



**Ministry of Health
National Reference Laboratory**

Situation Analysis of Rwanda Medical Laboratories

JULY 2005



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Foreword

The laboratory services play a critical role in the delivery of quality health care through early accurate diagnosis, rational use of drugs, appropriate treatment, monitoring of therapy and epidemiological surveillance on which to base policies. This situation analysis report highlights the current situation of laboratory services and the main constraints in the country. The information in this document also provides baseline data to monitor progress and implementation of the National Medical Laboratory Policy and technical guidelines aimed at improving our Laboratory services.

The report findings have been incorporated as major components of the National Medical Laboratory Policy.

The Ministry of Health looks forward to finalizing and consequently implementing the policy document, as an integral part of the health sector vision 2020, which aims to combat the burden of diseases and epidemics in the country.

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Acknowledgments

The Ministry of Health and National Reference Laboratory would like to thank all the institutions which took part in the assessment. We would also like to express our gratitude to Management Sciences for Health/ Rational Pharmaceutical Management for the financial and technical support.

We extend our thanks to the assessment team for the time rendered during the assessment and editing of this document. We are also grateful to all who participate in data collection, data entry, editing and reviewing of this document.

Acronomys

ACM	Atelier Central de Maintenance
APAD	Association des Parents Adventistes pour le Développement
ART	Antiretroviral treatment
B D	Becton Dickson
CD4	Count: T4 lymphocyte cell count
EQA	External Quality Assessment
ESSA	Ecole des Sciences de la Santé
HIV	Human Immunodeficiency Virus
IQC	Internal Quality Control
KHI	Kigali Health Institute
MVK	Mairie de la Ville de Kigali
NRL	National Reference Laboratory
SOPs	Standard Operating Procedures
TB	Tuberculosis
WHO	World Health Organization

Executive summary

The situation analysis assessment was conducted to gather good qualitative and quantitative data on which to base laboratory policies and as a prerequisite to prioritize strategies and define basic inputs for the implementation of minimum and complementary packages of tests.

The data was collected on human resource, test profiles, equipment, infrastructure and service delivery. User perception and satisfaction of the quality of the laboratory services was assessed by interviewing the clinicians.

Major findings: The results indicate that the majority of the health center and hospital laboratories failed to meet the basic inputs; human resource, infrastructure, equipment and supplies necessary for a laboratory to function. The failure to meet the set standards were graded as follows: 50% lack qualified laboratory personnel, 78% lack laboratory supplies and reagents, 76% lack equipment and 71% have poor laboratory infrastructure. The quality assurance system was not well established only 50% of the laboratories participated in External Quality Assessment (EQA) for TB and HIV diagnosis. The management of the laboratory services is poor with a score of only 12 %, laboratory personnel do not participate in management, planning and budgeting meetings resulting in inefficient procurement system.

Conclusion and Recommendations: Laboratory support for the new emerging diseases is critical for early diagnosis, appropriate and efficacious use of drugs. The results of this assessment indicate that laboratory services are neglected at both health centers and hospital laboratories. Majority of laboratories are failing to meet the most basic requirements needed to support the packages of care and the implementation of ART. The lack of inputs such as infrastructure, equipment, supplies and human resource must be critically addressed. The facilities failing to meet the minimum standards should be targeted first and strategies developed to improve the basic services. Poor laboratory management

and inefficient procurement systems compromises the quality of laboratory services. There is need to build capacity of laboratory personnel in management, planning and budgeting to improve the quality of laboratory services. The competencies and skills of laboratory personnel need to be upgraded. The laboratory training institutions should be strengthened and upgraded by providing teaching materials (equipment and supplies) and increase the number of qualified teaching personnel.

Chapter 1

INTRODUCTION

Background

Rwanda is a landlocked country in the Great Lakes region of Central Africa. It has a population of 8 272 000, and covers an area of 26 338 square kilometers with a population density of 300 habitants/km². Life expectancy at birth for the whole population is estimated at 38.3 years¹.

Since the 1980's, Rwanda has adhered to the Alma Ata declaration² which adopted a strategy of Primary Health Care to promote public health. Following the Lusaka conference in 1985¹ Rwanda decided to decentralize its health care system including laboratory services with a focus on health districts.

Shortly after the genocide of 1994, the Ministry of Health started introducing reforms in the health sector in keeping with the Lusaka declaration. In 1996, the National Unity Government adopted these reforms, whose purpose was to contribute to the improvement of public welfare by providing accessible and acceptable quality health to the majority of the population with full participation of the community. To achieve these goals, the reform policy was based on three main strategies, namely the effective decentralization of health services, the development of a primary health care system and the strengthening of community participation in managing and financing health services.

The principal causes of mortality and morbidity in Rwanda are communicable diseases. For the most part, these illnesses can be prevented through hygiene and behavioral change. AIDS, TB and malaria are the diseases that place the greatest burden on the national health services.

The organization of the health system in Rwanda is based on a pyramidal structure. At the base of the pyramid is the Health Center; the intermediate level comprises District Hospitals, and the top of the pyramid is the referral Hospitals. Each level of the health system is expected to provide a minimum package of activities.

Similar to the health system organisation the laboratory network has also a pyramidal structure, consisting of three levels: central, intermediary and peripheral. The central level includes the Reference Hospital Laboratories and National Reference Laboratory. In principle, each of Rwanda's 385 health centers, 34 district hospitals and 4 referral hospitals have a laboratory. The National Reference Laboratory elaborates policies and strategies, ensures monitoring and evaluation, and regulation in the laboratory network. It organises and coordinates the intermediary and peripheral levels of the laboratory system, and provides them with technical and logistical support.

The intermediary level is found at the Health District, and consists of an administrative office, a district hospital and a network of health centres that are either public, government assisted non-profit, or private. The health district deals with the health problems of its target population. The functions of the health district include: (i) the organisation of health services in health centres and the district hospital in terms of the minimum and complementary package of laboratory activities, (ii) administrative functioning and logistics, including the management of resources and supply of drugs, under the responsibility of the district management team, and (iii) the supervision of community health workers including laboratory professionals

Community participation is a key element in the implementation of the primary health care strategy: it plays a role in the planning, execution and monitoring of primary health care activities, including the provision of certain services at the grass roots level (nutrition, mental health, family planning etc) and the search for appropriate solutions to local health problems and the mobilisation of resources.

Different packages of laboratory activities have been defined in 1998³ according to each level in the health pyramid in order to provide equitable and quality care across the country, to ensure that there are procedural standards for operation and management, to allow better planning and management of resources, and to provide the basis for establishing and evaluating the quality of laboratory services.

The minimum package of laboratory activities is a common list of priority activities for all health centre laboratories, intended to solve basic health problems in an equitable, effective and efficient manner. The package takes into account the laboratory needs and demands of the population, but equally recognises the financial constraints of the country.

The complementary package of activities is a common list of priority activities for all laboratories of district hospitals, intended to provide curative health care in an equitable, effective and efficient way using techniques unavailable at the health centre laboratory level. The demands of the population as well as the financial resources of the Ministry of Health and the population determine the package.

A situation analysis was carried out by the National Reference Laboratory between November and December 2004 to assess how laboratories in both public and private sectors are functioning. The assessment was financially supported by USAID and managed by MSH who provided the technical support.

Objectives

General Objective

To collect and collate quantitative and qualitative data on the current status of the laboratory services on which to base the laboratory policy.

Specific Objectives

- To determine the status of the current laboratory services
- To determine inputs required to improve services to the optimum standards
- To prioritize strategies for improving laboratory services
- To provide a baseline for monitoring and evaluating the implementation of
- the laboratory policy

Chapter 2

METHODOLOGY AND DATA COLLECTION TOOLS

Methodology

The assessment was conducted in health institutions for ten days in twelve (12) provinces of the country from 22nd November to 3rd December 2004. A total of two hundred and seventy- seven (279) laboratories were visited. All district hospital, and twenty (20) health centers laboratories from each province, three (3) Reference hospital laboratories, Kanombe Military hospital laboratory and the National Reference Laboratory were visited. The majority of the private laboratories visited were in Kigali City compared to other provinces that had few private laboratories visited.

Data was collected by six groups comprising of two members per group. The Data collectors came from:

- The National Reference Laboratory
- Kigali Health Institute
- National University of Rwanda
- King Faycal Hospital
- Management Sciences for Health / Rational Pharmaceutical Management Plus

Data Collection Tools

The data collecting tools were questionnaires, interviews and visits to the laboratories.

- There were four questionnaires for health district administrative personnel, Laboratory personnel, the clinicians and in charge of laboratory training institutions.

Questionnaires for laboratory personnel were on human resources, infrastructure, equipment, tests profiles, procurement system, quality control and laboratory services provision.

- Interviewing laboratory personnel
- Visiting the laboratories
- Verification of documents on norms related to laboratory in the health system were available; number and qualification of laboratory personnel in health centers and district hospital laboratories, minimum equipment in health centers and district hospital laboratories and the minimum and complementary package of tests in health centers and district hospitals (these norms have not been updated since 1998)³.

