

Analysis of factors that influence early tuberculosis case detection among aged 15 years and above in Liberia

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Liberia

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Vrije Universiteit Amsterdam

“Analysis of Factors that Influence Early Tuberculosis Case Detection among Aged 15 Years and Above in Liberia”

A thesis submitted in partial fulfillment of the requirement for the degree of Master of Public Health

By

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Liberia

Declaration:

Where other people's work has been used (either from a printed source, internet or any other source) this has been carefully acknowledge and referenced in accordance with departmental requirements.

The thesis **Nelson Konteh Dunbar** is my own work.

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Dedication

This thesis is dedicated to my beloved daughter Ms. Desiree L. Dunbar and my fiancée Ms. Sabina A. Greaves for their tireless moral support and reasons they gave me to obtain this master degree.

I would also dedicate this thesis to my parents Mr. and Mrs. Roland K. Dunbar, Mrs. Comfort Kollie, Ms. Gifty Dunbar, Emmanuel K. Dunbar, Promise Konteh, other family members and my in-laws: Ms. Sabina A. Taylor and Mrs. Francis Greaves for their persistent support they gave me while obtaining this degree.

Finally, I dedicate this degree to my mother, Ms. Garmen Konteh for supporting, even in her absence.

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Abbreviation

ACSM	Advocacy Communication Social Mobilization
AFB	Acid Fast Bacilli
AIDS	Acquired Immune Deficiency Syndrome
ART	Antiretroviral Therapy
CDC	Central for Disease Control
CHSWTS	County Health and Social Welfare Teams
CMO	Chief Medical Officer
DOTS	Directly Observed Treatment Short-Course
DPM	Deputy Program Manager
DST	Drug Susceptibility Testing
EPHS	Essential Package of Health Services
EQA	External quality Assurance
gCHVs	General Community Health Volunteers
HBC	Health Based Care
HIV	Human Immunodeficiency Virus
HMIS	Health management Information System
IEC	Information Education Communication
IT	Information Technology
KAP	Knowledge Attitude and Practice
KM	Kilometer
LDHS	Liberia Demographic Health Survey
LED	Light-emitting Diode
LISGIS	Liberia Institute for Statistics and Geo-information Services

LMIS	Liberia Malaria Indicator Survey
M&E	Monitoring and Evaluation
MDGs	Millennium Development Goals
MOH&SW	Ministry of Health and Social Welfare
MTB	Mycobacterium Tuberculosis
NLTCP	National Leprosy and Tuberculosis Control Program
OICS	Officers In-Charge
PM	Program Manager
PPM	Deputy Program Manager
PVtHE	Private Expenditure on Health
RIF	Rifamycin
SMS	Spot-Morning-Spot
SSM	Spot-Spot-Morning
TB	Tuberculosis
THE	Total Health Expenditure
UNDP	United Nations Development Program
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization
ZN	Ziehl-Neelsen Carbol-Fuchsin

Abstract

Background: The burden of tuberculosis is high in Liberia with 87% of new smear positive TB cases notified among age group (15-54 years). WHO estimate reveals a TB prevalence of 453 per 100,000 population and incidence of 299 per 100,000 population with TB mortality rate of 46 per 100,000 population.

Objective: To analyze factors influencing early TB case detection among 15 years and above in Liberia, in order to recommend to the Ministry of Health & Social Welfare evidence based interventions for decision making.

Methodology: Literature review of articles was done through internet search. WHO Action Framework for TB case detection was used as a guide to obtain relevant literature and analyzed systematically.

Findings: Patient, access and health services delays are challenges for implementing TB services in Liberia. Limited knowledge and awareness on recognition of TB signs and symptoms and misconceptions about TB are primary patient delays. Longer distances, transportation cost, poor quality of services and stigma, are access delays hindering TB diagnosis. Under staffing, poor motivation, out-dated protocols, limited laboratory supplies and screening among high risk groups, and poor data quality and feedback systems, were challenges of health services.

Conclusion and Recommendations: The study concludes that access and health facility delays are the main contributing factors influencing early TB diagnosis in Liberia, though there are patient delays challenges that need to be addressed. The MOH should develop TB communication strategy, strengthen community-based DOTs and intensify screening among high risk group in health facilities with involvement of all stakeholders.

Key Words: Tuberculosis, diagnostic delays, patient delays, health services delays, Liberia

Word Count: 12,846

Introduction

Tuberculosis (TB) is an “airborne communicable disease mainly caused by Mycobacterium tuberculosis (MTB) and still remains a major public health problem worldwide (WHO, 2013a). Current global estimate shows that 8.6 million new TB cases and 1.5 million deaths occurred in 2012. About 26% of the global TB cases were reported from the African Region. TB cases and deaths occur mainly among men, but remains among the top three killers of women worldwide with an estimated 410.000 TB deaths among women in 2012 (WHO, 2013a).

I have worked with the Ministry of Health and Social Welfare (MOH/SW) for over five years with a little experience working with National Leprosy and TB control program (NLTCP) in Liberia. My experience began as a research officer in 2011 assigned with the Ministry of Health of Liberia and charged with the responsibility to govern, manage and coordinate the implementation of research for health.

I participated in the conduct of two studies; a KAP study and tracing of TB defaulters to explore reasons among patients; all commissioned by the NLTCP nationwide. Key results of these studies revealed misconception and stigma coupled with the lack of knowledge and limited geographical access to TB cares (NLTCP, 2011). As such, it has interested me to probe further issues influencing TB case detection rate to better inform further field investigation and recommend to the NLTCP evidence based information that will enhance the provision of TB care in Liberia.

This thesis is divided into five chapters. Chapter one looks at the country’s background information with focus on Geography, Demography, Political Situation, Socio-Economy status, Health Status, Health system and Financing, and the National Leprosy and Tuberculosis Control Program (NLTCP) History, Organization and Structure. Chapter Two describes the Problem Statement, Justification of the study, General and Specific Objectives used, Study Methodology including Conceptual framework, Search Strategy and Limitations. The Chapter Three deals with the Findings of the study obtained from the review of available literatures specific to the thesis topic and Chapter Four elaborates on the Discussion of the paper, while Chapter Five provides Conclusion and Recommendations with respect to good practices and as well problems and challenges identified.

Chapter I: Country Background Liberia

1.1. Geography

Liberia is a West African Country (See map in annex 1) with an approximate land area of 110,080 sq km and a coastline of 560 km along the Atlantic Ocean. It is bordered by Sierra Leone to the Northwest, Guinea to the northeast, Côte d'Ivoire to the east and south by the Atlantic Ocean. The country has 15 counties subdivided into 95 political districts. Rain forest and swampy areas are common geographic features. Liberia has two seasons namely: the rainy begins mid April of each year and ends mid of October, while the dry season starts mid October and ends mid April the following year (LISGIS, 2008).

1.2. Demography

Liberia has an estimated population of 3.5 million with a growth rate of 2.1%. Religions practiced are Christianity (85%) compared to 12.2% Muslims and 2.2% others. Sex distribution shows males to females (ratio 1:1), with an average household's size of 5.1 members. Liberia has a crude birth rate of 38.5 per 1000 population with a total fertility rate of 5.2 children per woman. About 54% of the population is 15 years of age or younger, and the average life expectancy at birth is 59.1 years (UNDP 2010). About 33.3% of the general population lives in the capital Monrovia (LISGIS, 2008).

1.3. Political Situation

Liberia has a democratic government headed by the first female president in Africa, Ellen Johnson Sirleaf for the second term. Currently, Liberia is still a fragile state struggling to make progress in areas such as political rights, freedom of speech and civil liberties. Liberia is ranked 22nd of 52 African States in the 2012 Mo Ibrahim Index of Participation and Human Rights (African Development Bank, 2013).

1.4. Infrastructure

Liberia faces challenges in relation to adequate water supplies and sanitation, roads, and affordable electrical supplies and communication services. Currently, 72% of Liberian households use an improved source of drinking water and only 8 % an improved source of non-shared toilet facility compared to 25% who use a shared toilet facility. The remaining 67% households use non-improved and non-shared toilet facilities. About 96%

Liberian households lack access to electricity (LMIS, 2011) and only 45% can access an all-season road within 5km (African Development Bank, 2013).

1.5. Socio-Economic Situation

Liberia is ranked 174th of 187 countries in the 2012 Human Development index report. Eighty-four percent (84%) of the general population lives below the poverty line with less than 1.25\$ per day (UNDP, 2011) and 78% of the labor force is engaged in “vulnerable employment” (Ministry of Labour, 2010). The proportion of unskilled youth remains very high with 62% of the labor force aged 15-24 having incomplete primary or no education (African Development Bank, 2013). The primary education enrolment is still low at 44% with the ratio of girls to boys being 8.8:10. The youth literacy was 79% in 2010 against the Millennium Development Goals (MDGs) target of 80%. The real gross domestic product (GDP) growth of the country was 8.9% in 2012 and is projected to expand by 7.7% in 2013 (African Economic Outlook, 2012). The GDP per capita in purchasing power parity terms was \$396 USD in 2011 (LMIS, 2011).

1.6. Health Status

Despite reduction in maternal (MMR) and under-five mortality rates, Liberia is unlikely to achieve the MDG targets by 2015. The under-five mortality rate has reduced from 194 per 1000 births in 2000 to 94 in 2013, while the MMR is now 640 per 100,000 live births as compared to 994 per 100,000 live births in 2007 (WHO&UNFPA&UNICEF, 2013). There are still challenges mainly due to TB, HIV and malaria burden in the country (Table one below).

Table 1: Liberia Key Health Indicators

Indicators	Values	Year and Sources
Maternal Mortality Ratio	640 per 100,000 Live Births	WHO&UNFPA& UNICEF, 2013
Under-five Mortality Rate	94 per 1000 Live Births	LDHS, 2013
Infant mortality Rate	54 per 1000 Live Births	LDHS, 2013
HIV Prevalence Rate	1.5%	DHS, 2007
Incidence of TB (all forms) per 100,000	299 per 100,000 Population	WHO, 2012b
Malaria Prevalence Rate	28%	LMIS, 2011
Immunization Coverage of BCG	94%	LDHS, 2013

1.7 Health System, Management and Financing

The Ministry of Health and Social Welfare is the policy and regulatory body of the health sector of Liberia, headed by a minister of health who supervises four deputy ministers and seven assistant ministers. At the county level, a County Health and Social Welfare Officer (CHO) heads the County Health and Social Welfare Team (CHSWT), while Officers In-Charge (OICs) manage health services at the facility level within health districts.

