



THE REPUBLIC OF MALAWI

MINISTRY OF HEALTH

**NATIONAL SAMPLE
TRANSPORTATION SYSTEM
GUIDELINES**

DECEMBER, 2010

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ABBREVIATION / ACRONYMS

AIDS	Acquired Immuno Deficiency Syndrome
ANC	Ante Natal Care
ART	Antiretroviral Therapy
BASICS-MSH	Basic Support for Institutionalized Child Survival- Management Sciences for Health
CDC	Center for Disease Control and Prevention
CD4	Cluster of Differentiation 4 or Helper T Lymphocytes
CHAI	Clinton Health Access Initiative
DBS	Dry Blood Spot
DHO	District Health Officer
DNA-PCR	Deoxyribonucleic acid –Polymerase Chain Reaction
DREAM	Drug Resource Enhancement Against AIDS and Malnutrition
DTO	District TB Officer
EID	Early Infant Diagnosis
EQA	External Quality Assurance
HIV	Human Immunodeficiency Virus
HTC	HIV Testing and Counseling
HTSS	Health Technical Support Services
HUTAP	Howard University Technical Assistance Program
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IDSR	Integrated Disease Surveillance Response
IQA	Internal Quality Assurance
LCC	HIV and AIDS Laboratory Capacity Consortium
MDG	Millenium Development Goal
M&E	Monitoring and Evaluation
MoH	Ministry of Health
MSF	Medicines Sans Frontières

PMTCT	Prevention of Mother to Child Transmission of HIV
PVHO	Plant and Vehicle Hire Organization
SOPs	Standard Operating Procedures
STS	Sample Transportation System
TAT	Turn Around Time
TB	Tuberculosis
VMU	Vehicle Management Unit
WB	Whole Blood

DEFINITION OF TERMS

Ambulance	A vehicle specifically use for transporting patients requiring emergency lifesaving care to a health facility where that care can be provided.
Sample	Any type of specimen collected from the client requested by the clinician as part of care and treatment intervention.
Sample transport	Carrying/ moving/shipping sample form one facility to another for testing.
Sample Transportation system	A coordinated structure or approach on transporting sample and delivery of results from lower health facility level to a reference laboratory.
Stakeholders	All personnel from MoH, NGOs or partner organizations those are either providers or users of laboratory testing services.
Triple packing system	An essential safety feature for the transport of infectious materials and is an international requirement.
Turnaround time	The amount of time it takes for the sample from the point of collection at the health facilities to the point the result gets back to the health facilities/clients.
Utility vehicle	Any vehicle that is not an ambulance but is meant to provide other kinds of transport services.

FOREWORD

The government of Malawi through the Ministry of Health (MoH) is working tirelessly to provide high quality curative and preventive services at all tiers of health delivery system to address the prevalence of all disease conditions. In order to do that, prompt diagnosis, treatment and monitoring of response to treatment are required. However for this to happen, there is need to strengthen the overall laboratory diagnostic capacity and institute a dedicated well functioning, effective and efficient sample transportation system. Achieving this will improve the health of its citizens in line with the Millenium Development Goals (MDGs).

The government is aware of the several sample transportation modalities currently in use in Malawi primarily intergrated in the public healthcare delivery system. This disjointed system has been confirmed to be uncoordinated and inefficient. Overwhelmed by scale up of PMTCT, HIV, TB, Malaria, ART and other services at all levels, the need to develop a comprehensive national sample transportation system was necessitated. Furthermore, this system forms part of the process in strengthening laboratories towards accreditation where building a reliable and cost-effective sample transportation system is a requirement.

It is the wish of the Ministry of Health in collaboration with development partners and stakeholders to establish a national sample transportation and referral system for Malawi. The government therefore commits to ensure that all stakeholders undertake to implement the system exhaustively realizing that previous sample transportation modalities led to long turn-around-time for most if not all tests and often compromised the quality of samples. In the interest of leveraging resources, this system surmounts the economic obstacles.

This national sample transportation guideline will serve as a guiding principle for the country to have a well coordinated, standardized, functioning, effective and efficient sample transportation system. This guideline applies to healthcare institutions as end users and sample transportation service providers and suppliers.