Data Analysis

Data was analyzed using an excel template.

Chapter 3

RESULTS

I. Characteristics

Characteristics of laboratories are defined by their type of administration (government, religious or private).

Table 1: Total number of Administrative management of laboratories

	HC laboratories	DH laboratories	RH laboratories	Total	Percentage
Government	152	16	3	171	62
Religious	66	15		81	29
Private				25	9
Total	218	31	3	277	100

Table above shows the total number of administrative management of laboratories visited.

Out of 277 visited laboratories, 171 (62%) were government administration, 81(29%) were religious denominations administration and 25 (9%) were private.

II. Human resources

The assessment for human resource looked at the number of laboratory personnel, qualifications and trainings received in the past two years.

In this data analysis, the following categories of laboratory qualifications are being mentioned:

- A0: Biomedical Sciences degree
- A1: Diploma in medical laboratory sciences

- A2: Three years laboratory training after three years secondary school
- A3: Three years laboratory training after primary school
- Auxiliary: received on job training in laboratory
- Laboratory aide: on job trained in laboratory
- Non identified qualification: working in the laboratory

Table 2: Number of laboratory personnel by qualification in health center and hospital laboratories

Qualification	Number	Percentage
Laboratory aide	98	24
Auxiliary	53	13
A3	47	12
A2	167	41
A1	4	1
A0	0	0
MD specialised	0	0
Non identified	27	7
Other qualification	8	2
Total	404	100

The above table show the number of qualified laboratory personnel in the 277 visited laboratories. Four (4) of A1 are currently working in the health centers where ARV programs are being implemented. . The A1 mainly work in reference and district hospital laboratories implementing ARV programs. The A0 and Medical Doctors specialized in laboratory medicine are very few and only available in reference hospital laboratories because up to now there is no training institution to train this type of laboratory personnel. Rwanda Laboratory services

have some staff with master in biomedical sciences but they are only working in academic institutions such as KHI and National Reference Laboratory.

In service training

Capacity building of laboratory staff is vital to be updated with new technology in diagnosis of emerging diseases.

Table 3: Percentage of in service training received in the last two years by discipline both in health center and hospital laboratories

Training	HIV	TB	Biochemistry	Hematology	Quality Control	Parasitology	Other
Hospital Laboratories	33	23	8	10	3	13	13
Health center Laboratories	48	39	1	0	0	11	1

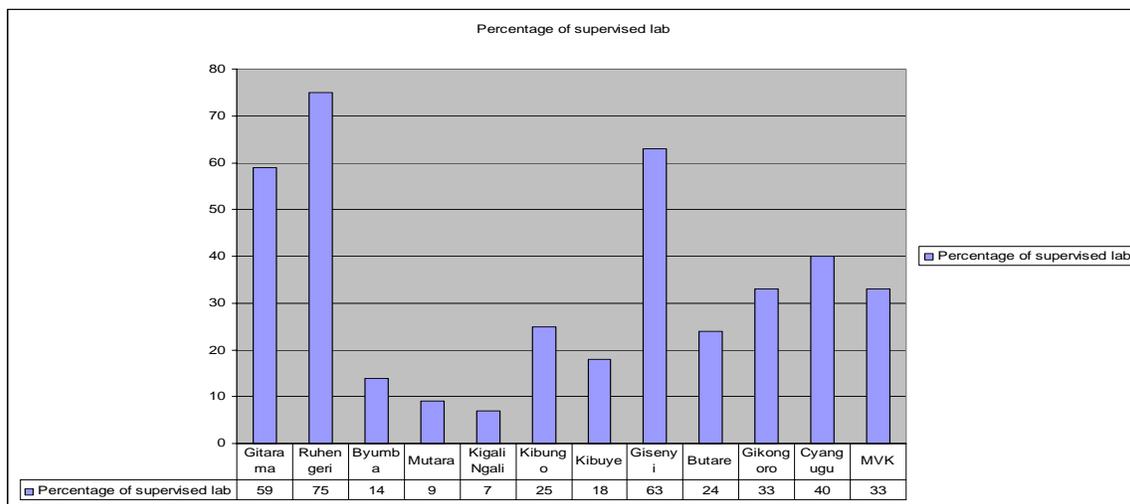
The above table shows that HIV testing training received by laboratory personnel in the last two years was 43% for health centers and 33% for district hospital laboratories. This was because of the expansion of HIV programs (VCT, PMTCT and ARV).

In TB, the training was 39% for health centers and 23% for district hospital laboratories. The health centers scored highest results because of the technical supportive visits for TB microscopy. Parasitology scored 11% and 13% respectively in health centers and district hospital laboratories.

Supervision done by NRL in the last two years

NRL has a mandate⁴ to coordinate and to provide technical supportive visits to all laboratories in the country. The graph below shows the percentage of supervision done per province by NRL in the last two years. Out of 277 visited laboratories 92 (33%) laboratories were supervised by NRL.

Figure 1: Percentage of supervision done by NRL per province



The graph above shows that supervisions are inequitably distributed in the country: Ruhengeri, Gisenyi and Gitarama provinces scored the highest respectively 75%, 63% and 59% supervisory visits from NRL, this is why the quality performance indicators are high and the perception of the quality of laboratory results by the clinicians was satisfactory in Ruhengeri.

Medical Laboratory Training Institutions

It was necessary to assess the preservice training institutions (educational institutions) to obtain information on the number of students enrolled in the institution, entry qualifications of students, qualification of teachers, number of full time teachers, number of Rwandese teachers and non Rwandese. The availability of standard equipment list and reagents required to train the students

was also assessed. Four training institutions were assessed in MVK Kigali Health Institute (KHI), and APAD-Kicukiro, Gisenyi province ESSA Institution and Ruhengeri province ESSA institution. The KHI trains only AI (Diploma), APAD and ESSA train A2.

Table 4: Number, nationality and qualifications of teachers in training institutions

	Masters	Bachelor degree	Diploma	TOTAL
KHI	3	2		5
APAD			6	6
ESSA-Gisenyi			4	4
ESSA-Ruhengeri			4	4

The findings were that KHI had five Rwandese full time teachers, three with Masters, two with Bachelor of Science and two clinical tutors for practicals with A1 qualification. The total number of students at KHI was 114. APAP had six Rwandese full time teachers, all of A1 qualifications and total number of students was 144. ESSA- Ruhengeri had four non Rwandese full time teachers with A1 qualifications. The total number of students at ESSA was 162. ESSA- Gisenyi had four non Rwandese full time teachers of A1 qualifications and total number of students was 127.

Table 5: Number of equipment available in the training institutions

	Microscope	Spectrophotometer	Centrifuge	Water Bath	Autoclave	Incubator	Fridge	Balance	Heamatocytometer
KHI	11	0	2	3	2	1	1	1	18
APAD	14	0	0	0	0	0	0	0	2
ESSA-Ruhengeri	42	1	1	1	0	1	1	1	15
ESSA-Gisenyi	6	2	3	2	3	3	1	1	5

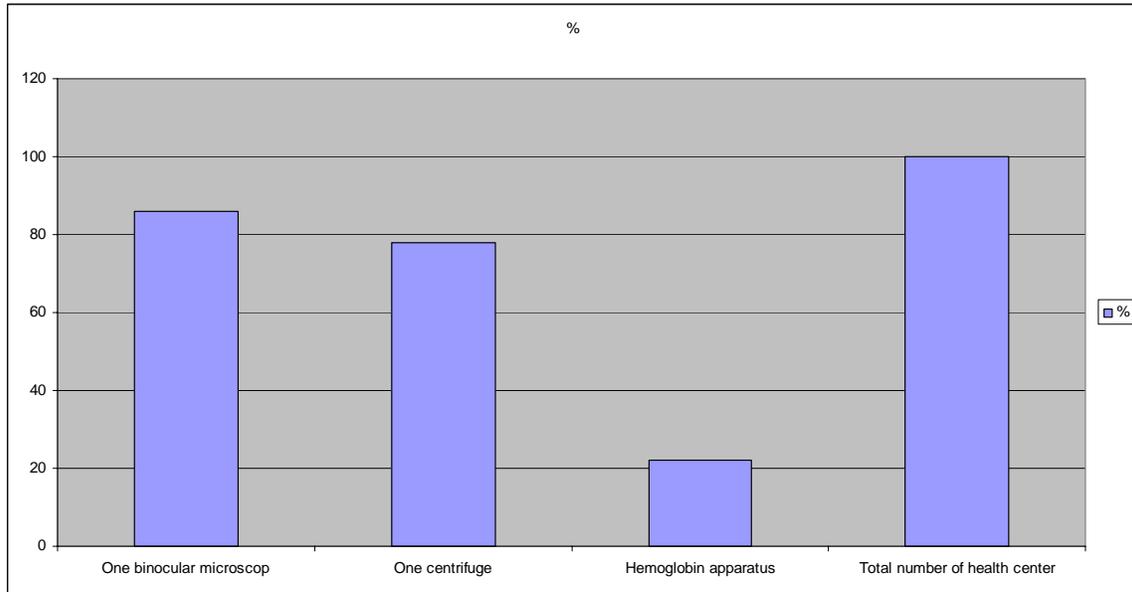
The table above shows that there is a critical shortage of equipment for training students in all the institutions compared to the number of students available in the institution.