The MOH/SW has a ten year Policy and Plan and an Essential Package of Health services (EPHS) with services “free at point of care” in public facilities. Population living within 5 Kilo meter (km) of health facility is 72% and the current proportion of skilled personnel is 7.4 per 10,000 population (MOH&SW, 2013).

The health sector has a three tiers system (primary, secondary, and tertiary levels) integrated by a decentralization policy. At the primary level are the clinics that provide basic primary care and integrated outreach services to population people outside of a 5km radius. The secondary level consists of first and second tiers referral facility (health centers and hospitals) that offer maternal and child health care, and basic and comprehensive emergency obstetric and neonatal care services. The tertiary level offers specialist services not provided at secondary level of care (MOH&SW, 2011a). The Government of Liberia is still heavily depending on external funding sources (34.6%) (WHO, 2012a). Table 2 below shows the trends of spending on health from 2008 to 2012.

Table 2: Liberia's Health Expenditure from 2008-2012

Years	Total Health Expenditure (THE) as % of the Gross Domestic Product	General Government Expenditure on Health as % of THE	Private expenditure on Health (PVtHE) as % of THE (includes external resources on health)	External Resources on Health as % of THE
2008	12	33	67	47
2009	14	23	77	63
2010	13	18	82	41
2011	16	30	70	54
2012	16	30	70	35

Source: WHO Global Health Expenditure Data Base 2012

1.8. National Leprosy and Tuberculosis Control Program (NLTCP)

The National Leprosy and Tuberculosis Control Program (NLTCP) established in 1989, operates under the arm of the MOH&SW with responsibilities to implement prevention and care of Leprosy and TB programs in Liberia. The program has implemented a five year strategic plan (2007-2012) (see annex 4) aimed at reducing the national burden of TB in Liberia by 2015 which is in line with the MDGs. Liberia adopted the DOTS and WHO STOP strategies in 1999 and 2007 aiming to address the high burden of TB in the country. The NLTCP is mainly supported by a 5 year (2008-2013) Global Fund grant (round 7 and 10) to enhance TB control in the country. Table 3 below shows the current trend of cases reported in past 7 years.

Table 3: Estimated and Reported Cases of TB Notified 2006-2012

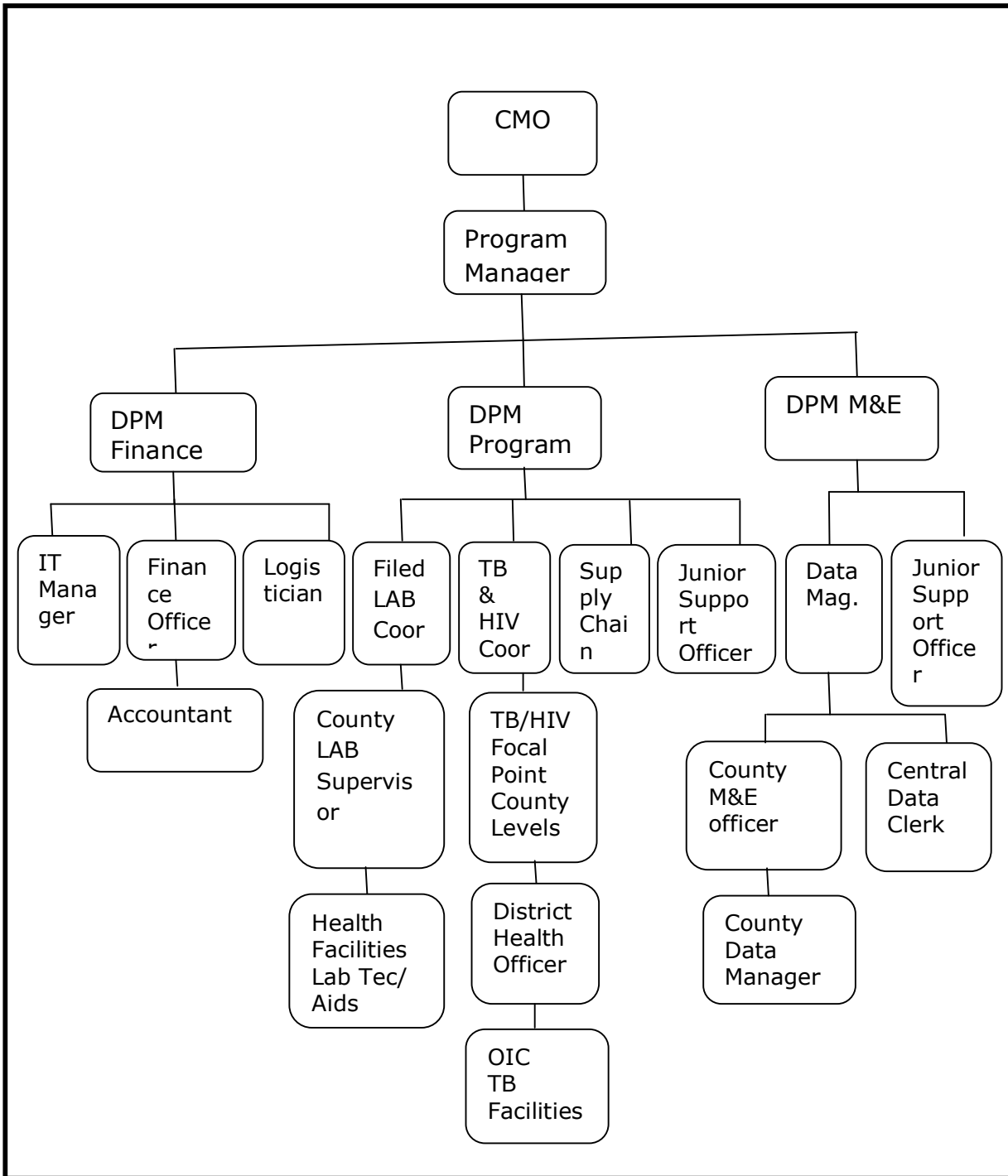
Classification	Years recorded (2006-2012)						
	2006	2007	2008	2009	2010	2011	2012
Estimated Population (in millions)	3.36	3.41	3.47	3.54	3.62	3.70	3.77
Estimated TB Cases of All Forms	9145	9301	9447	9655	9858	10065	10276
All Forms of TB Case recorded	4514	4535	5007	5964	6668	7899	6212
Estimated Smear Positive TB Cases	3967	4035	4111	4189	4277	4366	4458
New Smear Positive Reported	2906	2850	3042	3796	3750	4261	3249
New Smear positive Case Detection Rate	73%	70%	74%	91%	88%	98%	72%
Case Detection Rate (TB Cases of All Forms)	49%	49%	53%	62%	68%	78%	60%

Source: NLTCP 2012

The NLTCP is headed by a Program Manager (PM) and provides technical oversight in program planning, implementation and coordination. The PM reports directly to the Chief Medical Officer of Liberia (Figure 1 below).

The NLTCP is currently also responsible for the operations of the two specialized TB hospitals in the country: TB Annex Hospital (Monrovia) and Ganta Hospital in Nimba County owned by a Faith Based Organization.

Figure 1: Organogram of National Leprosy and TB Control Program



Source: NLTCP 2011

The PM has three Deputy Program Managers (DPMs) who oversee generally administration and finance, monitoring and evaluation, and program

implementation at all levels. Several Field and Lab Coordinators monitor TB implementation in the 15 counties. There are TB/HIV focal points at county levels in charge of TB programs. The Officer-In-Charge (often a nurse or a physician assistant) within a health facility oversees TB implementation and reports to the District Health Officer or County TB/HIV focal points for submission.

The general community health volunteers (gCHVs) including males and females, are not captured in the organogram. However, they play key roles in community-based TB health promotion, patients support, suspects identification, notification and referral to TB lab diagnostic and treatment centers (NLTCP, 2012). A gCHV is to cover 250 to 500 hundred people living more than 5 km or above one hour walk from the closest health facility (MOH&SW, 2011b).

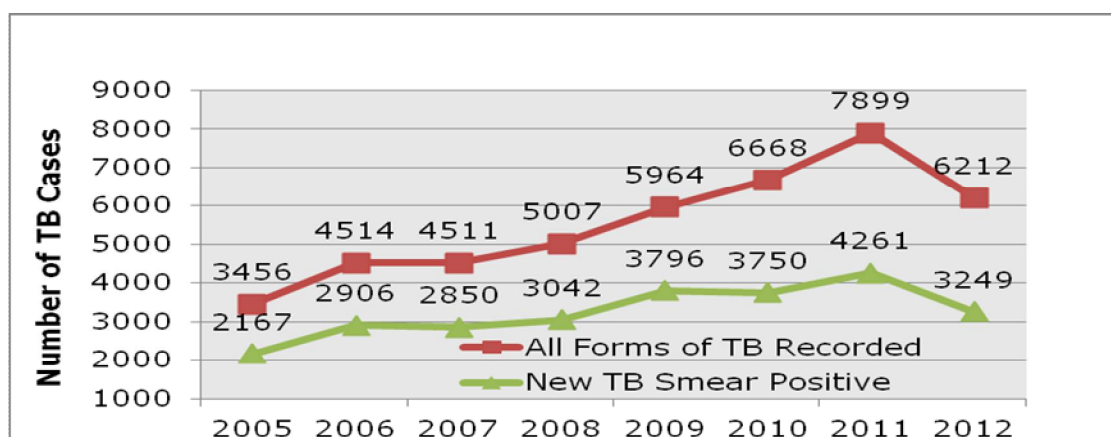
Chapter II: Problem Statement, Justification and Study Method

2.1. Problem Statement

The burden of Tuberculosis remains to be a serious issue in many countries, including Liberia, and is the leading infectious cause of death worldwide (WHO, 2013a). An estimated 8.6 million incident cases of TB and 1.3 million deaths due to TB, of which 320,000 were among HIV-positive patients, occurred in 2012. Despite progresses made towards achieving global targets for reductions in the burden of TB, the number of cases and deaths for a curable disease couple with the enormous HIV burden remain a global challenge to control TB (WHO, 2013a).

With the pending National TB Prevalence Survey, the increase in registered TB cases (figure 2 below) recorded in recent years, shows high burden of the disease in Liberia. The 2012 WHO Global estimate report on Tuberculosis shows that Liberia has a TB prevalence of 453 cases per 100,000 population with an incidence of 299 per 100,000 population and mortality rate of 46 per 100,000 population due to TB (WHO, 2012b).

