Rapid Gap Analysis of Medicines Quality Assurance and Quality Control Capabilities of Burundi

Bujumbura, Burundi
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Trip Report

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PROMOTING THE QUALITY OF MEDICINES

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Executive Summary

Dr. Hajjou and Dr. Smine traveled to Bujumbura, Burundi to conduct a rapid gap analysis of the quality assurance (QA) and quality control (QC) capacities of the country. The team met with key stakeholders, including the President's Malaria Initiative (PMI) team at United States Agency for International Development/Burundi (USAID/Burundi); Directorate of Pharmacy, Medicine, and Laboratories (DPML); the National Institute of Public Health (INSP); the National Malaria Control Program (PNILP); Faculty of Medicine of Burundi; and World Health Organization (WHO) Burundi office. The major findings include:

- A national pharmaceutical policy has recently been issued
- A national Pharmaceutical Act is in circulation for review
- The role of DPML lacks clarity in the areas of inspection and procurement
- Medicines quality control activities are under INSP. The QC lab is mandated to provide services to DPML and has basic equipment. However, the lab is newly established and lacks the capacity to conduct QC testing of medicines due to limited human resources and lack of training
- A new regulatory authority will be created that will replace DPML
- There is no medicines testing prior to market authorization in the country
- There are no post-marketing surveillance, pharmacovigilance, or medicines quality monitoring programs in place
- There is no medicine information unit
- There are no regulations on clinical trial oversight
- Human resources from the Faculty of Medicine are available who could support some QA/QC activities

The Government of Burundi is planning put in place an efficient medicines QA/QC system. There is a need to support all the institutions involved in pharmaceuticals quality assurance to reach this goal.

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About PQM

The Promoting the Quality of Medicines (PQM) program, funded by the U.S. Agency for International Development (USAID), is the successor of the Drug Quality and Information (DQI) program implemented by the United States Pharmacopeia (USP). PQM is USAID's response to the growing challenge posed by the proliferation of counterfeit and substandard medicines. By providing technical assistance to developing countries, PQM helps build local capacity in medicine quality assurance systems, increase the supply of quality medicines to priority USAID health programs, and ensure the quality and safety of medicines globally. This document does not necessarily represent the views or opinions of USAID or the United States Government. It may be reproduced if credit is given to PQM and USP.

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- Dr. Donatien Bigirimana, Focal Point for Essential Drugs and Medicines Policies/Patient Safety and Human Resources for Health at WHO Burundi Office
- Mrs. Godeberthe Ndihukubwayu, Head of Quality Control Laboratory
- Dr. Georges Nsengiyumva, Project Manager for Amagara Meza
- Mrs. Aline Mukerabirori, Country Program Director at Systems for Improved Access to Pharmaceuticals and Services (SIAPS)
- Mrs Diane Ndayiragije, Senior Technical Advisor at SIAPS
- Dr. Ignace Bimenyimana, Coordinator for Malaria at the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM)
- Dr. Bonaventure Nyabenda, National Medicines Regulations Officer, East African Community-Burundi
- Dr. Donatien Ntakarutimana, Burundi Team Leader, President's Emergency Plan for AIDS Relief (PEPFAR)
- Dr. Eleonore Rabelahasa, PMI Malaria Advisor/Program Manager at USAID/Burundi
- Dr. Liévin Nsabiyumva, PMI Program Development Specialist at USAID/Burundi
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ACRONYMS

CAMEBU	Central Medical Store
DPML	Directorate of Pharmacy, Medicine and Laboratories
DQI	Drug Quality and Information Program
GFATM	Global Fund to Fight AIDS, Tuberculosis, and Malaria
INSP	National Institute of Public Health
MOH	Ministry of Health
MSH	Management Sciences for Health
NOMCOL-SSA	Network of Official Medicine Control Laboratories-Sub-Saharan Africa
PEPFAR	President's Emergency Plan for AIDS Relief
PMI	President’s Malaria Initiative
PNILP	National Malaria Control Program
PQM	Promoting the Quality of Medicines Program
QA	Quality Assurance
QC	Quality Control
RBM	Roll Back Malaria
SIAPS	Systems for Access to Pharmaceuticals and Services
USAID	United States Agency for International Development
USP	United States Pharmacopeia
WHO	World Health Organization

Background

The U.S. Agency for International Development Mission in Burundi (USAID/Burundi) requested the Promoting the Quality of Medicines (PQM) program, implemented by the U.S. Pharmacopeia (USP), to assist in strengthening quality assurance systems for antimalarial medicines in the country.