With effect from January 2005 all the Medical laboratory training schools training A2 level and below with exception of Gatagara have not recruited any new intakes of students because they are being phased out. KHI which trains A1 level diploma holders have been allowed to continue the training.

III. Equipment

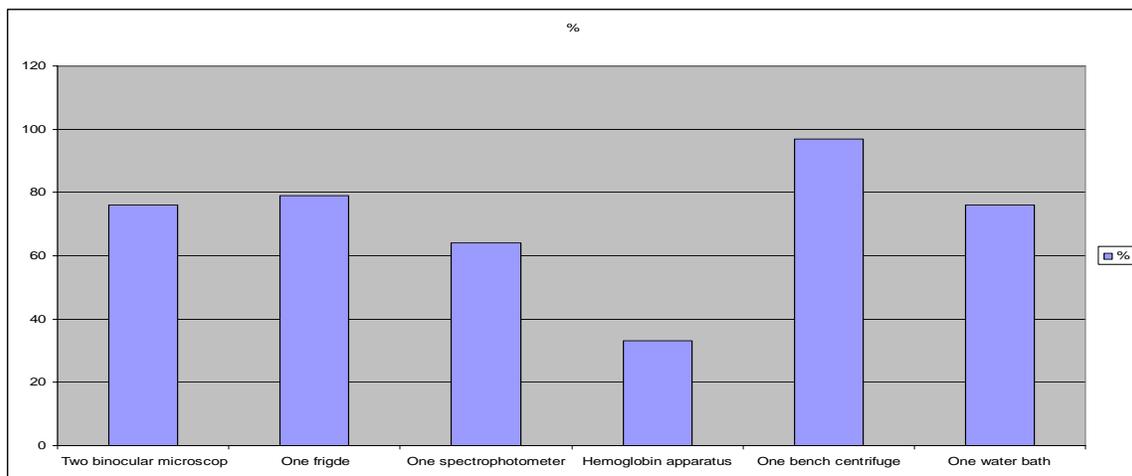
An essential standard equipment list for use in the laboratories at all levels of care was developed in 1998³ but needs to be updated to include the new emerging diseases.

Figure 2: Percentage of Health Center laboratories with the minimum basic equipment



The graph shows a critical shortage of essential basic equipment at the health center laboratories, especially hemoglobin apparatus.

Figure 3: Percentage of district hospital laboratories with the minimum basic equipment

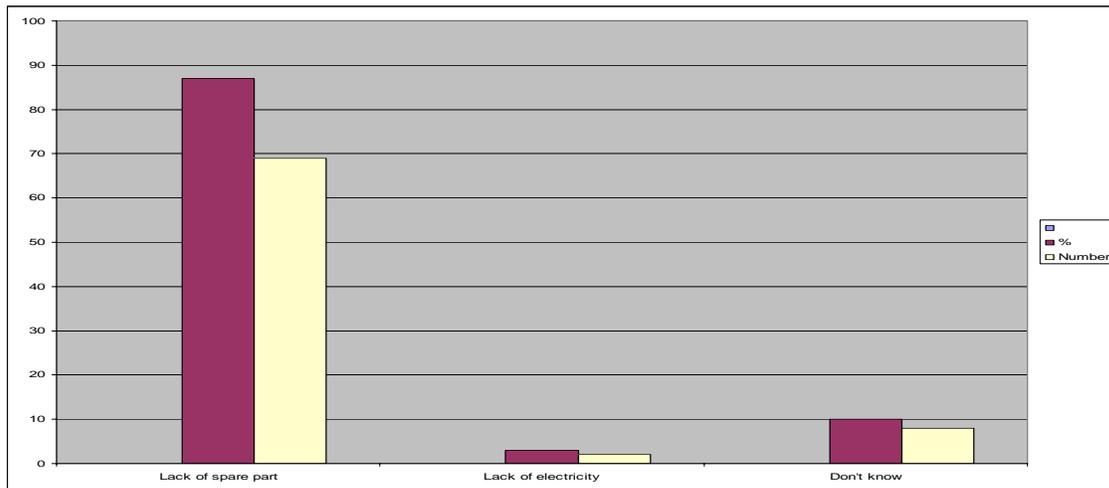


The graph shows a critical shortage of hematology analyzers in hospital laboratories.

Reasons for non functional laboratory equipment

The laboratory personnel were asked to give reasons why the equipment was not functioning. The graph below shows that many laboratory personnel (87%) responded that there were no spare parts, a few said that there was no electricity and some had no idea (do not know). Lack of servicing and preventive maintenance of the equipment resulted in the equipment being broken down.

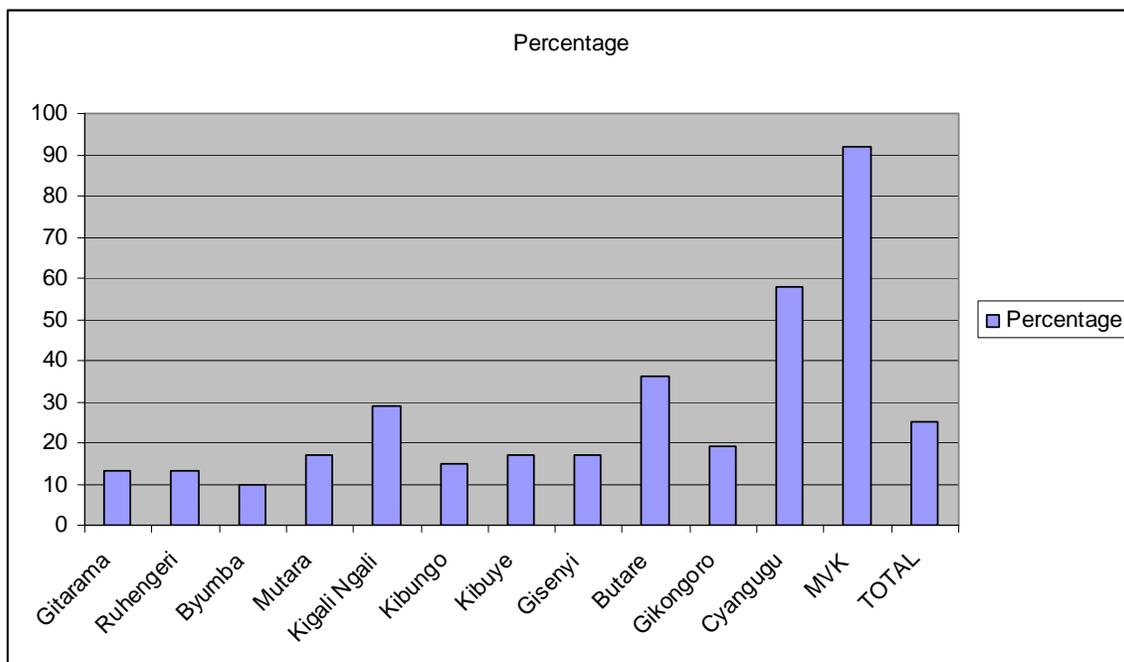
Figure 4: Percentage of reasons for non functional equipment both health center and hospital laboratories



IV. Test profiles

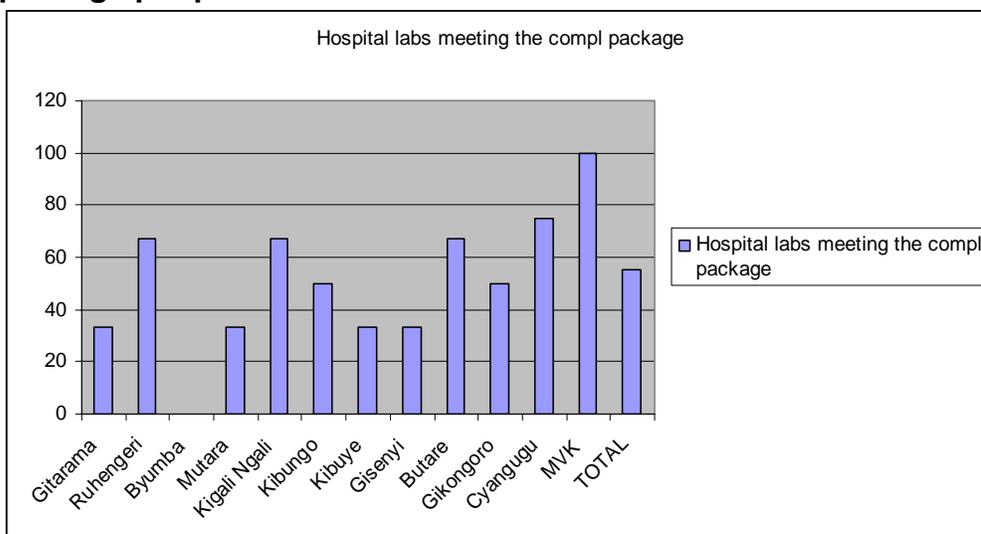
Test profiles are defined as a minimum package of activities for health center laboratory or complementary package of activities for district hospital laboratory. They are defined in the document developed by Health Care Unit in the Ministry of Health (DSS) in the document “*Normes du district de santé*”. This document contains: norms for health center and district hospital personnel, minimum equipment for health center and minimum and complementary package of tests for health center and district hospital laboratory. The document was developed in 1998 but needs to be updated in order to consider the current context of health system especially related to the expansion of HIV/AIDS programs in the Country.