Figure 2: All Forms and New Smear Positive TB Notified 2005-2006



Source: NLTCP Annual Report 2012

Out of all forms of TB cases reported in 2012, 3249 new smear positive cases were recorded far below 2011 and 2010. The National targets for TB case notification in the NLTCP was to increase the rate of notification of new smear positive TB cases from 103 per 100,000 in 2010 to 109 per 100,000 population by 2015. Currently, the TB Case notification rate is 86 per 100,000 based on the latest report of 2012 representing a slight decline after a sharp increase in 2011.

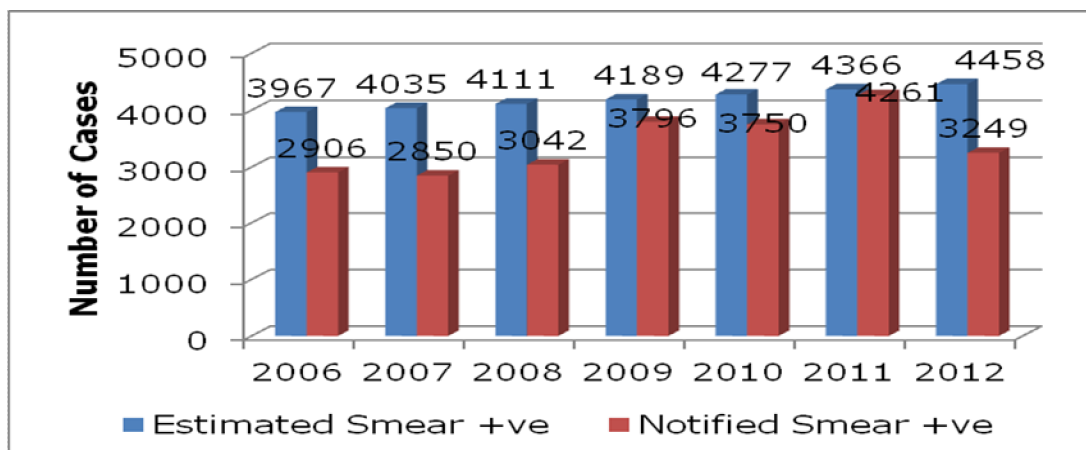
The population's most productive age group (15-54 years) accounts for more than 87% of new smear positive TB cases notified and this has consequences for the socio-economic growth and development of the country. The data on children below 15 years is poor due to low index of suspicion of TB and highly selective diagnostic algorithm for children. TB case notification remains heavily dependent on passive case finding with active case finding mainly focus on screening TB/HIV co-infected patients (NLTCP, 2012).

Although the program is heading in the right direction, the fluctuation in cases notified as indicated in figure (2) above especially in 2012 remains a concern. The short fall in the notified cases in 2012 could be due to the lack of data for the reporting period in the last quarter (October to December) of 2012 and reasons responsible for the under reporting are not yet known. With these challenges and the high burden of TB, the need to explore factors influencing early TB diagnosis is key to enhancing early detection of TB in Liberia.

2.2. Justification

The NLTCP of Liberia remains focus on TB case detection and treatment of TB patients in Liberia. Despite achieving 72% in 2012 above the WHO target for active TB case detection rate of 70%, there is still a gap of 28% left to be reached by the program. The country still faces challenges with control of the disease due to gaps in estimated and notified smear positive TB cases reported over the years (Figure 3 below) (NLTCP, 2012).

Figure 3: Smear Positive TB Cases Notified 2006 -2012



Source: NLTCP Annual Report 2012

The difference in these figures cannot be taken lightly because every TB patient left untreated infects on average an estimated 10 to 15 persons a year (WHO, 2013a).

Though TB control in the country is heading in the right direction, still more needs to be done to bridge the current gap of case detection. The TB case notification rate of new smear positive cases is 86 per 100,000 population (NLTCP, 2012), far below the national target of 109 per 100,000 population in 2015 and below the baseline of 103 per 100,000 in 2010.

With this current trend, is highly unlikely that the NLTCP will achieve the MDG target of 2015. Without understanding reasons for current program gap and inconsistencies in cases notified over the years, it is difficult to improve case detection and prevention of further transmission of TB in communities. With the poorest being the prime target of TB, Liberians stand huge risk of increase TB burden. Currently, there is limited information available regarding factors that influence TB case detection in the Liberia context, as such, it is necessary to understand the predictors of TB to better inform policy and decision makers in designing appropriate strategies and interventions for NLTCP in Liberia.

2.3. Objectives

2.3.1 General Objective

The overall objective of the study is to explore factors influencing early TB Case Detection among ages 15 and above in Liberia in order to recommend appropriate evidence based interventions to the MOH&NLTCP and partners that will contribute to improved TB case detection in Liberia.

2.3.2. Specific Objectives

1. To explore the patient related factors that influence TB case detection among population 15 and above
2. To explore the access related barriers that influence early case detection
3. To identify the health services related conditions influencing early TB diagnosis;
4. To explore experiences of other countries on addressing barriers of early TB case diagnosis
5. To provide recommendations on appropriate interventions to the NLTCP that will help improve TB case detection rate in Liberia

2.4. Methodology and Materials

2.4.1. Method

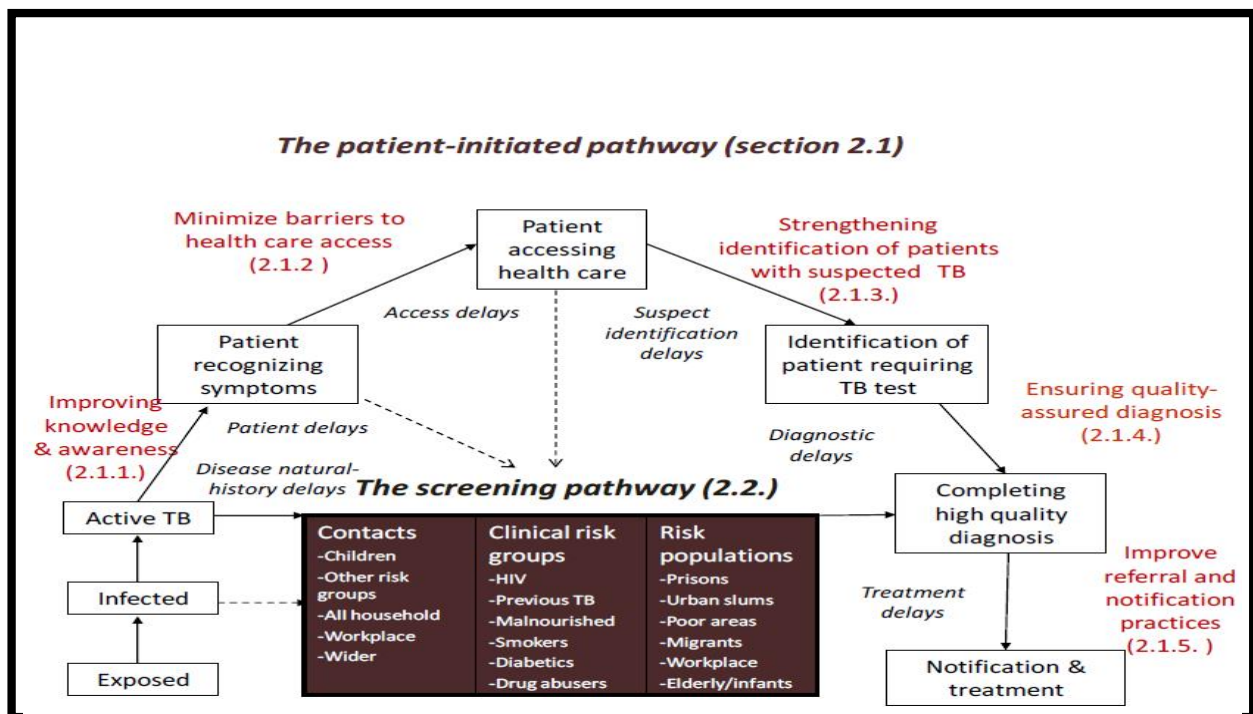
Literature review of published and non published literature, which include articles and national documents such as studies and policies of Liberia, were assessed.

Further inquiries were made from senior directors and managers of the National Leprosy and Tuberculosis Control Program to ascertain information. The findings of this thesis were systematically presented using an adapted framework for improving early TB case detection and treatment developed by WHO&STOP TB partnership (WHO&STOPTB, 2011a).

2.4.2. Conceptual Framework

The WHO Stop TB Partnership 2011 Action Framework (Figure 4 below) for Earlier TB Case Detection was adapted and used for this thesis. A decision to use this model was made after revision and comparison with the Piot model of 1967. The Piot model is more generic and only the first four steps focus on case detection. As a result, it was decided to use the Stop TB Action Framework based upon the idea that it is specific for TB and assesses pathways and barriers for early detection of TB with priority interventions areas.

Figure 4: Pathways to TB Diagnosis and Treatment



Source: WHO Stop TB Partnership Action Framework 2011

The framework consists of two pathways namely: the patient-initiated and the screening pathways. The upper part of the framework (patient-initiated pathway; related to passive case detection) consists of steps that represent a potential barrier to early case detection and requires both active health seeking and responsive health systems with capacity to identify suspects who should undergo diagnostic investigation for TB. The screening pathway (health provider-initiated pathway; related to active case finding) refers to the identification of presumptive TB disease among people who do not actively seek and receive care for signs and symptoms of TB. This pathway also considers screening of target specific risk groups.

For the purpose of this thesis, the delay factors (patient, access and health services) of the patient initiated pathway and the screening pathway were focused of specific objective one to three, while intervention areas (2.1.1 to 2.1.5) was used for specific objective four. Treatment delays were not considered since the thesis topic focuses only on early case detection and not in treatment. Patient delays (annex 2) in figure 4 focus only on those factors that directly influence suspect ability in recognition of TB signs and symptoms such as knowledge, awareness and education, while access delays include geographical access, availability, affordability, acceptability and health seeking behaviour of patient towards TB services.

Suspect identification delays and diagnostic delays in the patient-initiated pathway were combined and considered as health services delay, since the two are health services issues. Political commitment and leadership; human resources for health, TB diagnosis and quality control, TB case findings (passive case finding) and notification system, monitoring and evaluation, recording and reporting formed part of health services delays. The Screening pathway focuses on contacts, clinical risk groups and risk populations were also considered as part of health services delay factors.