The Ministry of health therefore invites all stakeholders to take part and support the implementation, monitoring and evaluation of the new system.

W. W. Samute
Secretary for Health

ACKNOWLEDGEMENT

The work of developing this Guideline has been shared by many people, especially led by the Ministry of Health, HTSS (Diagnostics) Unit with technical assistance from other organizations and stakeholders.

The Ministry of Health wishes to acknowledge and commends the core team comprised of MoH (HTSS-Diagnostics), CHAI, HUTAP, LCC, MSF-OCB, DREAM, BASIC-MSH and CDC for their dedication and efforts in coming up with this National Sample Transportation System Guidelines. Likewise, all the stakeholders for their participation and involvement on the development of detailed and thorough aforementioned Guidelines, your dedication and effort are truly commendable;

Dr. K. Kamoto
Director of Health Technical Support Services

1.0 INTRODUCTION

The government of Malawi through the Ministry of Health (MoH) with support from partners is scaling up HIV/AIDS, Malaria, Tuberculosis diagnostic and care and treatment services among other diseases in order to improve the health of its citizens in line with the Millennium Development Goals (MDG). It is well known that prevention of diseases through health education and integrated disease surveillance remains a key pillar in improving the health population. However, high quality curative services should be provided at all levels to address the prevalent disease conditions. This requires prompt diagnosis, treatment and monitoring of response to treatment. For this to happen, there is need to strengthen the overall laboratory diagnostic capacity and institute a well functioning, effective, and efficient sample transportation system.

The national Prevention of Mother to Child Transmission (PMTCT) program and ART services are relying mostly on ambulances and other modalities to transport Dried Blood Spot (DBS) samples for Early Infant diagnosis (EID) and blood samples for CD4+ analysis from collection points to the testing laboratories. Many of these PMTCT sites lack the capacity to provide routine and reliable testing. Moreover, several of the sites offering PMTCT and ART services have weak systems in place for referring patients for care and treatment and the long turnaround time to receive test results exacerbates the problem.

Findings from a situation analysis of the current sample transportation done in November 2010 showed that there are several sample transportation modalities currently in use in Malawi primarily integrated in the public healthcare delivery system. However, the system is uncoordinated and inefficient leading to long Turn Around Time (TAT) for most tests. In addition, issues of specimen quality especially blood samples for CD4+ analysis when they are transported from health centers to district laboratories, influence the quality of results obtained.

The scale up of PMTCT, HIV, TB, Malaria, ART and other services at all levels necessitates that a well coordinated sample transportation system should be in place. Furthermore, as the process of strengthening laboratories towards accreditation continues, building a reliable and cost-effective sample transportation system is of absolute importance. MoH in collaboration with partners intend to establish a national sample transportation and referral system.

During the stakeholders meeting a situation analysis had been presented, a decision was made to develop national sample transportation guidelines as the next step towards achieving the goal. The core team was formed to spearhead the development of this guidelines comprised of MoH (HTSS-Diagnostics), CHAI, HUTAP, LCC, MSF, DREAM, CDC and BASICS-MSH. This National Sample Transportation Guideline will serve as a guiding principle for the country to have a well coordinated, standardized, well-functioning, effective and efficient sample transportation system. This guideline applies to healthcare institutions as end users and to sample transportation service providers as suppliers.

2.0 GOAL

The goal of National Sample Transportation Guidelines is to provide direction in the establishment of well-coordinated, standardized, reliable, efficient, cost-effective and sustainable sample transport system in the country that is acceptable to Ministry of Health (MoH), District Health Offices (DHOs), health workers and stakeholders.

3.0 TRANSPORTATION SCHEME

The transportation to be used should be a dedicated vehicle which can conform to an exact schedule, cost effective, minimal maintenance and able to access hard to reach health facilities even during the rainy season.

The transport options are;

- a. Dedicated motorcycles
- b. Utility vehicle
- c. Courier service
- d. Boat

A combination of the transport options should work best for different levels of referrals. Ambulances will **only be** considered if the other options available have been compromised. This is in compliance to National Health Transport Policy on the priority use of ambulances in the country.