Figure 5: Percentage of health center laboratories meeting the minimum package per province



Out of 218 health center laboratories visited, only 25% met the minimum package of test profiles. 92 % of Kigali city health center laboratories met the minimum package.

Figure 6: Percentage of Hospital laboratories meeting the complementary package per province

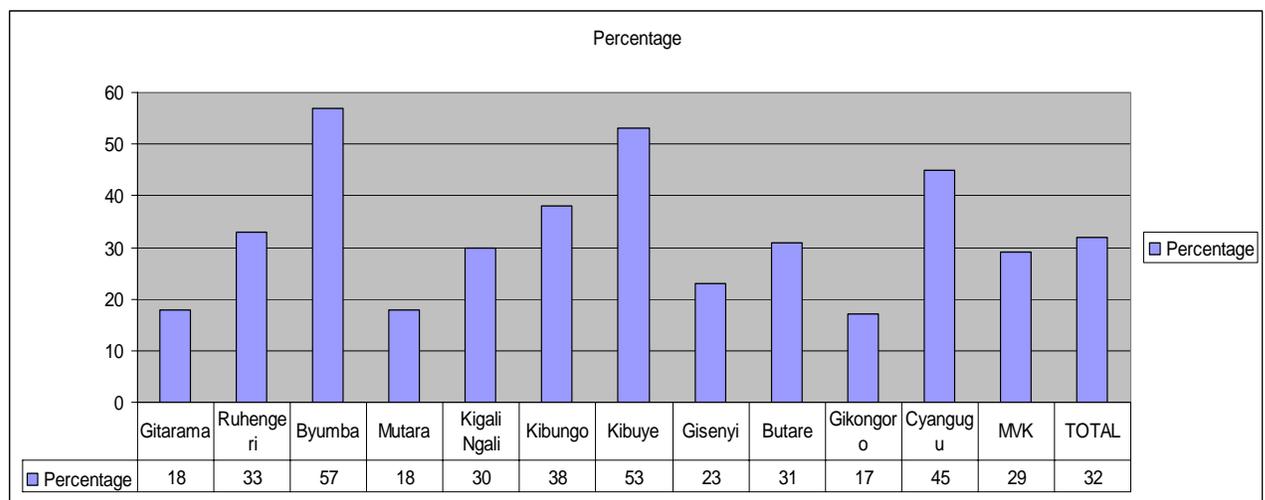


Out of 31 district hospital laboratories, 55% met the complementary package of test profiles. MVK scored 100% and Cyangugu scored 75%.

V. Supplies

Supplies are vital for performing laboratory tests. So the laboratory needs an efficient, reliable procurement system in place in order to provide continuous quality services.

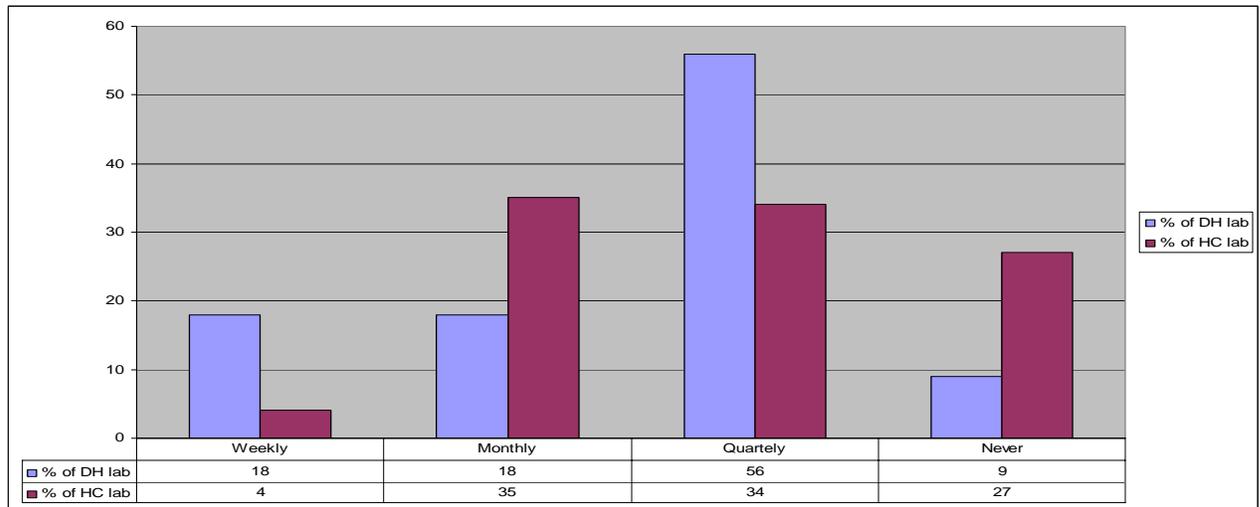
Figure 7: Percentage of laboratories satisfied with procurement system of supplies



Out of 277 visited laboratories, Majority of the laboratories are not satisfied with the procurement system.

The graph on the previous page shows that Byumba province scored 57% satisfaction of the procurement system and the least satisfied is Gikongoro with 17%. In general, most of laboratories are not satisfied with procurement system.

Figure 8: Percentage of frequency of stock out in health center and hospital laboratories

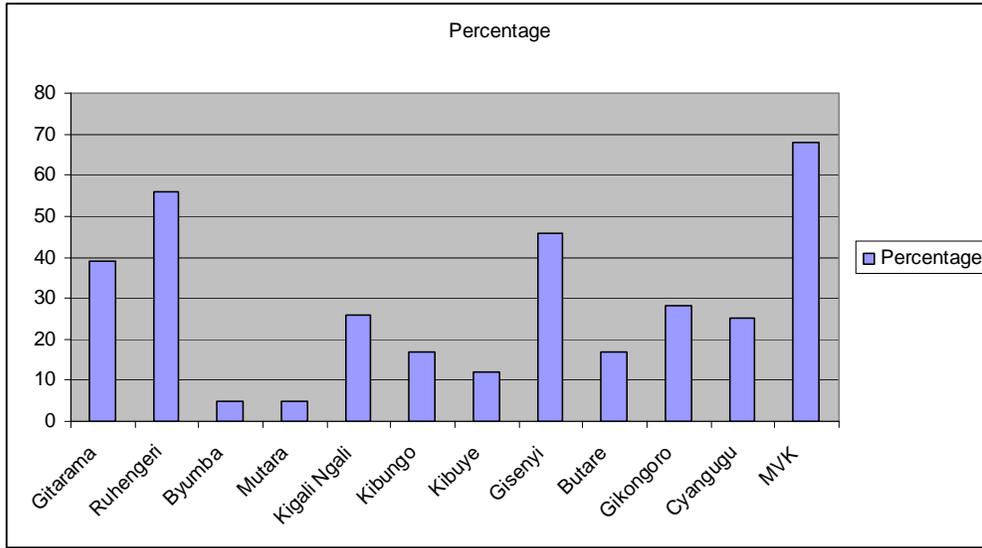


This graph shows that the frequency of stock out of supplies is quarterly: 56% of district hospital laboratories and 34% for health center laboratories. The main reason is the poor procurement system in place.

VI. Infrastructures

The national standards for laboratory designs were not available. Therefore the laboratory adequate working space was just estimated by the data collectors by comparing laboratory space to the activities volume in the laboratory. In general, only 29% of laboratories out of the total number of laboratories visited (277) have adequate working space area

Figure 9: Percentage of laboratories with adequate space per province.