2.4.3. Search Strategy

Multiple searches were carried out using alternative search terms combined by Boolean operators (AND/OR). Pubmed, Google scholar, Medline, Science Direct, Web of Science, Biomed, Cochrane database, VU library and Public Library of Science were searched for relevant literature.

Further searches on literature were also done using websites such as WHO, World Bank, USAID, CDC, and Liberia MOH&SW. The reference sections of selected articles were also screened to identify additional publications not found through the initial search.

Key search terms used to gathered information were: Tuberculosis, Liberia, Mycobacterium Tuberculosis, Patients Delays, Access Delays, Health Services Delays, Access Barriers, Case Detection, Geographical Access, Availability, Affordability, Acceptability, Active and Passive Case Finding, Diagnosis, Utilization, Health Seeking Behaviour, West Africa, Sub Saharan Africa, determinants.

The inclusion criteria considered literature of TB particularly from low and middle income countries with focus on either patient, access and health services related delays that directly or indirectly influenced early diagnosis of TB published in English. Literatures with only abstracts, narratives and opinions were excluded. The literature search considered mainly studies from the year 2000 to 2014, however, one or two studies published before 2000 important to the completion of the thesis were considered.

Chapter III: Findings/Results of the Study

The findings of this study are based on four sections following a similar pattern of the specific objectives and the conceptual framework, namely: Patients delays, access delays, health services delays (including active case finding among contacts, clinical risks groups and Risk population) and experiences from other countries.

3.1 Patient Delays

The early detection of TB cases followed by immediate and effective treatment is vital in controlling the disease (Pitman, Jarman & Coker, 2002). However, delays in recognition of TB signs and symptoms among TB suspects still serve as a major challenge for the early TB diagnosis. This section focuses on knowledge and awareness of TB suspects with considerations on awareness of signs and symptoms of TB, knowledge on mode of transmission and preventions, awareness of TB diagnostic facilities and sources of TB information.

3.1.1 Knowledge and Awareness on TB

Awareness on Signs and Symptoms of TB

Nine (9) in ten of every men and women in Liberia have heard of the disease TB (LDHS, 2007). Those in rural areas and the North Central region of Liberia are less likely to have heard of TB compared to others. A knowledge attitude and practice survey conducted by the NLTCP among the general population reveals cough (58%), weight loss (56%) and coughing blood (51%) as the most frequent signs and symptoms mentioned (table 4 below).

Table 4: Respondents Knowledge on the Signs and Symptoms of TB

Category	Total (%)	Area Type	
		Urban (%)	Rural (%)
Rash	1.9	2.5	1.6
Cough	58.0	56.2	59.0
Cough lasting more than 3 weeks	22.2	24.9	20.5
Coughing blood	51.4	44.0	55.8
Weight loss	56.1	61.8	52.8
Fever	5.1	5.2	5.0
Fever without clear cause for more than 7 days	0.5	0.6	5.0
Chest pain	12.9	14.3	12.0
Ongoing fatigue	2.4	2.7	2.2
Others	17.3	19.4	16.3

Source: NLTCP KAP Survey 2011

A study done in Urban Nigeria revealed that about 80% of the suspects had heard of TB with 66.2% stating cough as the most common symptoms of TB (Desalu et al., 2013). Similar to these results, about 74.4% of TB suspect in a KAP study done in South West Ethiopia mentioned cough as the most common sign and symptom (Abebe et al., 2010).

Knowledge on Mode of Transmission and Prevention of TB

The LDHS 2007 reveals that over half of men and women who have heard of TB knew that TB can be transmitted through the air by coughing (59% of women and 69% of men) and about three quarters of the respondents knew that TB can be cured (LDHS, 2007). The NLTCP 2011 KAP result also reveals that only 62.6 % of respondents stated TB can be transmitted through air when a person with TB sneezes or coughs, while 88.2% stated that anybody can get infected with the disease (NLTCP, 2011). Level of education enhances population general knowledge about TB. According to the LDHS 2007 respondents with less education level were less likely to know about TB transmission especially among rural population.

Misconception and myths about the disease still exist in Liberia despite current knowledge of respondents. About 67.5% and 73.1% of urban and rural respondents (Table 5 below) stated that TB is transmitted through kissing.

Table 5: Responses on how TB Transmitted

Category	Total (%)	Area Type	
		Urban (%)	Rural (%)
Through handshakes	7.4	9.9	5.7
Through the air when a person with TB sneezes or coughs	62.6	67.6	59.0
Through kissing	70.7	67.5	73.1
Through sleeping in the same room	11.1	7.7	13.6
Others	5.6	4.0	6.7

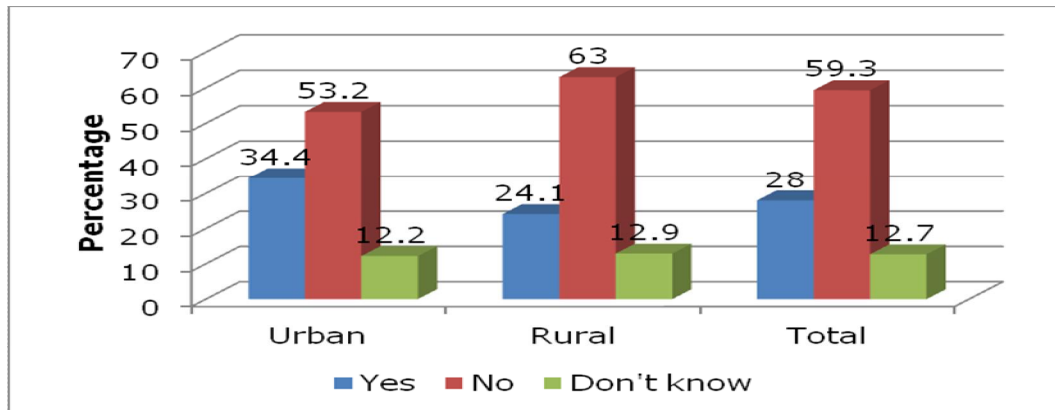
Source: NLTCP KAP Survey 2011

Studies in other countries mentioned several reasons for the spread of TB such as sharing of food utensils and eating from the same plate in Pakistan (Mushtag et al., 2011), mosquito bites in South Africa (Peltzer, mngqundaniso & Petros, 2006), witchcraft forces in Tanzania ((Verhagen & Kapinga & Rosmalen-Nooijens, 2010) and evil eyes in Ethiopia (Abebe et al., 2010).

Awareness of Tuberculosis Treatment Facility

Awareness of available treatment facilities is very important and contributes to early seeking of care in appropriate health facilities. In the NLTCP 2011 KAP, respondents were asked if they knew of any clinic that treated TB in closest proximity, the response was very low. Only 28.0% of the respondents knew of a treatment facility in their area for TB. Disaggregation of awareness in Figure 5 below was even lower among rural respondents with 24% as compared to 34% among urban respondents.

Figure 5: Respondents Knowledge of TB Treatment Facility



Source: NLTCP KAP Survey 2011

Sources of Information of TB

The sources of TB information in Liberia vary from radio to friends. The most common sources of information about TB mentioned by the respondents were radio (55.5%), health facilities (41.0%) and friends (35.5%). Further disaggregation by rural and urban settings shows equal proportions on sources of information (NLTCP, 2011).

Studies conducted in Nigeria (Okuonghae & Omosigho, 2010) and Pakistan (Mushtaq et al., 2011) reveal that 70% and 80.1% of respondents mentioned radio and television as the most common sources of information on TB.

3.2 Access Delay

Early TB case detection to reduce infectious load of TB in the community is vital but strongly depended on immediate access to health services (WHO, 2006). Access delays such as geographical access, availability, affordability, acceptability and health care seeking behaviour of TB suspects towards TB services were elaborated.

3.2.1 Geographical Access

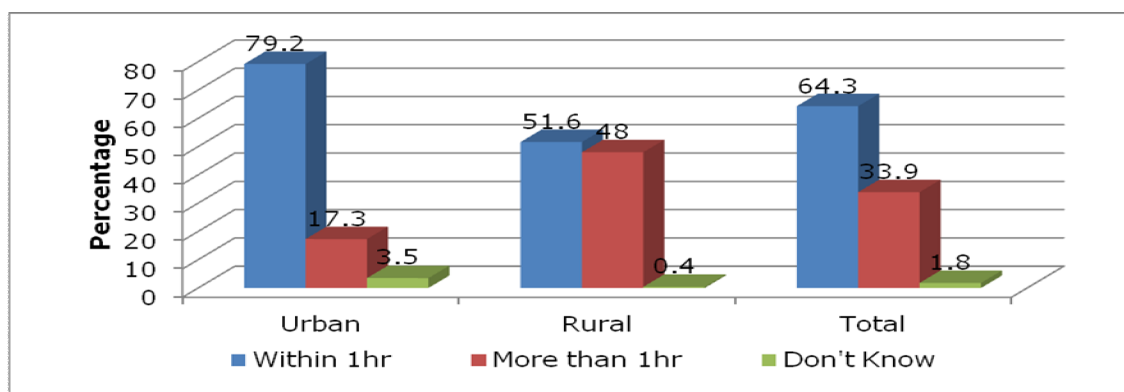
Long distances to TB facility coupled with transportation burden serve as major forms of geographical access barrier to TB diagnosis (Yan et al., 2007). The National Health and Social Welfare Policy (2011-2021) advocates for 85% of the population to live within one hour walking distance (5Km) from health facility by the year 2021.

Currently, only 72% of the population lives within 5km of a health facility with considerable disparity in geographical distribution of health facilities. Montserrado County that hosts the capital city of Monrovia has the highest coverage of 95% as compared to Gbarpolu County with 32% of population living in 5km distance of health facilities (MOH&SW, 2013).

On average, there is 1 health facility per 5,500 population in the country. Similarly, the estimated national coverage for facilities offering DOTS is about 1 facility per 9,000 population. TB treatment is delivered through 450 DOTS clinics (69%) out of 656 health facilities in the country. Of the 450 DOTs clinics, only 32.8 % has both diagnostic and treatment centres while the rest (67.2%) only offer treatment for TB patients (NLTCP, 2012).

According to the NLTCP KAP in 2011, respondents with knowledge of a treatment facility (Above figure 5) were also asked to estimate the distance to the nearest TB treatment facility. About 64.3% claimed to be living in 5Km distance of a facility. Disaggregation by rural and urban population in figure 6 below reveals that more urban (79.2%) than rural population (51.6%) live within the 5Km radius from a TB facility.