Following discussions with the President's Malaria Initiative (PMI) team at USAID/Burundi, it was agreed that PQM would conduct a rapid gap analysis of the medicines quality assurance and quality control (QA/QC) capacities of the country. The visit to Burundi was to coincide with the Roll Back Malaria (RBM) partners' annual meeting.

Purpose of Trip

- Meet with key stakeholders
- Participate in the RBM annual meeting
- Conduct a gap analysis of QA/QC capacities and propose priority activities

Overview of Activities

Management Sciences for Health/ Systems for Improved Access to Pharmaceuticals and Services (MSH/SIAPS)-Burundi office assisted the PQM team in setting up appointments with key stakeholders.

Details of PQM's gap analysis can be found in *Annex 1*.

Briefing USAID/Burundi - PMI team

Dr. Eleonore Rabelahasa, Malaria Advisor/Program Manager; Dr. Liévin Nsabiyumva, Program Development Specialist; and the PQM team attended the meeting.

Dr. Eleonore welcomed the PQM team and informed them about the National Malaria Control Program (PNILP) action plan meeting that was to take place January 17-18. She asked the PQM team to prepare a list of activities to be included in the PNILP annual action plan following the gap analysis. She also provided the team with a copy of the national pharmaceutical policy which contained insight into the pharmaceutical sector, including challenges and plans to address them.

The team emphasized the need for strong support from USAID/Burundi to build and strengthen the quality assurance systems for pharmaceuticals and requested a meeting with the President's Emergency Plan for AIDS Relief (PEPFAR) team.

Meeting with Directorate of Pharmacy, Medicine and Laboratories (DPML)

Dr. Emmanuel Bamenyekanye, DPML Director; Mrs. Diane Ndayiragije, Senior Technical Advisor at SIAPS; and the PQM team attended the meeting.

The PQM team explained the purpose of their visit, and Dr. Bamenyekanye indicated that he was newly hired as director of DPML. He added that his directorate will be replaced by a national regulatory authority for pharmaceuticals and food. This change is included in the Pharmaceutical Act that is in circulation for review. Dr. Bamenyekanye indicated that inspection is currently the responsibility of the Inspection General and that the quality control of medicines was the

responsibility of the National Institute of Public Health (INSP). DPML needs support to put policies, guidelines, and protocols in place. The PQM team informed the DPML director that PQM can help the directorate on several levels: PQM can review the draft Pharmaceutical Act, provide recommendations, and assist in drafting guidelines and procedures for the regulatory authority.

Meeting with Amagara Meza Project

The PQM team paid a courtesy visit to Dr. Georges Nsengiyumva, the Manager of Amagara Meza project. Dr. Nsengiyumva explained that the project is funded by the European Union with the main objective of strengthening the capacities of Ministry of Health (MoH) institutions with a focus on DPML and the Central Medical Store (CAMEBU). The project helps these institutions to implement good management practices. He indicated that there was a lack of clarity in the role and responsibilities of several institutions and much support for them is needed.

Meeting with World Health Organization-Burundi (WHO-Burundi)

The PQM team met with Dr. Donatien Bigirimana, Focal Point for Essential Drugs and Medicines Policies/Patient Safety and Human Resources for Health at the WHO-Burundi Office. The team provided an overview of PQM and the purpose of the visit.

Mr. Bigirimana expressed his enthusiasm about PQM's mission in Burundi and potential collaboration to strengthen pharmaceutical quality assurance in the country. He indicated that he used to be the Director of CAMEBU and emphasized the importance of medicines QA/QC, which is a component of the national pharmaceutical policy. Dr. Bigirimana said that WHO has been supporting the MoH and is actively involved in drafting the Pharmaceutical Act and the national pharmaceutical policy. He informed PQM that in July 2011, an ordinance gave the National Institute of Public Health (INSP) a mandate to control the quality of medicines, and the quality control lab of INSP is to provide services to DPML. However, the lab faces several challenges, including a lack of human resources and equipment, and needs to be strengthened and brought to higher standards. PQM can help the lab develop a three-year implementation plan to bring it to international standards. The PQM team invited Dr. Bigirimana to attend the meeting with INSP.