The following factors should also be considered in the comparison analysis of available transportation option;

- a. Reliability
- b. Turnaround time
- c. Human resource
- d. Sample viability based on machine used and throughput
- e. Cost

4.0 SAMPLES AND TESTS

When deciding on transporting samples, viability should be considered in order to ensure the quality of results. Each sample should meet the laboratory requirements for sample collection, labeling, storage stability, packing and transportation (refer to appendix A). In case of disease outbreak type of specimens collected should be transported in reference to the Integrated Disease Surveillance Response (IDSR) guidelines.

Table 1: Samples and tests

Type of test	Type of Sample	Programmatic Area
DNA-PCR	DBS	PMTCT, ART, Pediatric care
CD4+ count	WB	HIV care/treatment services
Viral Load	DBS/Plasma/WB	HIV care/treatment services
TB culture	sputum	TB program
Chemistry	Serum/plasma	HIV care/treatment services
IQA and EQA	WB/serum/plasma	HIV care/treatment services
Microbiology	Any body fluids/scrapings/ stool samples/puss swabs /tissues	Clinical services/ disease surveillance/EPI
Biopsies/Histopathology	Tissue biopsy and smears	Clinical services
Hematology (FBC, Diff)	WB	HIV care/treatment services
HIV Screening	WB/Serum/Plasma	HIV care/treatment services

5.0 SAMPLE TRANSPORT FLOW

It will be necessary to track the movement of samples and results. The testing process starts and ends at health facilities. Required sample should be collected in the appropriate container/tube, packaged and labeled appropriately, picked up by the transport rider and delivered to the referral lab along with the lab order forms and delivery checklist. In return pick up results from the referral lab and deliver results back to the health facilities (appendix B- single referral system). When samples need to be referred via the district lab, a courier must be engaged (appendix B- 2 way referral system). On the other hand, results can be communicated and sent through emerging technologies like GSM printers or SMS Results 160 for prompt delivery of results.

6.0 TURN AROUND TIME

Table 2 shows the target turnaround time for transporting key laboratory tests. Samples transport and delivery of results should be done in a realistic, coherent and efficient manner for all tests thereby impacting service delivery positively.

Table 2: Target turnaround time

Type of test	Target turnaround time
DNA-PCR	Within 3 weeks
CD4+ count	Within 1 week
Viral load	Within 3 weeks
TB culture	Within 6 weeks
Chemistry	Within 1 week
IQA and EQA	Within 2 weeks
Microbiology	Within 3 weeks
Biopsies and Histopathology	Within 3 months (CoM referrals)/ 2 weeks (private lab referrals)
Hematology (FBC, differential count)	Within 5 days
HIV screening	Within 2 weeks

7.0 SAMPLE TRANSPORT STANDARD OPERATING PROCEDURES

Standard Operating Procedures (SOPs) are required for every stage of the testing and transport process at health facilities, on the road, and at the reference lab to ensure that all staff handling samples remain safe, that samples arrive at the lab able to be tested, and that results can be delivered to the clients or their caregivers. Failure to adhere to SOPs at any stage can significantly influence the quality or even availability of results.

The SOPs should include;

- a. Collection of samples
- b. Labeling of samples
- c. Packaging of samples
- d. Storage of samples before transport (only applicable under certain circumstances, such as with DBS samples)
- e. Transport of samples to a testing lab
- f. Reception of samples
- g. Production of results
- h. Recording and release of results
- i. Transport of results
- j. Reception of results at the collection site

In addition to SOPs in general, it is important to stipulate acceptance and rejection criteria on collection of samples and inclusion of both Quality Control and Safety manual.

SOPs will be used as information guide and will be applied by the institution or group concerned on each specific activity on sample transport/transmission of results.