Figure 6: Respondents knowledge of Distance to TB Facility



Source: NLTCP KAP Survey 2011

Several studies (Jane et al., 2010) and (Khan et al., 2000) reveal that geographical access barriers among many factors impedes early diagnosis and treatment among TB patients. Other studies conducted in Nigeria

(Ibrahim et al., 2014) and South Africa (Kandel et al., 2008) also reveal that living far distances away from TB facility and lack of transport were major geographical access barrier to initiation and completion of treatment among TB patients.

3.2.2 Availability of TB services

The NLTCP has made improvement with available diagnostic equipment, drug and medical supplies in TB facilities influenced by financial support from the Global Fund. However, the program still faces serious challenges partly due to the untimely disbursement of the Global Fund Grant. This fluctuation in expected fund also results to inadequate drugs and medical supplies in TB facilities especially in hard to reach communities. At the moment, the community-based DOTs program is weak and lacks communication strategy to support implementation at all levels. Referral linkages between TB facilities and communities are not functional.

With approximately 30-33% of all TB facilities offering diagnostic services with limited number of microscopic, lab aids or technicians, issues of quality services is a concern. In the NLTCP KAP 2011, respondents were asked about their perception on the availability of well equip TB facility with drugs and other medical supplies including personnel. About 58% of the respondents who knew where TB services were offered acknowledged the availability of diagnostic equipment while 73.4% of them also said there were medicines in the facility to treat the TB disease (NLTCP, 2011).

Studies conducted in Ethiopia (Gele et al., 2010) reveal that rural hard-to-reach areas with TB facilities lack health personnel. In addition, (Tadesse et al., 2013) also in Ethiopia reveals that some TB suspects who visited TB facilities could not be diagnosed because staffs were not well trained on early diagnosis of patients presenting with symptoms of TB.

3.2.3 Affordability of TB Services

Despite the provision of free TB diagnosis and treatment in many countries including Liberia, out-of-pocket expenses incurred by patients such as transportation, food and other costs create huge economic burden. Financial burden for multiple visits to obtain TB diagnosis, indirect costs due to loss of employment or low productivity remain a challenged for TB patients (Balcha et al., 2011), (Yan et al., 2007).

Liberia is currently offering free point of care services for the essential package of health services as a commitment to universal health coverage within public facilities.

However, indirect cost of TB care and treatment to assess public facilities remain high due to longer distances and inequitable distribution of TB

facilities in the country (MOH&SW, 2012). Patients suspected with signs and symptoms of TB at treatment facility without diagnostic equipment or services are referred to diagnostic facility for submission of sputum. During this referral, suspected TB patients end up being missed due to increase expenses and longer distances or desire to initiate care elsewhere (NLTCP, 2011).

Tuberculosis services provided in private facilities (for profit) are not free and are not completely free in private non for profit facilities. As a result, expenses patients undergo are not refunded by the NLTCP. Currently, there is no national health insurance scheme to cover those patients who incurred extra charges outside of the public health facilities for obtaining TB care. At the moment, about 27 of the total health facilities offering TB diagnosis in the country is owned by corporate, private and faith-based organizations (NLTCP, 2012).

A joint external review carried out by the NLTCP&WHO 2013 in Liberia among TB patients, reveals that about 74% of TB patients had preference for government health facility as the first point of consultation in the event of sickness where services are offered free of charge, while 6% preferred a private facility and 20% other sources of care including Pharmacies or drug stores (NLTCP&WHO, 2013).

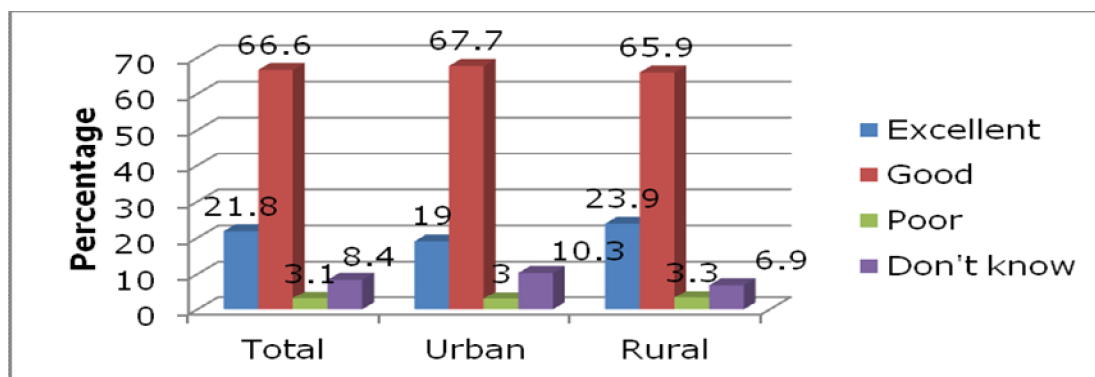
As revealed by studies among TB patients in Nigeria (Ukwaja et al., 2013) and Kenya (Mauch et al., 2011), 79% and 85% of total cost incurred by TB patients during pre diagnosis and up to the end of intensive treatment were due to indirect cost (travel, stop working, etc).

3.2.4 Acceptability of TB Services

Early TB diagnosis is influenced by several factors including perceived poor quality of services, stigma, fear of being diagnosed with TB/HIVs, and perceived negative attitudes shown by some health workers (Huong, 2007).

The Quality of TB services in Liberia is improving as revealed by NLTCP KAP 2011 and NLTCP&WHO external review report 2013. About 88.4% of respondents interviewed in the NLTCP 2011 KAP, felt that quality of services provided at TB diagnostic and treatment centres ranged from good to excellent (figure 7 below). Further disaggregation by urban and rural population, shows no significant difference of responses.

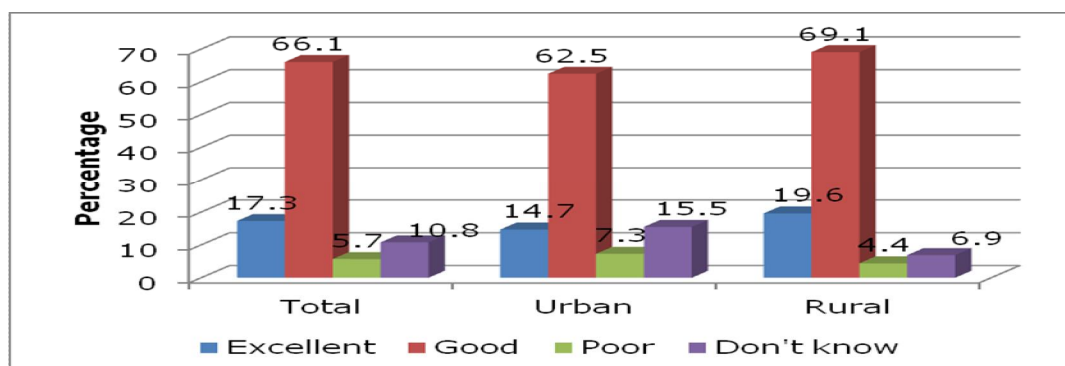
Figure 7: Respondents' Perception of Work of TB Facility



Source: NLTCP KAP Survey 2011

Respondents' of the same study were also asked about the behaviour of health workers in TB facilities in their surroundings. As reveals in figure 8 below, 83.4% also said that staff exhibited good behaviour towards their patients.

Figure 8: Respondents' Perception of Workers in TB Facilities



Source: NLTCP KAP Survey 2011

As noticed in Ethiopia, (Tadesse et al., 2013), Bangladesh and Swaziland (Insua et al., 2012), most TB patients were satisfied with care offered at diagnostic and treatment facilities including the attitudes of certain health workers towards patients especially in public facilities. On the contrary, there were also studies that revealed poor and unfriendly attitudes of health workers in Nigeria (Ibrahim et al., 2014).

3.2.5 Health Care Seeking Behaviour towards TB Services

There seems to be a positive health seeking behaviour among patients and TB suspects in Liberia. The NLTCP KAP report 2011, respondents from the general public were asked about the number of times they visited a health facility for care, 21.9% said they never visited the facility in the previous

year while 20.5% said they visited a facility once a year. The disaggregation by urban and rural population in the table 6 below shows that more rural population (60.8%) visited the facility two or more times within a year as compared to their urban counterpart (52.8%).

Table 6: Number of Facility Visits per Respondent per Year

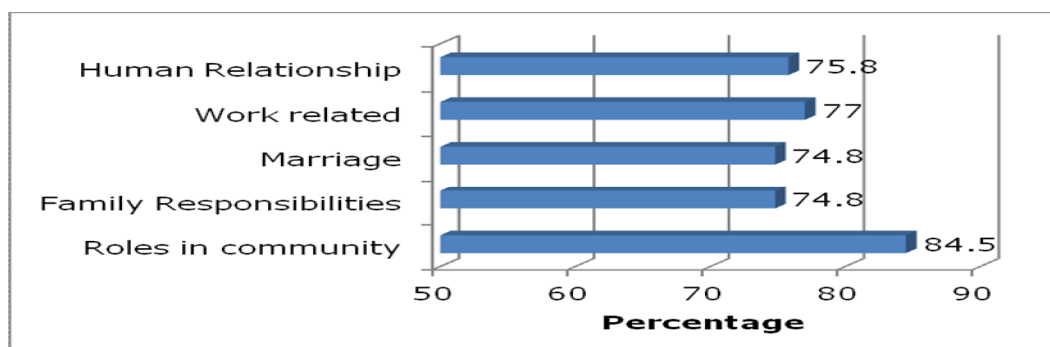
Category	Total	Area Type	
		Urban	Rural
Never	21.9	22.5	21.3
Once	20.5	23.2	17.8
two and More Visits	57.3	52.8	60.8
Total	100.0%	100.0%	100.0%

Source: NLTCP KAP Survey 2011

Stigma also influences patient’s choice in seeking care. Delays may occur once a patient decision to seek TB care is also associated with the fear of being diagnosed with HIV. Patients with TB suffer from a double stigma especially in communities with high prevalence of HIV/AIDS (Waisbord, 2005).

The NLTCP&WHO review2013 reveals that 58% of TB patient’s mentioned the existence of relationship between HIV and TB. In the NLTCP 2011 KAP, respondents were allowed to select more than one option on the effects of TB as shown in the Figure 9 below. The majority, 84.5%, said that TB had a negative effect on a person’s relationship with the community while 74.8% felt that TB would have an effect on a person’s marriage and family responsibilities (NLTCP, 2011).