Meeting with INSP

Dr. Pierre Claver Kazihise, General Director of INSP; Dr. Donatien Bigirimana, Focal Point for Essential Drugs and Medicines Policies/Patient Safety and Human Resources for Health at WHO Burundi; Mrs. Godeberthe Ndihukubwayu, Head of Quality Control Laboratory; and the PQM team attended the meeting.

Dr. Bigirimana introduced the PQM team and explained the purpose of the visit. Dr. Kazihise welcomed the possible support of the INSP QC lab, which is much needed. He indicated that the lab was newly established in the INSP facilities and emphasized the need for reference standards and documents as well as training for the lab staff. The PQM team noted that, in addition to USAID support, USP has several complementary initiatives, including a program that could allow the National QC lab to acquire USP reference standards and reference documents for free. USP also sponsors the Network of Official Medicine Control Laboratories-Sub-Saharan Africa

(NOMCOL-SSA). The lab could join the network and participate in its activities. As for training, PQM has much experience in assisting countries with QC at all levels, from establishing functional labs to helping labs attain ISO 17025 accreditation. The PQM team pointed out that some labs are impeded by their legal status, which does not allow them to procure equipment and reagents without going through a call for tenders. In many cases, in addition to delays that affect its functions, the lab ends up buying low quality commodities at prices that are not necessarily low. The PQM team emphasized the importance of the MoH's commitment in supporting the lab by providing necessary human resources to accompany the growth of QC activities.

The PQM team visited the QC lab and noted that the lab has the basic equipment to conduct QC testing (a list of the equipment is included in *Annex 2*). However, some equipment was out of service. While the facility has enough space for its intended activities, it would be difficult to prequalify or accredit the lab in the current facility. The air handling system and location of exits are some of the issues.

Meeting with the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM)
Dr. Ignace Bimenyimana, GFATM Coordinator for Malaria; Dr. Liévin Wizero, Pharmacist; and the PQM team attended the meeting.

The PQM team informed Dr. Bimenyimana that PQM could help GFATM recipients with the QA of medicines and diagnostics. Dr. Bimenyimana stated that Burundi has two grants and that medicines are procured through UNICEF. He informed the team that GFATM-Burundi is planning to hire a consultant to do sampling of antimalarial medicines and have them tested at a qualified laboratory. GFATM-Burundi requested a quotation from an external quality control laboratory for testing one antimalarial (artesunate-amodiaquine) in four formulations. The quote was much higher than the amount the GFATM team allocated for QA/QC of medicines.

The PQM team indicated that up to 10% of the budget for procuring medicines should be added to new grant applications and be allocated for QA/QC. For the current grant, the principal recipient (PR) needs to request budget reprogramming in order to allocate more money for QA/QC activities. It is important that the PR develops a QA policy, as required by GFATM. PQM could assist in drafting the request for budget reprogramming as well as the QA policy.

Meeting at the Faculty of Medicines
Dr. Joseph Nyandwi, Dr. Claudette Ndayikunda, and the PQM team attended the meeting.

The group discussed the importance of involving medical students in the quality of medicines. The PQM team cited examples of countries where medical schools are involved in sampling and testing of medicines as part of post-marketing surveillance activities. Dr. Nyandwi and Dr. Ndayikunda welcomed the prospect of participating in such activities in Burundi.

Meeting with the NMCP
Dr. Lydwine Baradahana, Director of NMCP-Burundi, and the PQM team attended the meeting.

The PQM team provided an overview of the QA/QC gap analysis findings, emphasizing the lack of any quality control for antimalarials (and medicines in general) and relating the discussion

with the GFATM coordinator for Malaria. The PQM team indicated that the QC lab should be involved in any post-marketing surveillance activities on antimalarials. Dr. Baradahana expressed interest in the QA policy and requested that the PQM team present their findings the next day at the RBM meeting.

Meeting with PEPFAR-Burundi

The PQM team met with Dr. Donatien Ntakarutimana to present the program and seek support from PEPFAR. The team presented some of their observations following the gap analysis. They stressed the fact that establishing a pharmaceutical QA system will require the involvement of all the health programs. Dr. Ntakarutimana indicated that PQM's visit was timely because the PEPFAR-Burundi team is about to prepare the country operational plan, and he is interested in knowing more about the work that PQM has done in other countries.

RBM Partners Meeting

The PQM team gave two presentations that received positive feedback from the participants. One presentation covered the QA policy, as required by GFATM, and one covered the findings of the gap analysis that the PQM conducted along with the proposed activities and recommendations to address the gaps.

