supplier/vendor
 - Provide technical oversight in the testing and commissioning of the oxygen plants in collaboration with the supplier/vendor
 - Working with the supplier/vendors and other stakeholders, engage in capacity building targeted at hospital management teams, medical technicians and plant operators; on the management and maintenance of medical oxygen plants including development of required SOPs, guidelines, manuals and other required materials
 - Support activities and provide technical assistance to the national level Oxygen Technical Working Team
 - Support to health facility level Oxygen Plan Management Committees as required
 4. Support establishment of 5 referral maintenance units and training centres for sophisticated and complex medical equipment in selected districts/hospitals
 - Advocacy and engagement with MoHS and other stakeholders and funders such as Global Fund
 - Develop required plans, guidelines, SOPs, operational manuals and requirement for setting up the centres
 - Provide support and oversight for implementation including required procurement of equipment, capacity-building and other routine support
 5. Support Implementation of solar energy systems in selected facilities
 - Support implementation of assessments and needs determination as required
 - Oversee implementation of solarization of selected/identified health facilities working with the respective UNICEF Health and Nutrition office units, Supply section, MoHS and suppliers/vendors
 - Implement capacity-building activities on operation and maintenance of solar energy systems for medical technicians
 6. Provide technical assistance to MoHS in activities towards establishment of the envisaged Directorate of Medical Equipment Maintenance

Deliverables

Deliverable 1 Capacity-building program for maintenance units implemented: Develop a capacity-building Programme including SOPs, manuals and other training materials for maintenance unit and health facility managers and staff and support implementation in selected districts within the first six months of the consultancy (July- December 2023)

Deliverable 2: CMMS fully implemented: Support MoHS Health Systems Strengthening Unit and the Directorate of Policy, Planning and Information to fully implement the CMMS through technical assistance for enhanced use/adoption with consolidated registry of biomedical equipment and devices at target district hospitals updated, consistent utilization of work order system and availability and use of monthly reports planning at MoHS level (July-December 2023)

Deliverable 3: IPM and CM institutionalized: Support implementation and mainstreaming of IPM and CM programme in 14 target hospitals and selected PHUs with including carrying out of quarterly support/supervision visits with outcomes documented (July-Dec 2023)

Deliverable 4: 10 oxygen plants installed, tested, commissioned and fully operational: Support operationalization of 10 oxygen plants including installation and commissioning of 7 new plants at Ola During Children’s Hospital; 34 Military Hospital; China Friendship Hospital, Jui; Port Loko Hospital; Kabala Hospital; Kailahun Hospital and Pujehun Hospital (July 2023-June 2024)
Deliverable 5: Capacity-building programme for oxygen PSA plants’ maintenance developed and implemented through training workshops, on-the-job training and mentorship and required materials developed including manuals, job-aids and SOPs (July 2023- June 2024)

Deliverable 6: Five referral maintenance units and training centres for sophisticated and complex medical equipment established in five selected hospitals (July -December 2023)

Deliverable 7: Semi-annual and annual review meetings for maintenance units conducted with activity implementation plans developed and reviewed (July-June 2024)

Deliverable 8: System for procurement, replenishment and management of equipment spare parts established at MoHS/NMSA with required catalogue and spares lists developed and adopted (July-December 2023)

Deliverable 9: System for operation and management of maintenance units established including development and operationalization of required guidelines including training and orientation of maintenance managers, staff and District Health Management Teams (July-September 2024)

Deliverable 10: Monthly progress reports outlining accomplishments submitted as scheduled (July 2023-June 2024)

Payment Schedule

The monthly fees for the Consultant will be processed by UNICEF with submission of his/her monthly progress report certified by his/her supervisor.

Child Safeguarding

Is this project/assignment considered as “Elevated Risk Role” from a child safeguarding perspective?