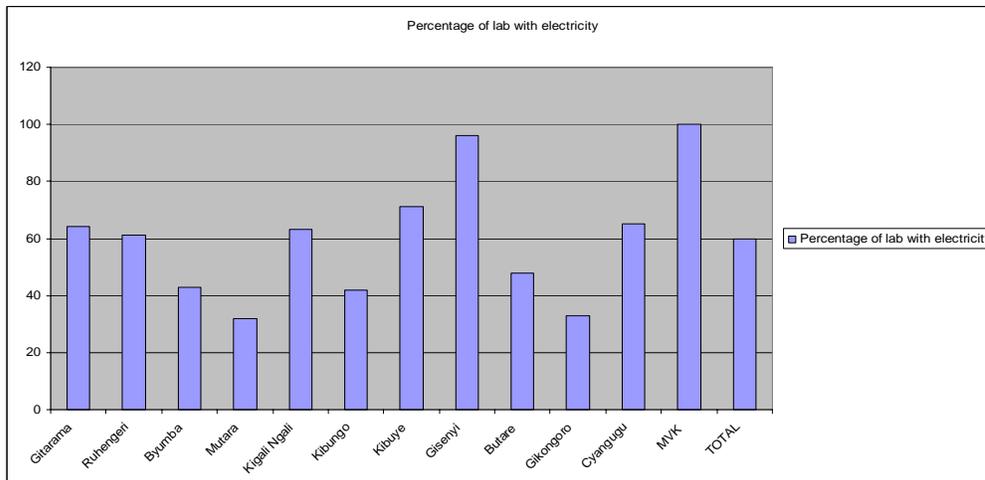
Kigali City (MVK) has 68% number of laboratories with adequate working space followed by Ruhengeri and Gisenyi respectively with 56% and 46%.

Laboratories with electricity

Power is key element in the laboratory to facilitate the process of performing various activities. If not available, it will limit the quality of tests performed in the laboratories.

Out of 277 visited laboratories, only 60% have electricity to perform various tests.

Figure 10: Percentage of laboratories with electricity per province

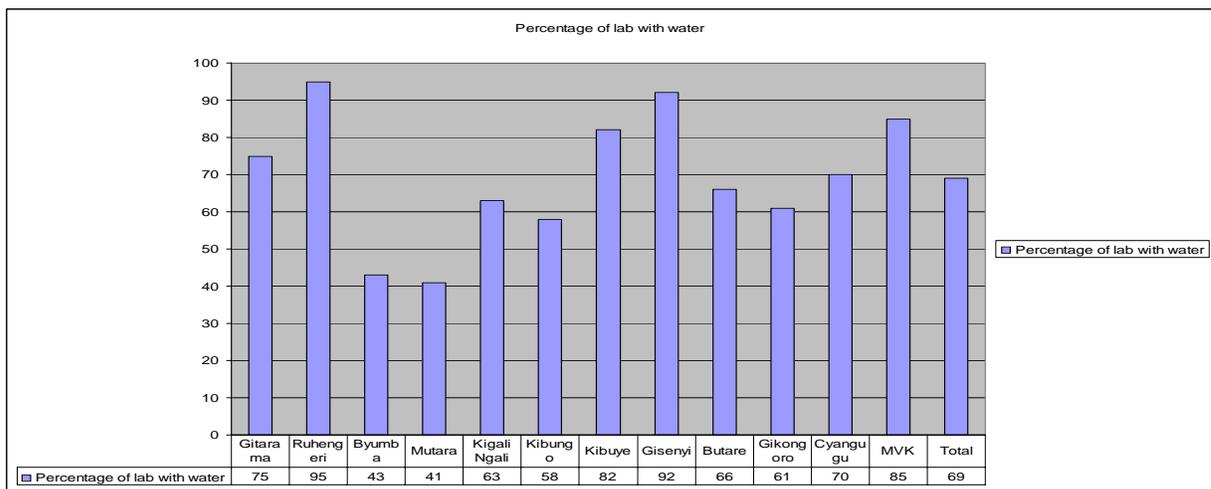


The graph above shows that Kigali City has electricity in all of its laboratories (100%), Gisenyi 96% and Mutara province has the lowest with only 32%.

Laboratories with running water

Water is a critical element required in the laboratory for performing various tests, the quality of analysis and laboratory biosafety. Out the 277 laboratories visited, 69% of laboratories have water.

Figure 11: Percentage of laboratories with running water per province



This graph shows that in general all the provinces have no problem of running water except Mutara and Byumba.

VII. Quality of services

Quality indicators are some aspects related to the quality of tests performed in visited laboratories which includes quality control performed (internal and/or external), availability of SOPs at least for the main test profiles and the satisfaction of clinicians with the quality of laboratory results.

Satisfaction of clinicians with laboratory quality of results

The clinicians were asked how they perceived the quality of the laboratory results. The overall response was that they were not satisfied with the quality of laboratory results.

Table 6: Percentage of facilities satisfying clinicians with the quality of laboratory results.

	Gita Rama	Ruhe ngeri	Byu mba	Muta Ra	Kigali Ngali	Kibu ngo	Kibu ye	Gise nyi	Buta re	Giko ngoro	Cyangu gu	MVK	Total
%	36	78	14	23	22	17	12	50	31	28	55	36	33

This table shows that the percentage of the total number of facility laboratories in which clinicians have responded to be satisfied with the quality of the laboratory results is low (33%).

Availability of SOPs for main test profiles

Availability of SOPs is one of quality indicators of laboratory test profiles.

Table 7: Percentage of laboratories with SOPs for the main test profiles

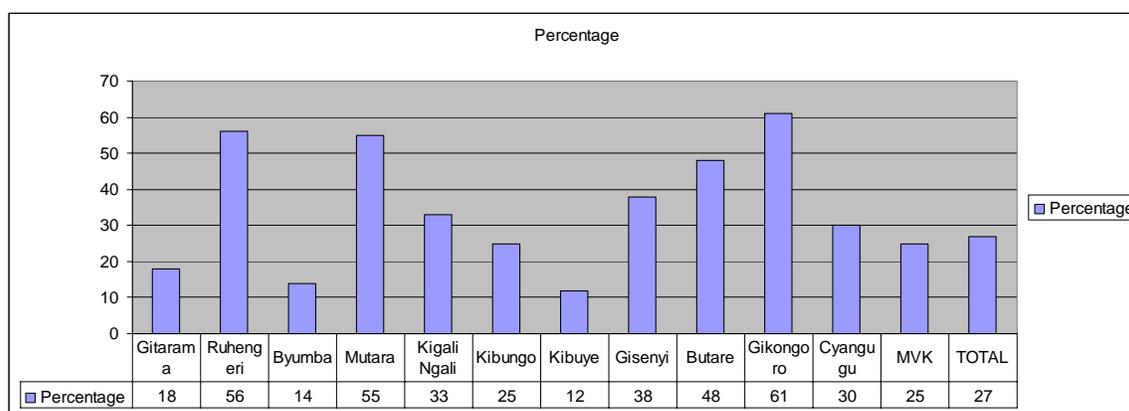
	SOPs available	SOPs non available
Number of visited laboratories	14	263
Percentage	5	95

The table above shows that out of 277 laboratories visited, fourteen (14), 5% had SOPs for the main tests performed in the laboratory.

Laboratories participating in External Quality Assessment (EQA)

Health institutions were asked if there was established EQA in their laboratories. It was observed that only HIV and TB control programs participated in the EQA. This graph shows the percentage of laboratories participating in HIV testing and TB microscopy EQA.

Figure 12: Percentage of laboratories participating in HIV and TB EQA



Gikongoro province scored the highest with 61% followed by Ruhengeri province with 56%, Butare province with 48% and Kibuye with 12% for external quality assessment for TB smear microscopy and HIV testing.

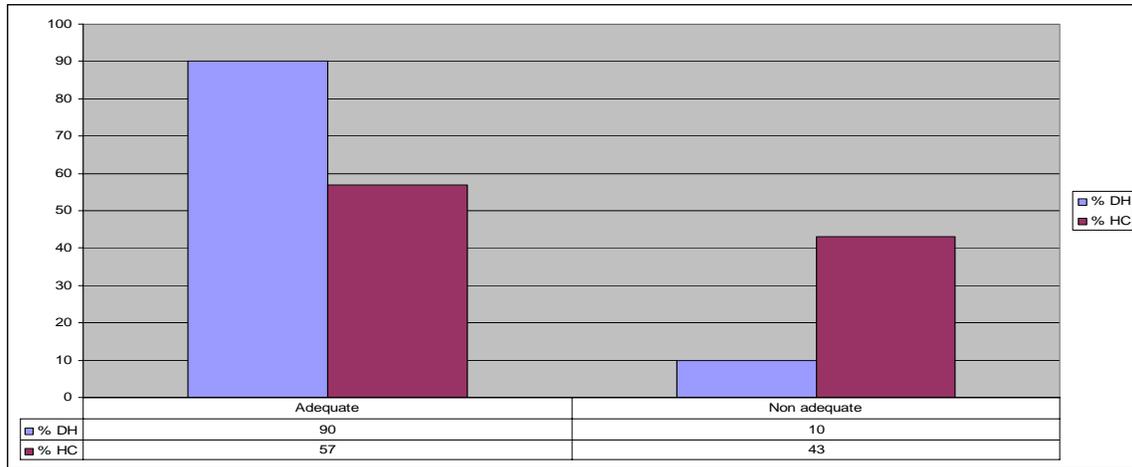
For the other tests, only Butare University Hospital and Kigali University Hospital laboratories participate in some external Quality control with WHO (pediatric meningitides) and/or Enzyme Immune Assay for hepatitis B, C and HIV. Most of laboratories do not include Internal Quality Control (IQC) when performing tests.