8.0 TRAINING ON SOPs, SAFETY AND TRANSPORT SYSTEM REGULATIONS

Specific training on SOPs, safety and transport system regulations is required for all individuals involved in the process;

- a. health facility staff and management
- b. transportation riders (dedicated riders for Sample transport)
- c. laboratory staff and management
- d. data clerk/ receptionist

The training should include modules on;

- a. Sample collection and labeling

The samples must be collected and labeled appropriately based on the test requested and required following the laboratory requirements to maintain sample integrity and stability (appendix A)

- b. Bio safety and Universal precaution

This is for prevention and minimizing the risk of transmission of infection that can cause harm to you and to others at work. Also in compliance to ISO 15189 Safety Standards

- c. Packaging, storage and transportation

Samples must be packed carefully and designed to minimize temperature variance and movement following the “triple packing of infectious materials” (appendix C) in compliance to IATA/ICAO regulations. Pick-up and delivery of samples will depend on the type of samples, their storage and stability (appendix A).

- d. Data and result management

Patients’ information and results must be properly entered/log and results communicated back to health facilities by either through the same transport mode or through emerging technologies such as GSM printers and SMS technologies such as; Results 160. This to ensure to capture patient information for patient care, follow up, monitoring and evaluation

- e. Road side trouble shooting and preventive maintenance

Trouble shooting and preventive maintenance protocol should be put in place to ease the burden of Vehicle Management Units (VMUs) in order to prevent delays and interruption of services delivery

9.0 TRANSPORTATION ROUTE AND SCHEDULE

The transportation route and schedule must be established by determining the health facilities to be included, arranging into geographical zones which are most sensible and cost effective for routing. The days of collection must be selected based on when most patients visit the clinic for HTC, ANC and ART clinic day and when most patients visit the health facilities. Twice weekly collection and delivery is strongly recommended. Patient accessibility as well as sample stability and machine capability at the reference lab must also be taken into consideration. Fridays are not recommended based on the reference lab tasking schedule and rules about working over the weekend.

10.0 REQUIREMENTS FOR TRANSPORT PROVIDERS

Any organization/institution involved in sample transportation must adhere to universal safety transport regulations. Training on the proper handling of samples is a pre-requisite to prior to embarking on sample transportation services. It is essential that the following requirements should be in place based on the option selected;

- I. Requirements for organizations/institutions
 - a. registration in Malawi
 - b. should be qualified on proper handling and safe transport of samples
 - c. should conform to IATA standard regulation
 - d. must have specimen tracking system

- II. Requirements for mode of transport

- a. Motorcycle

Should include the following;

- a-1 professional drivers' license with advance and defensive driving)
- a-2 protective gears (helmet, wind breaker jacket, gloves, boots, and rain coats)
- a-3 first aid kit
- a-4 communication device radio, phone)
- a-5 comprehensive insurance coverage (both motorcycle and rider)
- a-6 specially designed carrier/bag/ top box to carry samples and documents
(lab order form and delivery checklist)
- a-7 transport log

b. Utility vehicle

- b.1 professional drivers' license (with defensive driving)
- b.2 comprehensive insurance coverage and government certification
- b.3 must registered by PVHO
- b.4 first aid kit and portable fire extinguisher
- b.5 cooler box/carrier for samples and documents (lab order form and delivery checklist)
- b.6 communication device (radio, phone)
- b.7 transport log

c. Boat

- c.1 Professional pilots' license.
- c.2 protective gears (life jackets)
- c.3 first aid kit
- c.4 communication devise (radio, phone)
- c.5 comprehensive insurance coverage (both the boat and pilot)
- c.6 specially designed carrier/bag/ top box to carry samples and documents (lab order form and delivery checklist)
- c.7 transport log

The provision of protective gear must be stipulated to be reviewed every year and replaced when deemed necessary.

11.0 SAMPLE TRANSPORT SYSTEM COMMITTEE

A Sample Transportation System (STS) Committee should be formed in both District and Central level whereas a focal person (appointed by the committee) should be available at all levels including health centers

The STS Committee is responsible on addressing issues, challenges, incidents and continuity of efficient and effective sample transportation system. The focal person on the other hand will be responsible to communicate to the STS Committee any pertinent issues and challenges that need to be addressed. Likewise, facilitate supply needs and data reporting.