YES NO If YES, check all that apply:

Direct contact role YES NO

If yes, please indicate the number of hours/months of direct interpersonal contact with children, or work in their immediately physical proximity, with limited supervision by a more senior member of personnel:

Child data role YES NO

If yes, please indicate the number of hours/months of manipulating or transmitting personal-identifiable information of children (name, national ID, location data, photos):

More information is available in the [Child Safeguarding SharePoint](#) and [Child Safeguarding FAQs and Updates](#)

Budget Year: 2023-2024	Requesting Section/Issuing Office: <i>Health and Nutrition Section</i>	Reasons why consultancy cannot be done by staff:	
Included in Annual/Rolling Workplan: <input checked="" type="checkbox"/> Yes No <input type="checkbox"/> please justify: This position is included in the annual work plan and will be funded by the FCDO Saving Lives Grant and Regular Resources.			
Consultant sourcing: <input type="checkbox"/> National <input checked="" type="checkbox"/> International <input type="checkbox"/> Both Consultant selection method: <input type="checkbox"/> Competitive Selection (Roster) <input checked="" type="checkbox"/> Competitive Selection (Advertisement/Desk Review/Interview)		Request for: <input checked="" type="checkbox"/> New SSA- Individual Consultancy <input type="checkbox"/> Extension/ Amendment	
If Extension, Justification for extension: N/A			
Supervisor: Health Specialist, Supply Chain Systems Strengthening	Start Date: 1 st July 2023	End Date: 30 th June 2024	

* Expected timelines for completion are estimated and may vary depending on progress

Estimated Consultancy fee			
Travel International (if applicable)			
Permit/Visa			
DSA (if applicable)			
Total estimated consultancy costsⁱ			
<p>Minimum Qualifications required:</p> <p><input type="checkbox"/> Bachelors <input checked="" type="checkbox"/> Masters <input type="checkbox"/> PhD <input type="checkbox"/> Other</p> <p>Advanced university degree required (in any relevant engineering course, biomedical, electrical, mechanical, hospital engineering) Or a bachelor's degree plus two additional years' experience in the professional area</p>	<p>Knowledge/Expertise/Skills required:</p> <p>Experience</p> <ul style="list-style-type: none"> At least 8 years' experience in the maintenance and management of hospital and medical equipment, especially maintenance of MNCH equipment Experience in planning, procurement, installation, commissioning, maintenance, training, monitoring, risk assessment and boarding of medical equipment Experience in maintenance and/or management of oxygen systems including PSA plants will be an added advantage Previous experience working in Sierra Leone, or another African country is desirable Familiarity with the UN system, including similar prior work in the UN system, is desirable. Commitment and willingness to start immediately. <p>Skills required</p> <ul style="list-style-type: none"> Excellent analytical and organizational skills, including effective communication and people skills; ability to communicate and coordinate with various stakeholders and to express ideas and concepts concisely and clearly in written and oral forms. Language proficiency: Fluency in oral and written English is mandatory. 		
<p>Administrative details:</p> <p>Visa assistance required: <input checked="" type="checkbox"/></p> <p>Transportation arranged by the office: N/A</p>	<p><input type="checkbox"/> Home Based <input checked="" type="checkbox"/> Office Based</p> <p>If office based, seating arrangement identified: <input checked="" type="checkbox"/></p> <p>IT and Communication equipment required: <input checked="" type="checkbox"/></p> <p>Internet access required: <input checked="" type="checkbox"/></p>		
<p>Request Authorised by Section Head:</p> <p><i>OIC, Health and Nutrition</i></p>	<p>Request Verified by HR:</p> <p><i>Sanchia Gordon Hall, HR Manager</i></p>		

Approval of Chief of Operations (if Operations):

Approval of Deputy Representative (if Programme)

Representative (in case of single sourcing/or if not listed in Annual Workplan)

ⁱ Costs indicated are estimated. Final rate shall follow the “best value for money” principle, i.e., achieving the desired outcome at the lowest possible fee. Consultants will be asked to stipulate all-inclusive fees, including lump sum travel and subsistence costs, as applicable.

Payment of professional fees will be based on submission of agreed deliverables. UNICEF reserves the right to withhold payment in case the deliverables submitted are not up to the required standard or in case of delays in submitting the deliverables on the part of the consultant

Individuals engaged under a consultancy or individual contract will not be considered “staff members” under the Staff Regulations and Rules of the United Nations and UNICEF’s policies and procedures and will not be entitled to benefits provided therein (such as leave entitlements and medical insurance coverage). Their conditions of service will be governed by their contract and the General Conditions of Contracts for the Services of Consultants and Individual Contractors. Consultants and individual contractors are responsible for determining their tax liabilities and for the payment of any taxes and/or duties, in accordance with local or other applicable laws.