VIII. Safety

The laboratory is a potential area of biohazard to the health workers and the community who come in contact with the laboratory environment and waste. Therefore safety standards are essential to minimize risk of infection.

Safety covers many areas of laboratory practice but the assessment did not capture in details the safety component. Observations made by data collectors were in the safe disposal of waste generated by the laboratory.

Figure 13: Percentage of adequate safe waste disposal systems in health center and hospital laboratory



The above graph shows that out of 277 visited laboratories, the safe waste disposal system in health center laboratories were adequate with a score of only 57%.The hospital laboratories waste disposal were adequately safe with a score of 90%.

VIII. Management

The proper management of laboratory services plays a key role in the quality of laboratory services. Therefore, it is important to build capacity of the laboratory personnel in the management of laboratory services.

Out of 277 visited laboratories, only 15% and 9% are involved in management and budgeting meetings respectively.

Table 8: Percentage of laboratories involved in management and budgeting meeting

	% involved in management meeting	% involved in budgeting
Gitarama	4	4
Ruhengeri	44	44
Byumba	0	0
Mutara	0	0
Kigali Ngali	0	0
Kibungo	8	0
Kibuye	12	0
Gisenyi	62	35
Butare	17	10
Gikongoro	28	6
Cyangugu	5	0
MVK	11	11

The table shows that laboratory staffs are not involved in the management and budgeting meeting organised by the facilities thereby compromising the quality and standards of laboratory services in the country.

Chapter 4

Specialized laboratories

Kanombe Military Hospital laboratory

Kanombe Military Hospital provides health services to the army but also a certain number of services are provided to local population and occasionally accepts cases referred to public health facilities. The laboratory has adequate working space to perform all the laboratory tests at that level of care. But the problem the laboratory is encountering is the constant breakdown of the hematology analyzer and their Medical Equipment Technicians are not able to repair the analyzer. In general, doctors are not satisfied with the quality of laboratory services offered.

The total number of laboratory personnel working in the laboratory is twelve(12) that is three(3) A1, seven(7)A2, one(1)A3 and one(1) of non identified qualification. The laboratory participates in to external quality assessment for TB smear microscopy and HIV testing. The laboratory has no SOPs for the tests performed. The waste disposal system was not safe.

The main problems cited by Kanombe Military Hospital laboratory personnel were inadequate qualified laboratory personnel and inadequate equipment and supplies for laboratory tests. They are not satisfied by the procurement system because they have stock out every month due to poor procurement system. Laboratory personnel are not involved in planning and budgeting of laboratory activities.

National Reference Laboratory

The National Reference Laboratory was established in year 2002.

The role of NRL is to:

- Provide training and technical support to laboratory personnel at each level of care
- Perform specialized tests such as viral load and TB culture
- Establish quality assurance laboratory network in the country.
- Conduct epidemiological surveillance
- Carry out research

The number of qualified laboratory personnel working in the NRL is twenty six (26): three (3) with Master's degree in biomedical Sciences, four (4) with A0 qualification, nine (9) with A1 and ten (10) with A2. According to the required laboratory staff establishment, the NRL is understaffed.

The NRL infrastructure comprises 25 rooms (1 reception area, 1 specimen collection room, 13 laboratories, 5 stores and 5 offices) but the space is not adequate to perform all the specialized tests required.

The laboratory participates in external quality assessment for TB smear microscopy, HIV testing, CD4 count, viral load, measles and bacteriology with World Health Organization. The laboratory has SOPs available for the tests performed. The waste disposal system is adequately safe.

NRL is satisfied with the current procurement system because the frequency of stock out is rare. Laboratory information system related to patient results and identification is computerized.

The NRL has a service maintenance contract for some of the basic equipment with ACM. The service contract for the Facscounts and Facscaliburs are with BD International and the safety cabinets with Belgium. The maximum time for repairing of the equipment is one week.

Laboratory personnel in NRL are actively involved in budgeting of laboratory activities.

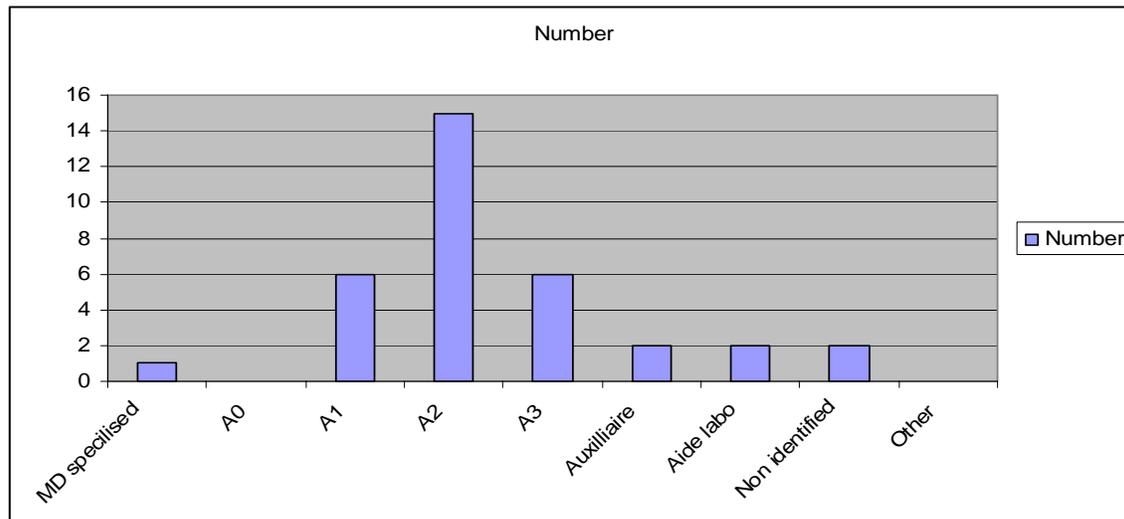
Private laboratories

The total number of private laboratories visited was 25. Three were polyclinic, six clinic and sixteen dispensary laboratories as shown in the table below.

Table 9: Number of different type of private laboratories

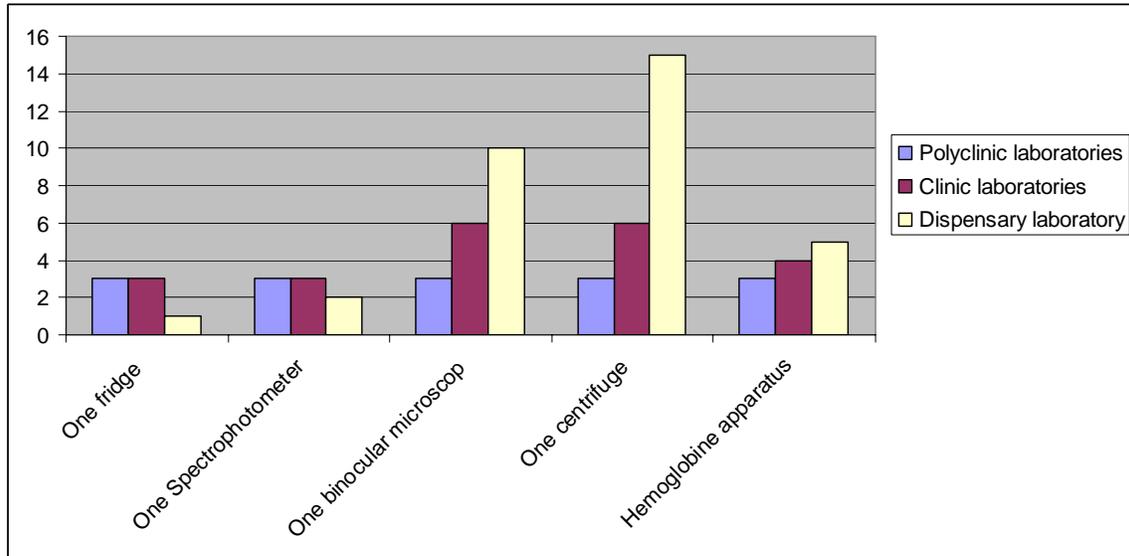
Polyclinic laboratories	Clinic laboratories	Dispensary laboratories	Total of visited private laboratories
3	6	16	25

Figure 14: Number of laboratory personnel by qualification in private laboratories



The above figure shows that, the highest number of laboratory personnel is of A2 level of qualifications, followed by A1 level. Even if the majority of these private laboratories are dispensaries, A1 laboratory personnel are found to be working in polyclinic and clinic laboratories (six A1 level qualifications in nine laboratories).