The STS Committee at District level comprises of;

- a. District Health Officer (Chairperson)
- b. Laboratory Manager
- c. District Environmental Health Officer
- d. District Nursing Officer
- e. MCH coordinator
- f. District TB Officer (DTO)
- g. Prevention of Mother to Child Transmission (PMTCT) coordinator
- h. HIV and AIDS coordinator
- i. ART coordinator
- j. Administrator
- k. Transport Officer

The STS Committee will work under the MoH regulation and should meet once a month and submit report to MoH (HTSS Directorate).

12.0 MONITORING AND EVALUATION

In order to ensure effective and efficient and well-coordinated Sample transport system delivery, there shall be a monitoring and evaluation strategy which shall track patient results and eligibility for care and treatment, turnaround time, tracing of samples and results and use of transport and maintenance,

Sample transport registers and logs should be in place in all health facilities;

- a. Register log book
- b. Delivery checklist
- c. Lab order/request form
- d. Transport log
- e. Sample rejection log
- f. Any additional log forms related to Sample transport

The MoH will facilitate the monitoring and evaluation of the Sample Transportation System. Monitoring data will be collected every month and a report sent to the Zonal office. Quarterly supervisory visits will be done by Laboratory zonal supervisors who will then compile quarterly reports and submit them to MOH- HTSS Directorate (Appendix D & E). Evaluation of the STS will be done every 6 months. An STS database will be created and maintained in line with Laboratory Information Management System (LIMS).

13.0 REFERENCES

1. AMREF Guidelines on Specimen collection, Storage and Transportation, Sadiki Materu.
2. Guidance on Regulations for the Transport of Infectious Substances, WHO/CDS/EPR/2007.2
3. Malawi National Health Transport Policy, MoH, October 2009
4. Situation Analysis Report on Sample Transportation System in Malawi, MoH/HUTAP, November 2010
5. Technical guidelines for Integrated Disease Surveillance and Response in Malawi, MoH/WHO, October 2005
6. IATA Guidance Document Infectious Substances. Available online at http://www.iata.org/SiteCollectionDocuments/Documents/Guidance_Doc62DGR_51.pdf/ Accessed online on December 17, 2010.

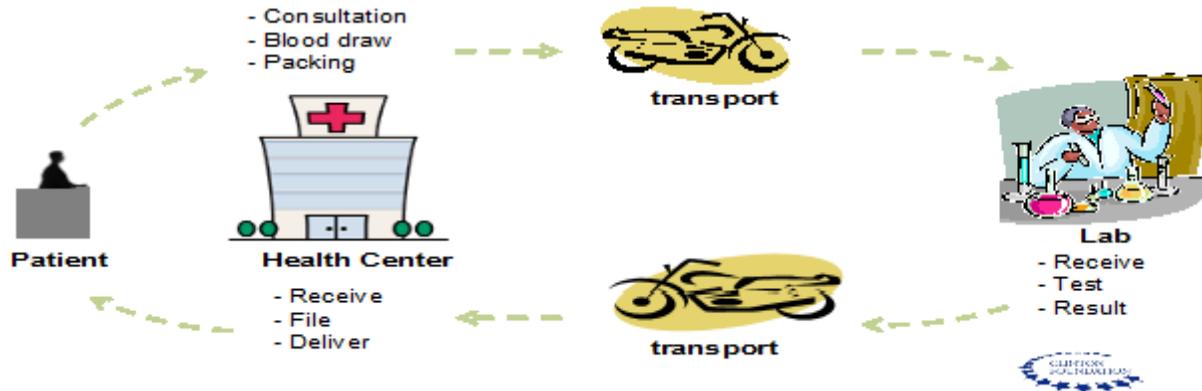
APPENDIX A. LABORATORY REQUIREMENTS FOR TESTS SAMPLE COLLECTION, STORAGE, PACKAGING AND TRANSPORT LOGS