Figure 9: Respondents Perception on the Effect of TB on.



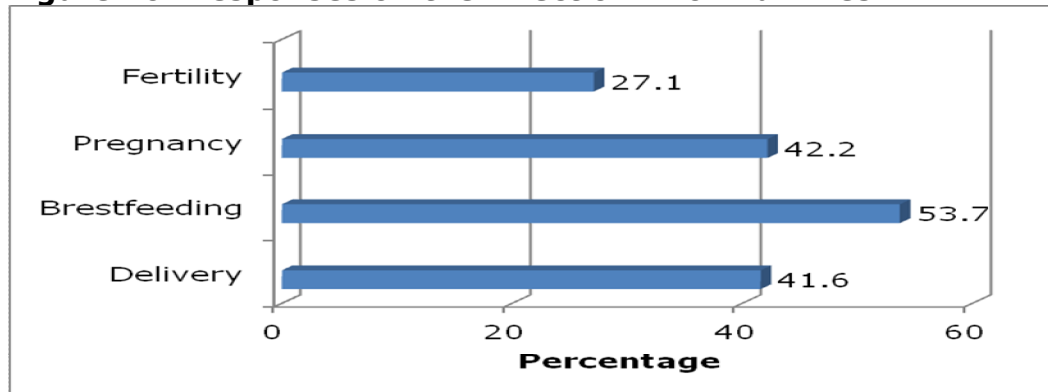
Source: NLTCP KAP Survey 2011

Also reveal by (Kpanyen et al., 2011) in Liberia, family members avoid their relatives due to fear of contracting TB. Even materials once used together are separated and a self contain room are preserved for relatives with TB.

Gender still plays a role in accessing TB services in Liberia. According to the NLTCP 2011 KAP, 74% of respondents felt that the risk of contracting TB was the same for women and men. However, at times women are neglected by their spouse and in-laws when reveal that women had TB. About 31% of respondents strongly agree that the husband of a woman with the disease may not take her to health facility for treatment. This is similar for the in-laws of a woman with TB at 34% (NLTCP, 2011). These conditions result in delays of health seeking behaviour among women when coupled with the fear of isolation.

Regardless of the fear of effects mentioned in Figure 10 above, respondents have limited awareness on the health implications of TB (Figure 10 below) with the highest responses of health implication being breast feeding (53.7%).

Figure 10: Responses on the Effect of TB on Families



Source: NLTCP KAP Survey 2011

Findings from studies conducted among TB suspects and or patients in other countries such as Ethiopia 80%, (Senbeto et al., 2013) and Zambia 89.4% (Mweemba et al., 2008) revealed good health care seeking behaviour towards TB services.

On the contrary, a study done in Rural Tanzania reveals that the majority of the patients visited traditional healers as the first service provider before going to a health facility. The common reasons were the patients believe that "TB as a disease was given by God or Allah or Witchcraft" (Verhagen, Kapinga & Rosmalen-Nooijens, 2010, p. 441).

A study by (Abioye, Omotayo & Alakija, 2011) in Lagos reveals that 72% of TB patients said TB had negative effects on their social relationship, while 51.3% of patients in rural Ethiopia (Abebe et al., 2010) reveal that people could less value them if they knew they had TB. These factors according to a systematic review by (Storla et al., 2008) undermined the utilization of available TB services, despite the close proximity as many patients fear of visiting the facility for diagnosis means disclosing to the public that they have TB.

3. 3 Health Service Delays

This section focuses on political commitment and leadership; human resources for health, TB diagnosis and quality control, case finding and notification system, monitoring and evaluation, recording and reporting, and screening contacts, risk groups and population.

3.3.1: Political Commitment and Leadership

The Government of Liberia has shown reasonable commitment to TB care and control as recommended by the WHO/STOP TB DOTs Strategy (WHO&STOPTB, 2002). TB implementation is integrated at all levels of the country. The MOHSW has initiated a multi-sectorial approach and partnership to enhance and sustain the current progress made by the TB program and partners.

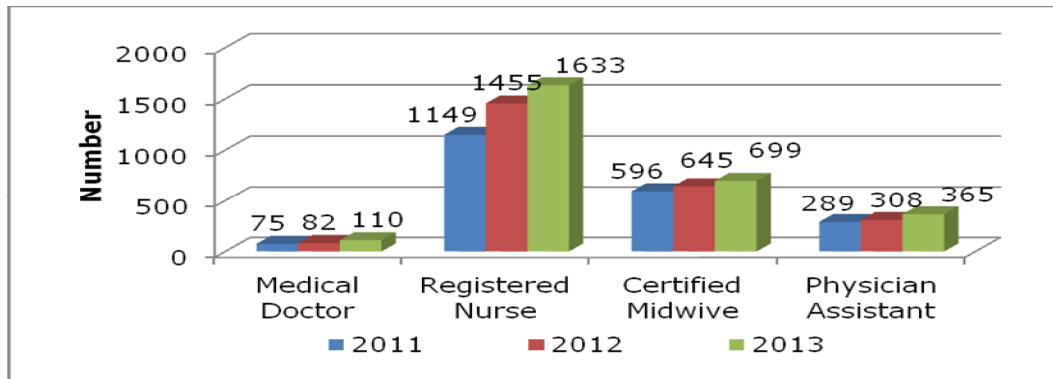
Despite the current efforts, the country faces many challenges including future sustainability of health care delivery. Liberia is one of the most donor dependent countries for health care delivery (WHO, 2012a). There is limited domestic funding allocated to the TB program. Since 2004 (UNDP, 2010), the global fund has been the main source of funding for the TB program.

Currently, the national TB program remains heavily funded by the Global Fund managed by the Ministry of Health. The lack of sustainable funding source and inconsistencies of supplies for TB services would influence progress of program implementation in the future.

3.3.2 Human Resource for Health

The identification of patients with suspected TB requires the full involvement of all health staff in all parts of the health system to be aware and screen patients for symptoms and make referral for TB testing according to national guidelines (WHO, 2010). Since the NLTCP forms part of the primary health care delivery system, human resources for TB cannot be considered separately. Despite increased in the number of skilled health personnel (Figure 11) at all levels, Liberia is still facing challenges in managing the workforce, retention and uneven distribution and lack of appropriate skills mix especially in rural areas (MOH&SW, 2013).

Figure 11: Skilled Health Personnel per 10,000 Population



Source: Liberia Health Sector Review Report 2013

Currently, skilled health personnel per 10,000 population is 7.4 compared to the National Plan Target of 14 per 10,000 population in 2021. There is still a limited number of laboratory staff offering TB diagnosis in the country with approximately 150 lab microscopic or lab technicians. As part of the NLTCP implementation plan, regular training including refresher training of health workers and provision of protocols and guidelines is done every year supported mainly by the Global Fund to enhance the knowledge of health workers about TB.

The gCHVs including treatment support groups, store keepers, cured patients, school teachers and other cadres working at community level form part of the community based TB program and have undergone some levels of training with focus on TB case finding and referral including TB case management. However, the actual size of this group is still not known.

They are not recognized as part of the formal health sector. In their current situation, they are not officially recognized as employees and this leads to poor motivation. Due to increases in attrition influenced by unemployment and poor motivation including the gCHVs particularly in remote and hard to reach areas, there are still huge gaps for skilled staff and trained gCHVs to offer TB diagnostic and treatment services in the country (NLTP&WHO, 2013;MOH&SW, 2013).

Currently, the MOH&SW in collaboration with partners is initiating a process to ensure population and utilization-based staffing norms, formulation of appropriate and standardized salaries structure, opportunities for career advancement, and a robust monitoring and evaluation system.

3.3.3 TB Diagnosis and Quality Control

The Diagnosis of TB in Liberia is based on the national laboratory guidelines for TB adapted from WHO laboratory guidelines (WHO, 2007A). Acid Fast Bacilli (AFB) microscopy is the most widely used TB diagnostic method in Liberia (NLTCP, 2008). This method is the cheapest and most feasible to resource poor countries. It has a high specificity (80-90%) but low sensitivity (40-60%). Despite being widely used by the NLTCP, it is highly insensitive for HIV co-infected individuals and children due to limited pulmonary bacillary loads in this group of patients (Farnia et al., 2002)

In addition to AFB microscopy, TB laboratories provide integrated services such as HIV testing, chemistry, parasitology and other microbiological tests. All Microscopy centres use Ziehl-Neelsen carbol-fuchsin (ZN) for staining after direct smear preparation with reagents. The Light-emitting diode (LED) microscopy with high specificity and sensitivity in staining AFB than the fluorescence and the ZN (WHO, 2011b) is not available at all the levels of laboratory network; however, the essential supplies for preparation of stains are available. Two units of Xpert MTB/Rif, one of the fastest and most sensitive ways to detect TB especially multi-drug resistant in TB patients (WHO, 2011c) has been acquired by the National TB Program, but is yet operational (NLTCP&WHO, 2013).

Most TB laboratories in the country collect three smear samples within two days (spots-early morning spot) instead of two smear samples for diagnosis. A course of broad spectrum antibiotics is given to TB suspects with sputum smear negative and later return for renew sputum smear microscopy followed by chest X-ray.

This process is not favourable most of the time and would promote delays and high financial burden for patients since they are to later return for further screening.

The national TB management guidelines provides for a symptomatic approach for children with presumptive tuberculosis. However, there are weaknesses in childhood TB management in Liberia due to challenges in establishing accurate diagnosis with sputum acid-fast bacilli smear positive in children with low bacillary load (Cruz & Starke, 2007).

Acid Fast Bacilli microscopy centres are found in all of the 90 health districts in the country and are supervised by the central office including lab technicians from the National Reference Lab. There is only one National Reference Lab in the Country for TB including other diagnosis. However, the TB component of this lab is still being upgraded and culture and sensitivity test being piloted on culture and drug susceptibility testing (DST).

All TB microscopy laboratories in country participate in a national quality assurance program based on panel testing.

An external review by the NLTCP&WHO 2013 reveals that 68% of the 150 microscopy laboratories met the quality control standards, while 32% performed below standards. The current capacity of TB laboratories is compromised by inadequate personnel, equipment and supplies. A workload ranging from 3 smears per day to 40 samples per day against a single microscope and one technician was observed (NLTCP&WHO, 2013). Such condition could result in poor quality of laboratory diagnosis especially when the burden of work is not commensurable with the current salary of the staff.