Figure 15: Number of different types of private laboratories with basic equipment



This graph shows that, the three polyclinic laboratories visited had all the basic equipment.

Of the six clinic laboratories visited; three clinics had fridges, and spectrophotometers, four clinics with hemoglobin apparatus and all the six clinics had binocular microscope and centrifuges.

The sixteen dispensary laboratories visited; one had a fridge, two had spectrophotometer, ten had binocular microscope, fifteen had centrifuges and five had hemoglobin apparatus.

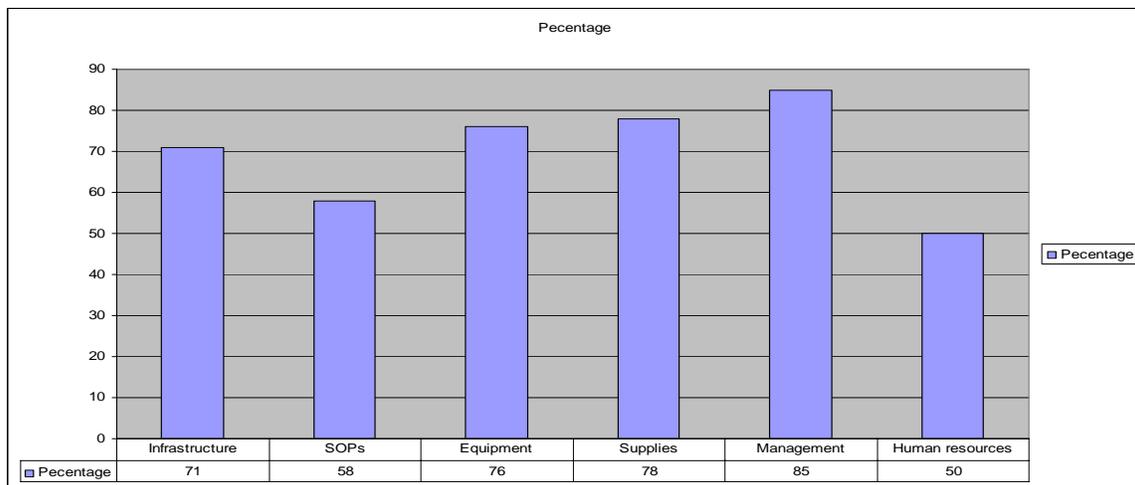
Chapter 5

CHALLENGES

The following were problems cited by laboratory personnel interviewed:

- Poor laboratory infrastructure
- Inadequate equipment and poor maintenance
- Lack of essential reagents and supplies
- Inefficient procurement systems
- Inadequate qualified laboratory personnel
- Poor laboratory personnel development/ poor retention of qualified personnel
- Inadequate biosafety practices
- Inadequate standards, technical guidelines and quality assurance systems in the laboratories
- Inadequate representation of laboratory personnel in management, planning meetings at all levels of care

Figure 16: Percentage of problems cited in different laboratories



The graph shows the magnitude in percentage of problems with the laboratory services in the country cited by laboratory personnel.

Out of 277 laboratories visited the total number of personnel working in the laboratory was 649 of which 327(50%) were qualified laboratory personnel with AO,A1, A2 and Masters in biomedical sciences. 71% of laboratories infrastructure have inadequate working space and standard designs are not available, 58% of the laboratories have no SOPs in place for the minimum and complementary packages of care,76% have inadequate equipment in the laboratories,78% lack reagents and supplies and 85% of the laboratories are not involved in management, planning and budgeting meetings.

Chapter 6

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

Quality laboratory services require quality standard equipment, skilled competent human resources, quality standard operation systems in place and continuous availability of supplies.

The findings of current status of the laboratory services were that: the NRL is constrained from performing its role as a reference centre and providing technical standard guideline and support to the peripheral laboratories due to the lack of resources. Laboratory infrastructures (designs) have failed to meet expected functional and biosafety requirements due to lack of standard designs. Inadequate planning and budgeting procedure have resulted in poor supply management and inefficient procurement systems. Due to insufficient qualified laboratory personnel with adequate skills and competencies, quality laboratory services have failed to meet the national demand. The standards of some training institutions are unacceptable this has contributed to the poor laboratory performance.

The results from this assessment indicate that there is an urgent need to mobilize resources to raise the standards of laboratory services and training to basic minimum acceptable level. The government and cooperating partners need a coordinated effort to achieve the goals of improving the laboratory services in the country.

RECOMMENDATIONS

The basic requirements for the laboratory to function are equipment, supplies, and human resources.

EQUIPMENT AND SUPPLIES

1. Equipment should be standardized for easy of maintenance, user training and reagent procurement. Standard specification and guidelines should be developed for all levels of care.
2. Laboratories should budget for preventive maintenance and repair of equipment.
3. Laboratories should be represented in all meetings for planning and development of the health sector budgets
4. Procurement guidelines for equipment and supplies should be developed and integrated with other medical supplies

HUMAN RESOURCE

1. Upgrade and strengthen basic training of laboratory personnel and establish continuous profession development.
2. Develop a career structure for laboratory personnel as a motivator
3. Improve the conditions of service for laboratory personnel for retention
4. Provide laboratories with skilled and competent laboratory personnel to deliver quality laboratory services at all levels of care
5. Increase the in takes of laboratory students at KHI
6. Train laboratory managers in laboratory management skills for effective organization and running of the service.
7. Upgrade and strengthen the training institutions and provide training materials (equipment and supplies)
8. Review and update curriculum for medical laboratory training institutions

QUALITY OF SERVICE

1. Technical standard guidelines to be developed for all levels of care
2. Establish quality assurance system at all levels of care

3. NRL should be provided with required resources to provide technical supportive visits to all peripheral laboratories

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Figure 14: Number of laboratory personnel by qualification in private laboratories

Figure 15: Number of different types of private laboratories with basic equipment

Figure 16: Percentage of problems cited in different laboratories

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APPENDIX

Questionnaires

I. Questionnaire for Health Institutions

1. FACILITY INFORMATION

Name of facility:

Administration type:

Type of facility:

Government district hospital	
Government health center	
Private district hospital	
Private health center	
Referral hospital	
Private clinic	
Private dispensary	

2. PERSONNEL

Qualification	Number
PH D	
Pathologist	
Msc Biomedical Sciences	
A0	
A1	
A2	
A3	
Auxilliary	
Laboratory aid	
Non identified	
TOTAL	

Qualification of the responsible of the laboratory:

Q1: Please, list training programs that laboratory staff received in the past 2 years.

Position held	Training received	Year	Sponsor	Duration

Q2: Is your laboratory

- Overstaffed?
- Adequately staffed?
- Understaffed?

Q3: Have received a supervisory visit from the National Reference Laboratory during the last year? Yes / No

If yes, who visited and what was the purpose of the visit?

.....

Q4. How did you find the visit? Very helpful / Moderately helpful / Not helpful at all

Q5. Safety: Does the laboratory have a safety cabinet? Yes / NO

Q6. Management: Do you provide an on call service? Yes / NO
 If yes, how many laboratory technicians A1 are on rotation?
 How many laboratory assistant A2 are on rotation?

Q7. Do on call staff get:

- Overtime? Yes/No
- Time of the following day? Yes/No

3. EQUIPMENT

Codes

Age: **1** = <6 months, **2** = 6months-1 year, **3** = 1-3 years, **4** =3-5 years, **5** =5-10 years, **6**=don't know.

If equipment is not working, please indicate the reason and length of time out of order using the following legend:

Reason of no working: 1= No spare parts, 2=No technician, 3=No money, 4=currentely beeing repaired, 5=obsolete

Length out of order: 1=less than three months, 2=3-6 months, 3=6-12months, 4=more than one year.