Test	Tube type/ sample required	Minimum amount of sample	Collection and Storage	Packing & transport	Accompanying documents (log forms)
CD4 count	EDTA, purple/ WB	2 ml	Draw blood/ keep at RT until transport with in 24 hrs (48 hrs maximum- BD machine) -Transport within 6 hours– Partec machine	Refer to Triple packing system at ambient RT in a transport pack/box - ambient RT in cool box with icepacks	- lab order/ request form - delivery checklist
Biochemistry	Plain, red Serum/ plasma	3ml serum	Draw blood Centrifuge, separate & transport within 6 hrs	Refer to Triple packing system at ambient RT in a transport pack/box with in 6 hrs	- lab order/ request form - delivery checklist
TB culture	Dry sterile wide mouth container/sputum	2 containers 3.5 ml/ container	Deep cough sample/ refrigerate at 4-8 C until transportation Within 24 hrs	Refer to Triple packing system & mark “handle w/ care” at RT in cool box with icepacks	- lab request form - referral form - delivery checklist
IQA & EQA	Micro tube/ liquid specimen/ DTS	1 ml	plasma units form blood bank, refrigerate at 4°C until ready to use; transport with in 24 hrs	Refer to Triple packing system & mark “handle w/ care” at RT in cool box with icepacks/ RT without icepack for DTS	- HIV PT result forms
Microbiology	Transport medium – body fluids, scrapings. stool	1 scrape/ swab	Swab the area & insert into transport medium/ store at RT until transport with in 24 hrs	Refer to Triple packing system at ambient RT in a transport pack/box	- referral form -delivery checklist
Biopsies and Histopathology	Tissue biopsy/ smears	2 slides/ part of tissue	Preserved in formalin/ fixed slides Transport with in 48 hrs (max 1 week)	Refer to Triple packing system at ambient RT in a transport pack/box	- referral form -delivery checklist
DNA-PCR	DBS- Filter paper	50µl	Finger/toe/heel pricked/ air dry at RT then keep in zip lock bag until pick up ; transport with in 72 hrs (max 1 week)	Refer to Triple packing system & mark “handle w/ care” Plastic bag with humidity indicator & desiccants	- lab requisition form - delivery checklist
Viral load	DBS filter paper/ WB -EDTA, plasma	50 µl 3 ml	Finger/toe/heel pricked/ air dry on dry rack then keep in zip lock bag until pick up; transport with in 72 hrs - draw blood and transport with in 6 hrs	Refer to Triple packing system & mark “handle w/ care” Plastic bag with humidity indicator & desiccants - Cool box at ambient temperature within 6hrs	- lab requisition form - delivery checklist
Hematology	WB	3 ml	Draw blood/keep at RT until transport within 6 hours; at fridge 2-8°C with in 24 hrs	Refer to Triple packing system & mark “handle w/ care” Cool box at ambient temperature within 6hrs	- lab requisition form - delivery checklist
HIV screening	WB/ serum/plasma	2 ml	Draw blood/keep at RT until transport within 6 hours; at fridge 2-8°C with in 24 hrs	Refer to Triple packing system & mark “handle w/ care” Cool box at ambient temperature within 6hrs	- lab requisition form/referral form - delivery checklist