MSH/SIAPS

The PQM team met with Mrs. Aline Mukerabirori, SIAPS Country Program Director. The team thanked Mrs. Mukerabirori for her support in facilitating the PQM team's meetings with local partners. They presented the activities that PQM will conduct during this fiscal year and the proposed activities for next year, in an effort to find opportunities for collaboration. One area identified was post-marketing surveillance. Mrs. Mukerabirori indicated that SIAPS is assisting DPML with pharmacovigilance activities but that the system is not in place yet. This year, activities will be dedicated to putting in place all regulatory documents and guidelines. The PQM team promised to provide SIAPS with a template that could be adapted to draft a guidance document/Ministerial decree for the implementation of pharmacovigilance in Burundi.

DPML and EAC/Medicines Regulation

The PQM team met with Dr. Emmanuel Bamenyekanye, DPML Director, and Dr. Bonaventure Nyabenda, EAC-National Medicines Regulation Officer in Burundi. The discussion was focused on strengthening medicines registration in Burundi. Dr. Nyabenda, who used to lead DPML, noted that the capacity to register medicines in Burundi was nonexistent. His current role is to help with regulatory aspects of registration that need to be aligned with current regulations in other East African countries. Dr. Bamenyekanye and Dr. Nyabenda stressed the need for PQM technical assistance.

Debriefing USAID/PMI team

The PQM team met with the PMI team and presented their observations following the gap analysis and their recommendations to establish and strengthen the QA/QC system of the country. The PQM team presented a set of activities and indicated that the funding allocated for this year will allow PQM to help PNILP develop a QA policy for antimalarials and rapid diagnostic tests. PMI requested that PQM develop a work plan for the remaining funds and

propose activities for the next fiscal year. These proposed activities will be considered for discussion during the preparation of the FY13Malarial Operation Plan.

Conclusions

The medicines QA capacity is in its embryonic stage in Burundi. The institutions in charge of QA are not fully functional. The existing regulatory infrastructure is incomplete and will only be effective when a comprehensive pharmacy law is enacted. However, the country is on the right path, and government commitment was clearly expressed by all of the heads of the institutions PQM visited. The new National Medicines Policy demonstrates that the MoH is engaged in making all essential medicines accessible, affordable, and of good quality.

Next Steps

PQM agreed to:

- Send a description of activities for inclusion in PNILP's Annual Action Plan
- Provide a work plan for the remaining allocated funds
- Draft proposed activities for FY13

As of the date of this report, all "Next Steps" have been completed.

Annex 1

Gap Analysis Findings on QA Capacities in Burundi

I. Medicines Regulatory Authority (MRA)

The Directorate of Pharmacy, Medicine and Laboratories (DPML)—the MRA of Burundi—is the official institution responsible for regulating the country's pharmaceutical sector. Its mission was enacted in the law decree n°100/254 on October 4, 2011. DPML is organized into three major areas:

- Procurement and registration of medicines, health products, and cosmetics
- Regulations and policies to control the pharmaceutical sector
- Laboratory services

Major Gaps:

The three major areas are not fully functional because of a lack of defined roles and responsibilities by the MoH. The regulatory functions of DPML are not all in line with WHO guidelines.

1. Policies and regulations

DPML is in charge of establishing laws and regulations to control the pharmaceutical market. However, the PQM team found out that a new National Medicines Policy was established, while the pharmacy law is still not approved. The absence of pharmacy law will make it impossible to effectively implement the National Medicines Policy.

2. Registration of medicines and health products

The DPML is responsible for delivering market authorizations and import and export permits; however, in reality, the DPML has a limited number of qualified staff to carry out these functions. Given the importance of verifying the efficacy, safety, and quality of pharmaceutical products before authorizing their introduction to the market is a major regulatory function where DPML needs strong technical and financial support.

In its action plan, DPML lists many activities in relation to medicines procurement. In Burundi, there is another institution responsible for procuring medicines. DPML's involvement in procuring medicines will constitute a major conflict of interest.

DPML's involvement in the pricing and control of medicines information and advertisement is a function that is under the MRA in many countries around the world. However, good governance and transparency must be part of all pricing definition activities.

3. Laboratories services

In all activities listed in DPML's action plan, there is confusion about the definition and type of laboratories mentioned. Normally, and according to WHO and other world standards about MRA functions, the main laboratories under such an authority should be dedicated to controlling the quality of medicines. In Burundi, DPML is also supposed to control the quality of reagents and chemicals used in health facilities. All of these products, together with pharmaceutical and

cosmetic products, could be controlled in a QC laboratory. In Burundi, the QC laboratory is within the National Institute of Public Health (INSP).