3.3.4 Case Finding and Notification System

Case Finding Strategy

The Patient-initiated pathway requires a very active health system with the capacity to identify people who should undergo TB screening at health facility. Tuberculosis case finding in Liberia is mostly based on passive case finding recommended by WHO DOTs strategy in settings with high TB burden, although people who actively seek care in a health facility but not for TB symptoms are sometimes screened. Passive case finding relies on self-presentation to health facilities by symptomatic persons for case detection (Ruutel, Uuskula & Loit, 2010).

The symptom and signs defining TB suspects according to national guidelines includes prolonged cough of 2 to 3 weeks duration, shortness of breath, chest pain, haemoptysis, loss of appetite, fever, night sweats, weight loss and general malaise. Clear symptomatology is also used for identification of extra-pulmonary TB cases and children suspected of TB (NLTCP, 2008).

Over the years, passive case finding has proven efficient in Liberia, as patients who self-presented at health facilities were more likely to be detected with TB. However, implementing passive case finding alone has challenges as suspects bear the financial burden alone and are not diagnosed sometimes during a single visit (NLCTP, 2012).

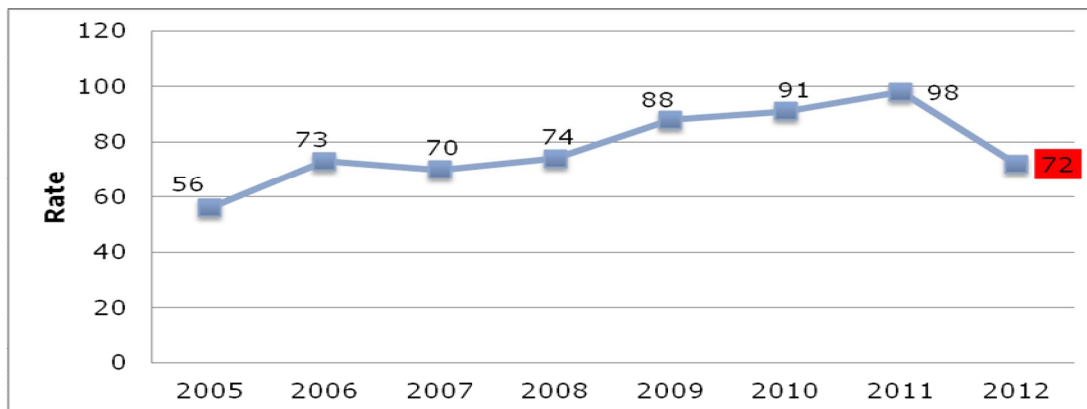
Screening of high risk groups has also been initiated in health facilities with focus among HIV/TB patients, though counselling and testing are not often done in both TB/HIV facilities (NLTCP, 2012). The NLTCP&WHO 2013, reveals that only 58% of HIV care facilities visited are conducting routine TB screening among new HIV clients (including pre-ART), while 32% do not conduct screening on a routine basis (NLTC&WHO, 2013).

With the uneven distribution of health facility, suspects face several obstacles with self-presentation such as longer distances to health facilities and socio economic-factors that increase diagnostic delays (Shapiro et al., 2013). Coupled with these challenges is the lack of early symptom of co-infection of TB and other diseases. Suspects with such conditions are less likely to recognize signs and symptoms of TB among other symptoms (Jam et al., 2010).

TB New Smear Positive Detection

Since 2006 Liberia remained above the WHO&STOP TB target of 70% case detection rate (UNDP, 2010). Despite progresses over time, the fluctuation in years of cases notified raises a serious concern over the quality of data recorded and reported (Figure 12).

Figure 12: Smear Positive Case Detection Rate 2005-2012



Source: NLTCP 2012 Annual Report

In 2012, new smear positive TB case detection rate was 72% as compared to 98% and 91% in 2011 and 2010 (NLTCP, 2012).

3.3.5 Monitoring, Supervision and Reporting

The NLTP has a monitoring and evaluation (M&E) framework that is integrated with the Central MOH&SW monitoring and evaluation system (MOH&SW, 2012). This M&E system is established at health facility, county and national levels. The NLTCP conducts quarterly joint supervision and onsite data validations with the inclusion of county level and health facility focal points to enhance the quality of TB case management and data recorded; use of diagnostic guidelines and data recording and reporting tool.

During supervision and monitoring visits, health workers and data recorders particularly, those responsible for TB services are provided onsite mentoring and in-service training. However, facilities visited are selective and the community based TB programs are often less monitored.

Despite the current efforts, there are many challenges including the lack of feedbacks and follow up actions of previous visits (NLTCP, 2012). There is no feedback on laboratory reporting, supervision and/or EQA data given regularly after a proper analysis. The current M&E system has many challenges as there are many gaps with the lack of available data for reporting. Data for the last quarter of 2012 and up to 2013 and 2014 is not yet available for decision making.

Recording and Reporting

The program has recording, reporting forms and registers for TB patients in all TB facilities. The data collection and reporting system at the health facility level are integrated into the wider Health Management Information System (HMIS) in line with the MOH&SW integration policy (NLTCP, 2012). Currently, recording and reporting at health facilities levels are done manually (Paper based) and data recorded are reported to the county level focal points and the data managers to prepare electronically and sent through central health management information system at the program and central levels.

Reporting of data is done on a quarterly basis (NLTCP, 2012); however, at times 2 to 3 quarters pass without a completed data for reporting especially during the rainy seasons when there are many hard to reach areas outside of the capital. As such, only available data are used for decision making which might not address existing challenges.

3.3.6 Screening Contacts, Risks Groups and Population

This section focuses on screening for active TB among contacts, clinical risk groups and risk population who may not actively seek health care due to TB symptoms. As such, the screening pathway implies active case finding (WHO, 2011a). Studies have revealed that facility based case detection alone is inadequate for TB control programs, thus the need for active TB case finding among TB risk groups to complement national programs efforts in early TB case detection (Shapiro, 2013).

Active TB Case finding has been initiated by the NLTCP following the WHO recommendation of screening risk groups with high TB exposure such as health care workers, prisoners, refugees, homeless people, slum dwellers

and other identified high risk populations (HIV, Diabetes etc.) that are less resource demanding and more cost effective (WHO&STOPTB, 2006)

There is no information currently on implementing screening of contacts and risk populations for TB in the country, though mentioned in the strategy plan as one of the strategic objectives. Moreover, the NLTCP is yet to develop protocol on implementation of contact investigation particularly for contacts of smear positive TB cases.

3.4 Experiences and Approaches in Developing Countries

This session focuses on interventions such as improving knowledge and awareness, minimizing barriers to health care access, strengthening identification of patients with suspected TB, ensuring quality-assured diagnosis, improving referral and notification, and enhancing active TB case findings practiced and feasible in developing countries. The idea to focus on these interventions was guided by gaps identified at each levels of the framework.

3.4.1 Improving Knowledge and Awareness

Ensuring improved awareness and knowledge in communities through advocacy, communication, and social mobilization (ACSM) activities, reaching vulnerable groups, can help ensure that people recognize TB symptoms and visit appropriate facilities (Lonroth et al., 2009)

In Angola, community mobilization as an intervention has shown to be effective in improving knowledge and awareness of TB among patients and suspects of TB and HIV as well as early diagnosis of TB. The TB program part of the broader HIV program initiated a community mobilization approach that included health system improvement and community involvement in the Benguela Province over a one year period. In order to change social norms, improve community competence and behaviour, the project designed and implemented a variety of participatory education and mass media activities such as posters, pamphlets and billboards placed in public places driven by the community.

The intervention also trained health workers, including community health volunteers, (signs and symptoms of TB, TB mode of transmission, prevention and referral) and carried out outreach activities with target groups such as community based organizations and, religious and community leaders. By the end of the one-year project, more than 8,000 and 6,000 people were tested for HIV and TB (TB CORE GROUP, 2008). However, there was no baseline given to measure the difference achieved.

Improving Awareness and Knowledge of TB through TB Club

Also in Northern Region of Ethiopia, a “**TB Club**” was established in two districts as part of the community based TB care program with the involvement of community members including people who once had TB. This initiative proved to be effective in improving patients’ compliance to TB treatment and creating suitable environment for positive attitudes and practice in communities regarding TB among rural population (Demissie, Getahun & Lindtjørn, 2003).

Cured TB patients are helpful in providing TB awareness, identification and referral of TB suspects, social support, and advocacy to enhance the performance of community TB care program. However, implementing this approach in larger settings is required for further evaluation. The “TB Club” is also practiced and has shown effectiveness in addressing stigma and improve early TB diagnosis and treatment in several countries including Bangladesh (Akramul, 2005) and India (Rangan et al., 2003).

3.4.2 Minimizing Barriers to Health Care Access

The NLTCP should engage and collaborate with all partners (see annex 3) including communities engaged in improving health services particularly for the poor and vulnerable population to enhance access to TB care (WHO, 2007b).

Public Private Mix (PPM)

Public private mix approaches can improve access to TB patients early especially the vulnerable groups, improve diagnosis and treatment results and help protect them financially through quality control standards (using national guidelines and international standards)(WHO, 2008).

In Indus hospital in Karachi, Pakistan, reported a doubling of TB care notification from 200 in 2010 to 420 cases after launching the scheme of engaging health care providers through PPM approaches. In 2011, the public hospital extended its electronic TB recording and reporting system to private providers for identifying and referring TB suspects, confirming TB cases and ensuring TB patients successfully completed treatment. Family doctors and community health workers reported their activities electronically using a mobile phone interface to the Indus hospital system.

After confirmation by the hospital TB personnel in charge, payments (conditional cash transfers) are made via mobile banking facilities directly to the doctors or community health workers mobile phone (STOPTB, 2011). This approach increases access to patients or TB suspects by making use of facilities within their ranged. Similar approach has also shown increase

notification of new smear positive cases as well as referral of TB suspects in Indonesia (Mahendeadhata et al., 2010).

Improving Access through Task Shifting

Task shifting has shown effective in strengthening access to and national health coverage by improving the skill mix in a country's health care system. This approach considers both formal and informal or community health volunteers to make the right balance of skill mix. It has shown to also reduce overburden on one group of staff.

In Afghanistan, the national TB program addressed shortages and maldistribution of certified laboratory technicians by shifting tasks to high school graduates and deployed them in most needing or hard to reach TB diagnostic facilities following the theoretical and practical training as microscopists at TB diagnostic centres.