APPENDIX B. EXAMPLE OF SAMPLE TRANSPORTATION FLOW

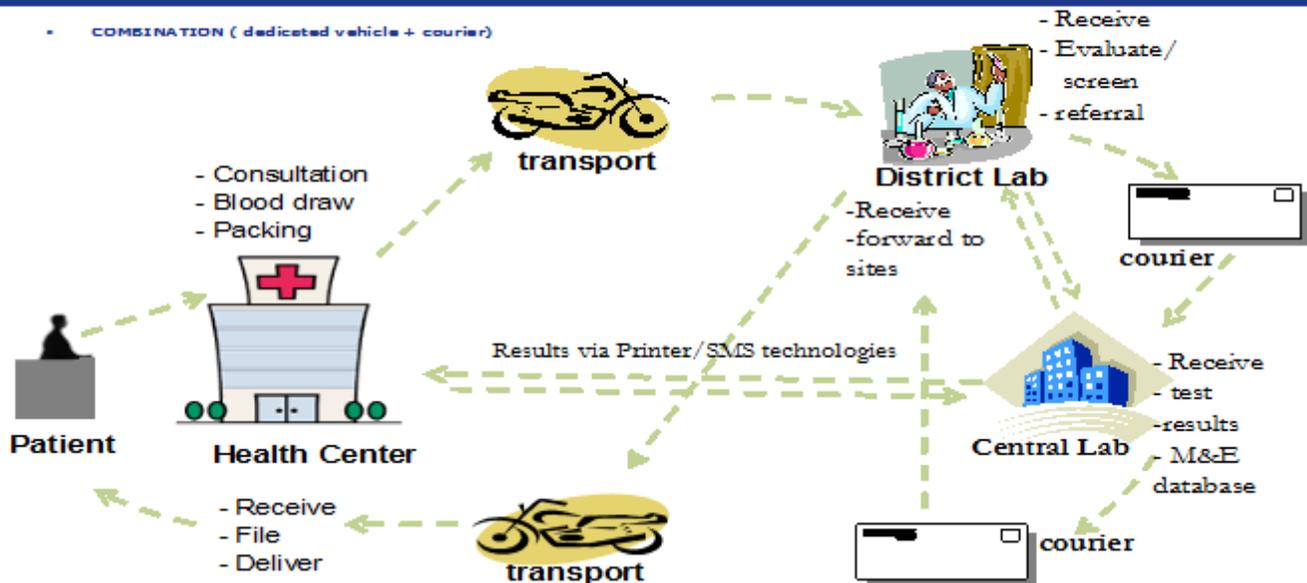
1. Single referral system

Tracing Samples and Results



2. Two way referral system

Tracing Samples and Results

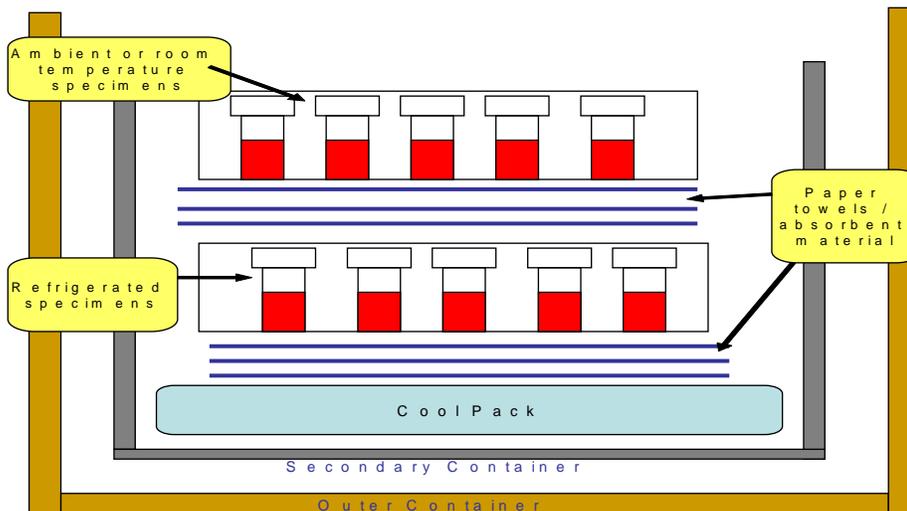


APPENDIX C. EXAMPLE OF TRIPLE PACKAGING SYSTEM



Transporting many Samples

Cross Section of Refrigerated Specimen Packaging



APPENDIX D: INDICATORS BY TYPE OF TEST

	Indicator Name	Type of Test							
		DNA-PCR	CD4+ COUNT	VIRAL LOAD	TB CULTURE	CHEMISTRY	IQA AND EQA	MICROBIOLOGY	Biopsies/ Histopathology
1	Number of samples collected								
2	Number of samples transported to the testing lab								
3	Number of samples tested								
4	Number of samples rejected								
5	Reasons for rejection								
6	Average time period samples spend at the collection facility								
7	Average time from sample collection at Health Centre to district hospital lab								
8	Average time samples spend from collection district hospital to testing lab (CHSU, Central Hosp)								
9	Average time of arrival in the lab to dispatching of results back to the collection facility								
10	Average time results take after dispatch from testing lab back to the collection facility								
11	Total turnaround time								