This major function needs to be clearly defined between INSP and DPML. INSP runs different types of laboratories which are already functional. The QC laboratory should logically be under the authority of the MRA; if this authority does not have the necessary resources, the QC lab could stay under INSP in an interim situation. However, the quality control (QC) of medicines should be supervised by DPML because it has the mandate to control the quality of medicines. The QC lab of INSP will then be considered as service provider to DPML. All other clinical and biological labs should be under the INSP.

4. Missing regulatory functions

4.1. Quality control of medicines

Medicines QC must be part of pre-market authorizations and post-market surveillance of all pharmaceutical products. In Burundi, the only existing QC laboratory is under the INSP and is still not functional. Laboratory activities must be clearly defined between INSP and DPML. Strengthening this laboratory is key to establishing quality assurance (QA) of medicines in Burundi. The absence of QC during product registration and in the market puts patients at risk of using substandard, unsafe, and even counterfeit medicines.

4.2. Absence of post-marketing surveillance program

The absence of any medicines QC in the market constitutes a major gap in the health system in Burundi. Post-marketing surveillance includes medicines QC and reporting medicines safety issues, and it often contributes to verifying the storage conditions and availability of medicines at different levels of the supply chain. The PQM team was told that attempts to initiate a pharmacovigilance program have failed because of a lack of ownership by DPML. PQM stated that even if a pharmacovigilance program starts, its direct impact on health systems will not be significant in the absence of QC capacities in Burundi.

4.3. Absence of a medicines information unit

DMPL has the mandate of controlling medicines and health product promotion, import, and export. Logically, this authority should have a unit dedicated to these activities. Under this unit, DPML could manage medicine information centers, medicines monographs, and all other activities related to use of medicines by health insurance systems. Many of these activities are listed in the action plan. DPML's organizational chart needs to be arranged based on well-defined functions from the World Health Organization (WHO) model.

4.4. Clinical trial oversight

The PQM team concluded that there are no regulations in place to control all aspects of clinical trials. The new law must address this gap. PQM will assist DPML to review the draft law and make the appropriate recommendations. When the pharmacy law is approved, DPML should be the authority with the mandate to ensure that clinical trials are done according to the country's legal provisions. DMPL needs to ensure that this area is covered in the new pharmacy law and should work with other institutions to set up the best mechanisms to better control clinical trials in Burundi, taking into consideration the available human, technical, and financial resources.

4.5. Enforcement unit

DPML does not have a specific unit/service in charge of enforcement. This is a major gap in the medicines regulatory system in Burundi. The enforcement unit of DMPL must be the arm to control existing pharmaceutical laws and regulations at all levels where medicines are present. The PQM team learned that an inspection department will be established within the Ministry of Health. Even with such a department, the inspections and enforcement power of medicines must be under DMPL control. The new law must clearly define the enforcement provisions given to the MRA in Burundi.

II. The Quality Control Laboratory

The existing QC laboratory was created with the support of WHO. There is a legal decree giving this laboratory the legal mandate to conduct medicines QC. The QC lab is part of INSP.

1. Personnel and qualifications

The number of laboratory staff is limited, with only four analysts managed by a lab manager who also acts as the manager of other laboratories. The existing personnel lack training on compendial science and need extensive training on good laboratory practices, quality systems, and analytical methods according to pharmacopeial standards. The number of staff will not allow proper functioning of a QC laboratory that is required to tests all types of medicines. Because of the nature and the skills required to conduct medicines QC according to international standards, there is a need for laboratory staff to have high, medium, and basic skill levels. Also, there is a need for chemists, pharmacists, biologists, and microbiologists, in addition to support staff with administrative, computer, and financial skills, to properly run a fully-functioning QC laboratory. However, given that the country is in the early stages of establishing QA/QC capacities, the existing lab with its current personnel could be functional by focusing on the basic quality control skills. With effective technical assistance, the existing staff could be the first pillars of the human resources needed to start building QC capacity in Burundi.