Description	Quantity	Make	Model	Source	Age	G	F	Poor	Not working	y		No
										o	a	
						d	r					
Bench centrifuge												
Haematocrit centrifuge												
Hand centrifuge												
Autoclave												
Water bath												
Water distiller												
Water deioniser												
pH meter												
RPR shaker												
Incubator												
Microtom												
Histokinete												
Haematology autoanalyser												
Biochemistry autoanalyser												
Ionogram analyser												
Complete ELISA system												

Anaerobic jar												
Monocular microscop with miror												
Monocular microscop with built in illuminator												
Binocular microscop with miror												
Binocular microscop with built illuminator												
Domestic fridge												
Colorimeter												
Lovibond comparator												
Sahli kit												
Hot plate												
Dryer												
Dessicator												
Hot air oven												
Balance												
Spectrophotometer												
Others												

4. TESTS PERFORMED

A. Health Center

TEST	METHOD USED	Number/ month
Hemoglobin		
White cell count		
Red cell count		
Haematocrit		
Sickling test		
ESR		
WBC differential		
Urinary protein/ glucose		
Blood glucose		
Stool examination		
Malaria smear		
Pregnancy test		
Gram stain		
ZN/Kinyoun stain		
HIV rapid test		
Microscopic examination of urine (deposit)		
Others		

B. District hospital

TESTS PERFORMED	METHOD USED	NUMBER / month
Biochemistry		
Albumin		
Alkaline phosphatase		
Amylase		
Bilirubin total, direct		
Creatinine		
Glucose (Blood)		
Glucose (CSF)		
Protein total		
Triglycerides		
Uric acid		
Urea		
Transaminases		
Cholesterol		
Others		
Blood transfusion		
ABO grouping tile		
Rhesus grouping tile		
Cross match room temperature		
Others		
Microbiology		
Microscopy		
Gram stain		
ZN/Kinyoun		
Wet preparation		
Others		
Parasitology		
Stool for routine O/P		
Urine deposit		
Blood slides for trypanosomiasis		
Blood slides for malaria		
Others		
Serology		

Blood grouping		
Hepatitis B		
Hepatitis C		
HIV		
Widal		
VDRL		
Pregnancy test		
RPR		
TPHA		
Weil Felix		
Others		
Haematology		
Haemoglobin		
White cell count		
Red cell count		
Hct/PCV		
MCV		
MCH		
MCHC		
ESR		
Reticulocytes		
Platelet count		
Bleeding time		
Clotting time		
WBC differential		
Sickling test		
Others		

C. Referral Hospital

TESTS PERFORMED	METHOD USED	NUMBER / month
Biochemistry		
Acid phosphatase		
Transaminases		
Albumine		
Blood alcohol		
Alphafeto protein		
Amylase		
Bilirubin		
Calcium		
Creatinine		
Total Cholesterol		
Electrolytes (Na, K, Mg, Cl, PO4)		
Glucose (CSF)		
Glucose (Blood)		
Total proteins		
Protein (CSF)		
Proteins electrophoresis		
Triglycerides		
Uric acid		
Urea		
CRP		
LDH		
CPK		
Lipase		
Fer serique		
TIBC		
Total lipids		
Steroids hormons		
Tyroids hormons		
Steroids hormons		
Catecholamine and derivates		
Glycated Hb		
Other		
Blood transfusion		
ABO grouping tile		
Rhesus grouping tile		
ABO grouping tube		

Rhesus grouping tube		
Cross match room temperature		
Cross match albumin 37 ⁰ C		
Cross match saline 37 ⁰ C		
Cross match Coombs 37 ⁰ C		
Direct Coombs test		
Donor screening HBs Ag		
Donor screening for HIV		
Donor screening for RPR		
Preparation of packed cells		
Preparation of fresh frozen plasma		
Blood collection and storage		
Others		
Microbiology		
Culture and sensitivity		
Ear		
Throat		
Stool		
Nasal		
Mouth		
Eye		
Urogenital		
Urine		
Blood culture		
Sputum		
Pus/wound		
Plural effusions		
CSF		
Microscopy		
Gram stain		
Fluorescent		
ZN/ Kinyoun stain		
Wet preparation		
India ink		
Culture atmosphere		
Aerobic		
CO2		
Anaerobic		
Other microbiology performed		

Parasitology		
Stool for routin		
Concentration technics		
Urine		
Urine deposit		
Blood slides for trypanosomiasis		
Blood slides for malaria		
Blood slides for microfilariae		
Others		
Hematology		
Heamoglobin		
White cell count		
Rd cell count		
Hct/PCV		
MCV		
MCH		
ESR		
Reticulocytes		
Platelet count		
Bleeding time		
Clotting time		
Prothrombin time		
Partial thromboplastin time with Kaolin		
Fibrinigen		
Fibrin degradation products		
WBC Differential		
Sickling test		
Bone marrow		
G6PD		
Hb electrophoresis		
Others		

HISTOLOGY/CYTOLOGY

If no histology is performed, do you refer specimens elsewhere? Yes/No

If yes, where?

Please, use this sheet to record any additional tests performed in your laboratory.

TEST	METHOD

5. INFRASTRUCTURE/LABORATORY

	YES	NO
Is there rooms built for laboratory?		
How many rooms you have in the laboratory?		
Is there a room for reagent and supplies storage?		
Is there a room for patient reception?		
Is there a room for specimen collection?		
Is the specimen collection room separated with analysis room?		
Is the distribution of rooms logic with the flow of specimen?		
Are laboratory rooms enough?		
If not, is the extension possible?		
Have you electricity in the laboratory?		
When power shortage, what do you use?		
If it is a generator, is it used for the laboratory?		

Do you have gas in the laboratory?		
Do you have water in your laboratory		
Do you have strong bench in your laboratory?		

Please list the major causes of morbidity and mortality in your area.
 What are the five main causes of OPD visits please include % if know?
 What are the five main causes of in patient admissions?
 Please list the major causes of mortality for your district.

7. MEDICAL DOCTORS / CLINICAL OFFICERS

1. Your name
2. Title
3. Please indicate your degree of satisfaction with the laboratory services at your hospital / District / Health Center

Very satisfied	
Moderately satisfied	
Not satisfied at all	

4. Please list the five most important tests required by you in order of priority (District hospital, Health Center or Internal Medicin if referral hospital) (i.e. ones that you considered critical to your management of patient)

5. Please indicate how often these tests were available to you in the last ten months

	Always	Frequently	Occasionally	Never
1.				
2.				
3.				
4.				
5.				

Q2. If sometimes when did you last perform quality control on the following ?

RPR tests						
Malaria slides						
TB microscopy						
Biochemistry test						
Sensitivity tests						
Blood grouping						
HIV tests						
Haematology tests						
Serology tests						

Q3. Do you have SOPs Yes / No

Q4. Which disinfectant do you use in the laboratory?

1. Javel 2. Iodin alcohol. 3. Denaturized alcohol

9. FINANCE AND PROCUREMENT

Q1. Do you have a separate budget for the laboratory? Yes / No

Q2. Do you charge user fees for laboratory tests?

Q3. If yes, is the money made available to the laboratory? Yes/ No/ don't know

Q4. Who is given responsibility to for laboratory budgeting?

- a. Laboratory responsible
- b. Director
- c. Pharmacist
- d. Others

Q5. Did you budget for laboratory activities in the 2003 action plan?

Q6. Do you attend management meeting? Yes/ No

Q7. Who is given responsibility for procurement of laboratory supplies?

Q8. From where do you receive laboratory supplies?

CAMERWA / Local supplies / Overseas / don't know

Q9. Are satisfied with the present system of procurement for laboratory equipment and supplies?

Very satisfied / moderately satisfied / unsatisfied

Q10. If you are not very satisfied, what are the main problems with the current system?

- a. Wrong reagent
- b. Much delay
- c. Small quantity
- d. Burocratic system of procurement

Q11. How often do you run out the reagent and supplies?

Weekly / monthly / every few months / Never

Q12. Have you run out the following supplies in the last six months?

	YES	NO	NON APPLICABLE
Urine stool containers			
Haemoglobin reagents			
Giemsa stain			
ZN/ Kinyoun stain			
Biochemistry reagent			
Haematology reagent			
Serology reagent			
Immersion Oil			
HIV kits			
Multistix / Uristix			
Microscop slides			
Others			

Q13. What tests have been unable in the past 6 months because of lack of supplies or equipment? Please indicate the reason.

TEST	REASON	LENGTH UNAVAILABLE

Q14. Please list the five most frequent tests requested and how often were done.

TEST DONE	Always	Almost always	Frequently	Almost never

10. MAINTENANCE

Q1. Do you have a service maintenance contract for your laboratory equipment?

Yes / No

Q2. Did you budget for spare parts and maintenance in your 2003 action plan?

Yes/ No

Q3. Where do you send your laboratory equipment for repair?

Q4. How long does it take on average?

One week

One month

Up to three months

To six months

More than six months

11. RECORDS

Q5. Is the laboratory keeping records on tests results by type of tests?

Q6. Does the laboratory refer patients or sample?

II. QUESTIONNAIRE FOR TRAINING INSTITUTIONS

Name of institution:

Location:

Number of students: Secondary 4e: 5e:..... 6e:

Total:.....

KHI 1e:..... 2e:..... 3e:....

Total:.....

Level training qualification:

Number of permanent teachers:

Number of theory classrooms:

Number of Rwandans teachers:

Number of practical classrooms:

Number of others:

Qualification of teachers A2: A1:

A0:

Equipment and Reagents available:

Description	Number
Microscope	
Spectrophotometer	
Centrifuge	
Water bath	
Autoclave	
Incubator	
Fridge	
Balance	
Haemocytometer	
Haemoglobinometer	
Slides	
Giemsa	
Gram stain	
ZN/Kinyoun stain	
Glucose	
Urea	
Creatinine	
Bilirubin	
Pregnancy test	
RPR/ VDRL	
Blood grouping	
HIV rapid tests	
Others	