APPENDIX E. M&E FRAMEWORK FOR THE SAMPLE TRANSPORTATION SYSTEM

Indicator Name	Data Source	Frequency	Responsibility
<i>“to provide direction in the establishment of well-coordinated, standardized, reliable, efficient, cost – effective and sustainable sample transport system in the country that is acceptable to MoH, DHOs, health workers and stakeholders”</i>			
Number of samples collected	Register/ Logbook, Delivery checklist	Monthly	Lab Manager
	Register /Logbook, Delivery checklist, Monthly Reports	Quarterly	Zone Lab Supervisor
	Quarterly Reports	Bi-annually	HTSS Directorate
Number of samples transported to the testing	Register/ Logbook, Delivery checklist	Monthly	Lab Manager
	Register/ Logbook, Delivery checklist, Monthly Reports	Quarterly	Zone Lab Supervisor
	Quarterly Reports	Bi-annually	HTSS Directorate
Number of samples tested	Register/ Logbook, Delivery checklist	Monthly	Lab Manager
	Register/ Logbook, Delivery checklist, Monthly Reports	Quarterly	Zone Lab Supervisor
	Quarterly Reports	Bi-annually	HTSS Directorate
Number of samples rejected	Register/ Logbook, Rejection Logbook, Delivery checklist	Monthly	Lab Manager
	Register/ Logbook, Delivery checklist, Monthly Reports	Quarterly	Zone Lab Supervisor
	Quarterly Reports	Bi-annually	HTSS Directorate
Reasons for rejection	Register /Logbook, Rejection Logbook, Delivery checklist	Monthly	Lab Manager
	Register/ Logbook, Delivery checklist, Monthly Reports	Quarterly	Zone Lab Supervisor
	Quarterly Reports	Bi-annually	HTSS Directorate
Average time period samples spend at the collection facility	Register/ Logbook, Transport Log, Delivery Checklist	Monthly	Lab Manager
	Register/ Logbook, Transport Log, Delivery Checklist, Monthly reports	Quarterly	Zone Lab Supervisor
	Quarterly Reports	Bi-annually	HTSS Directorate
Average time from sample collection at Health Centre to district hospital lab	Register/ Logbook, Transport Log, Delivery Checklist	Monthly	Lab Manager

	Register/ Logbook, Transport Log, Delivery Checklist, Monthly reports	Quarterly	Zone Lab Supervisor
	Quarterly Reports	Bi-annually	HTSS Directorate
Average time samples spend from collection at referring facility to testing lab	Register/ Logbook, Transport Log, Delivery Checklist	Monthly	Lab Manager
	Register Logbook, Transport Log, Delivery Checklist, Monthly reports	Quarterly	Zone Lab Supervisor
	Quarterly Reports	Bi-annually	HTSS Directorate
Average time samples spend from collection district hospital to testing lab (CHSU, Central Hosp)	Register/ Logbook, Transport Log, Delivery Checklist	Monthly	Lab Manager
	Register/ Logbook, Transport Log, Delivery Checklist, Monthly reports	Quarterly	Zone Lab Supervisor
	Quarterly Reports	Bi-annually	HTSS Directorate
Average time results spend in the testing lab back to the collection facility	Register/ Logbook, Transport Log, Delivery Checklist	Monthly	Lab Manager
	Register/ Logbook, Transport Log, Delivery Checklist, Monthly reports	Quarterly	Zone Lab Supervisor
	Quarterly Reports	Bi-annually	HTSS Directorate
Average time taken from sample being taken from the patient to when results are returned	Register/ Logbook, Transport Log, Delivery Checklist	Monthly	Lab Manager
	Register/ Logbook, Transport Log, Delivery Checklist, Monthly Reports	Quarterly	Zone Lab Supervisor
	Quarterly Reports	Bi-annually	HTSS Directorate
Total turnaround time	Register/ Logbook, Transport Log, Delivery Checklist	Monthly	Lab Manager
	Register/ Logbook, Transport Log, Delivery Checklist, Monthly Reports	Quarterly	Zone Lab Supervisor
	Quarterly Reports	Bi-annually	HTSS Directorate