2. Facilities

The QC laboratory was established in pre-existing facilities which were upgraded and refurbished to be used as a QC laboratory. The facilities will not comply with the requirement of ISO 17025 or WHO standards for QC labs; however, at this point, the priority is to train existing staff and assist the laboratory to establish and start carrying out its mission, taking in consideration the existing human and financial resources, with a clear strategy for development in the next three years. Ultimately, the laboratory needs to move to a larger and more appropriate facility if the target will be to attain ISO 17025 accreditation and/or WHO prequalification.

3. Equipment

The laboratory has the basic equipment needed to conduct basic medicines QC testing; however, the laboratory analysts are not trained on the proper use and maintenance of important equipment. In fact, most instruments are new and almost never properly used. To properly use the existing equipment, the lab needs to get spare parts, calibration tools, and maintenance tools. The lab analysts do not know how to calibrate existing instrument as required by pharmacopeial standards.

There is a need for technical support and gradual training for at least three years to get the laboratory to fully function and be able to test all types of medicines. This, of course, can only be possible if additional analysts are also gradually hired and trained by professionals in the field of medicines QC.

4. Management and quality systems

Because of the limited number of laboratory staff and their limited skills, there is no quality system yet in place. The four analysts are managed by the head of the lab, but at this point, there is no overarching structure in the laboratory. The PQM team learned from the head of the laboratory that INSP is planning to hire a QA manager for the laboratory. This person will be in charge of establishing the first steps in the quality system.

Technical support to this laboratory should also focus on assisting lab personnel and management define a clear mission and good vision for the laboratory. Solid work ethics and a "culture of quality" should be focuses from the beginning.

III. Faculty of Medicines and National Institute of Public Health

The PQM team met with the Faculty of Medicines and the INSP to discuss how both institutions could provide the needed human resources to help build QA systems in Burundi. The Faculty of Medicines is already working with health programs and conducting efficacy studies for diseases, like malaria. Medical students and faculty staff could serve at different levels to support DPML and the QC laboratory.

The INSP already has teaching programs to train laboratory and pharmacy assistants. These graduates could also be used to support both DPML and the QC lab in various areas of quality assurance. With close collaboration and a clear vision between all parties, training modules could be added to the curricula of certain disciplines to address the country's need for human resources to build medicines quality assurance systems.

Annex 2

List of QC Laboratory Equipment

N°	Equipment	Model	Date acquired	Working condition
1	Heater/Magnetic stirrer	VELP SCIENTIFIC and AG 460	2008	Working
2	Vortex	VELP SCIENTIFIC and AG 460	2008	Working
3	Friability Tester	PHARMATEST PTF-DR TEST	2008	Working
4	Hardness Tester	ERWEKA D-63150	2008	Out of service
5	Disintegration Tester	ERWEKA D-63150	2008	Working
6	Dissolution Tester	ERWEKA DT600	2011	Out of service
7	Dissolution Tester	DR.SCHLEUNIGER PHARMATRON	2008	Working
7	Two analytical balances	1. SARTORIUS AG TE214S 2. OHAUS CORPORATION PA 214	2008 and 2012	Working
8	Centrifuge	ROTOFIX 32A	2012	Working
9	Chauffe - Ballon	ELECTROTHERMAL	2008	Working
10	Water Distillation System	GFL 2001/4	2008	Working
11	Pure Water System	SIMPLICITY MILLIPORE	2011	Working
12	Rotavapor	BUCHI CH-9230	2008	Working
13	Hood	FISCHER SCIENTIFIC MEDCAP SD321	2010	Working
14	Laminar Flow Hood	HOLTEN LAMINAIR 1.5	2008	Out of service
15	Flame photometer	JENWAY PFP7	2008	Working
16	Polarimeter	ZUZI	2008	Working
17	Spectrophotometer	DR2800	2008	Working
18	Spectrophotometer UV lambda 25	PERKIN ELMNER LAMBDA 25	2008	Working
19	HPLC System	LC220 WITH SHIMADZU RF-20A (FLUORESCENCE DETECTOR)	2011	Working
20	Karl Fischer	TITROMATIC KF 1S-2B	2012	Missing accessories
21	Titrator	TITROMATIC 1S/2S	2012	Missing accessories
22	Water-bath	MEMMERT	2008	Working
23	Two ovens (105° and 60°C)	THERMOSI 2000 et XO24	2008 2012	Working
24	Two Refrigerators (4° and 8°C)	HXC 358 SHARP SJ-T690R	2008 2012	Working
25	Two pH-meters	HI 2221 UP-25	2008 2012	Out of service Working
26	TLC tank	-	2008	Working