Within three months of deployment in 2009, 7,313 slides from 386 microscopy units in 30 provinces of Afghanistan were collected and cross checked as part of external quality assurance program. The result shows that the quality of work of certified laboratory technicians was not significantly different (Odds Ratio 1.11; 95% CI 0.64. 1.94) from high school graduates without much certification (Mohammad, 2012).

Financial Social Protection Approaches

Reducing the economic burdens associated with TB diagnosis and impact on patients by identifying appropriately vulnerable groups and communities to provide economic support for transportation to TB diagnostic centres has shown effective. Inclusion of food packages and a place to stay for few times if necessary for patients is also necessary. This approach reduces risks of impoverishment among TB suspects and patients and improves utilization of TB diagnostic and treatment services (Insua et al., 2012).

3.4.3 Strengthening Identification of Patients with Suspected TB

Improve Training and Retention of Health Workers

Health staffs in all parts of the health system should be alert on asking suspects about TB signs and symptoms and refer them for TB diagnostic testing as per the national TB guidelines (WHO, 2010). It requires pre and in service training to maximize the efficiency and performance of existing workforce. However, scaling up of education and training of health workers must be complemented with retention strategies (WHO, 2006).

In an effort to fairly redistribute health workers between rural and urban areas, the Zambian Ministry of Health since 2003, initiated a twin-pronged strategy to attract and retain health workers to disadvantage health facilities by improving their cash income with top-up and non-cash incentives aimed at improving professional practice environment such as solar lighting at health facilities, improved supply water and sanitation and transport for workers (motorbike, bicycle, etc). This approach succeeded to attract and retain doctors in public health system. The number of doctors has increased and stabilized (Gow et al., 2013).

Screening Higher Risk Groups in Congregate Settings

Screening higher risk population such as patients seeking care for (diabetes, malnutrition, HIV, etc) is feasible and can improve early case detection and limit transmission to others (WHO, 2011a).

In Francistown Botswana, TB screening was implemented among adults at patients' in-take in five clinics between August to December 2009 using anti TB check list. The Staff ask patients age 18 and above if they currently had any of the following signs and symptoms (cough 2 weeks or more, fever, night sweats, unexplained weight loss, coughing with blood and history of contacts with TB patients).

Patients with positive TB screen (cough for 2 or more weeks) or any combination of 2 to 8 signs and symptoms or risks factors were selected for further clinical evaluation. There was 97% acceptance of screening among suspects (11,779) of which only 19 (0.16%) were diagnosed with TB. Routine TB screening at intake was operationally feasible, but had low yield due to loss to follow up and the use of symptomatic approach especially screening also people living with HIV (Bloss et al., 2012).

3.4.4 Ensuring Quality Assured (EQA) Diagnosis

Same Day Sputum Collection and Use of Sputum Smear Microscopy

The use of sputum smear microscopy has been recommended worldwide for initial diagnosis of pulmonary TB, except for people with HIV. The WHO 2007 definition of new smear positive is now based on the presence of at least one acid fast bacilli (AFP) in at least one sputum sample in countries with well-functioning external quality assurance (EQA) with very high workload and low human resource capacity (WHO, 2007a). Evidence shows that good quality microscopy of consecutive sputum specimens identifies (95-98%) smear positive TB patients (WHO, 2011a).

In 2011, a trial by (Cuevas et al., 2011) enrolled 6,627 patients in Ethiopia, Nepal, Nigeria and Yemen who had a cough for over two weeks. Participants were randomly assigned each week for a year to use either the SMS or SSM sample collection schemes. The result proved that patients tested using the SSM scheme(new) were more likely to provide the first two samples than patients tested using the SMS scheme (98% versus 94.2%).

Enhance Diagnosis of Sputum Smear-Negative TB by use of the GeneXpert

The Gene Xpert MTB/RIF assay is an automated system that allows a “relatively untrained” operator to perform DNA amplification and detection of MTB, and screening for rifampicin (RIF) resistance in less than 2 hours. WHO strongly recommends that countries use xpert MTB/RIF as first diagnostic test in individuals suspected of having MDR-TB or HIV associated TB and when appropriate as a backup test to microscopy especially in smear negative specimens (WHO, 2011b).

In a randomized, parallel-group, multicenter trial in four African countries (South Africa, Zimbabwe, Zambia and Tanzania), 758 patients (182 culture positive) were randomly assigned to smear microscopy and 744 patients (185 culture positive) also assigned to xpert MTB/RIF. The results reveal that more patients 178 (24%) of 744 and 168 (23%) of 744 assigned to xpert MTB/RIF had same-day diagnosis and treatment initiation as compared to 99 (13%) of 758 and 115 (15%) of 758 assigned to smear microscopy (Boehme et al., 2011).

3.4.5 Improve Referral and Notification Practices

There are evidences on interventions that have proven to be effective through private public approaches to enhance TB notification and referral system (WHO 2011a).

For example in Malawi, a store keeper-based referral system was established in two urban districts in Lilongwe to enhance TB notification and referral system. About 654 Storekeepers who met the criteria such as residing and working in the project areas for more than a year and volunteer to participate without financial incentives were recruited and trained to implement the project. The training focused on participatory approach to build referral and advisory skills through brainstorming and a field practical referral in health promotion and referring TB suspects to health facilities for diagnosis.

The store keepers screened TB people with cough 3 weeks or more, who sought medicine at a drug store and provided TB suspects with referral letter to visit a health centre for appropriate diagnosis.

A follow-up supervision was carried out by the TB project trainers through quarterly review meetings inclusive of health facility representatives, store keepers and community leaders. The project was evaluated in 2003 and 2006 the result reveals that mean patient delay has reduced from 8.8 weeks in comparison areas to 2.14 weeks in intervention areas; and the proportion diagnosed with smear positive in intervention sites was 1.2 per 1000 compared to 0.6 per 1000 population in the comparison areas (Simwaka et al., 2012).

3.4.6 Enhancing Active TB Case Findings

Screening specific risk groups such as people with HIV and household contacts of people with TB has been part of the STOP TB strategy for many years (WHO, 2011a). This approach is effective and improves early TB diagnosis among most at risk population.

Home-Based Care (HBC) Approach

For example in Malawi, a Home-Based Care (HBC) Approach is being used to screen and support high risk group. Volunteers were selected in communities where they lived and are willing to work with high risks groups including HIV/TB patients. They were theoretically trained, first on care and support of TB/HIV (Salaniponi et al., 2003) including adherence; counselling, IEC and home based care activities and were finally provided job training with regular visits in the communities.

On each visits, they were given HBC kit containing basic drugs and supportive materials for first-line care for TB and HIV patients. They systematically screen for chronic cough (2-3 weeks) in households with TB and HIV positive patients. By the end of December 2004, over 7,062 HIV-Positive individuals were being follow up by HIV/TB clinics regularly. This strategy has proven to be effective and build positive health seeking behaviour towards TB/HIV in communities (Zachariah et al., 2006).

Chapter IV: Discussion

The progress of national tuberculosis control programs can be shown by early detection of TB cases, with the aim to discontinue the chain of transmission by identifying infectious TB sources early and providing treatment (Bhardwaj et al., 2014). This intention however, is challenged by multiple factors that have been identified through both the patients' pathway and the screening pathway. The discussion of the study followed similar patterns of the findings with focused on important gaps identified at each level of the framework and how experiences from other countries can be applied in the Liberian context to address the gaps identified simultaneously.

4.1 Patient Delays

The study reveals lack of proper knowledge and awareness among the general population to recognize TB signs and symptoms which contributes to primary patients related delays in Liberia. Despite many mentioning cough and weight loss as the most common signs and symptoms of TB, knowledge on the mode of transmission and how TB can be prevented remain poor and is influenced by misconceptions. Many rural and urban populations in Liberia believed that the mode of transmission of TB is through kissing someone who has the disease (NLTCP KAP, 2011). The study also reveals low awareness among respondents about where to find TB services in their surroundings. The current knowledge gap shows the need for targeted education as well as behavioural change communications messages among the general population focusing on high risk groups.

The research has provided evidence that is useful for improving TB knowledge and awareness among people. People ability to recognize TB signs and symptoms and take health care in appropriate settings can be improved by used of appropriate advocacy, communications, social mobilization activities with full involvement of high risk groups and communities (ACSM) (Lennoth et al., 2009). The used of tailor made ACSM strategies such as the "TB clubs" among cured TB patients practiced in Northern Ethiopia (Demissie, Getahun & Lindtjörn, 2003) have proven helpful in improving TB awareness, identification and referral of TB suspects, social support, reduction in stigma and gender related barriers, and advocacy in community-based TB care program.

Currently, the TB program in Liberia is being implemented without a TB communication strategy, as such knowledge based interventions carried out may not reflect current TB knowledge gaps in the Liberian context and community based awareness interventions carried out by both private and public institutions offering TB services are not based on identified and agreeable knowledge gaps.

These approaches can be adapted and applied to the Liberian context to bridge the current gap on TB knowledge and awareness among the population. The full implementation and sustainability of ACSM strategies will require an ACSM communication strategy that is current lacking for the TB program in Liberia. Moreover, prioritizing Community involvement and strengthening capacities of community health workers (general community health volunteers, primary school teachers, Cured patients, etc.) through a participatory approach are important success factor that should also be consider.

4.2 Access Delays

Access to quality health care is improving in Liberia with 72% of the population living within 5km of a health facility. The study reveals that the poor and vulnerable groups living in remote and rural settings and urban slums communities still lack equitable access to TB diagnostic and treatment facilities (NLTCP, 2012).

The study also reveals that long distances coupled with huge transportation burden, long waiting time due to over-crowdedness at the point of care are major delays factors affecting diagnosis of TB in Liberia. Though the NLTCP has made some progresses with the provision of diagnostic equipment, drug and medical supplies through the help of Global Fund beginning 2003, there are still shortages of supplies needed for implementation of TB diagnostic services especially during the rainy seasons when there are more difficult means of travel in hard to reach areas.

The study also found that some patients delayed of the use of available services due to several reasons including stigma, social isolation, fear of being diagnosed with TB/HIV and also negative attitudes of some health workers. Even though, good quality of TB care is offered, some patients still do not have access to health facilities in their surroundings due to fear that their status will be disclosed to others in the communities by health professionals (NLTCP, 2011).

The study has also explored evidence based interventions that can be used to improve the access related barriers that were identified. Public private mix approaches has shown to improve access to TB patients especially among vulnerable groups. Engaging all health care providers in public and private facilities to identify, confirm and refer TB cases among suspects of TB as is being practiced in Pakistan can help improve access to TB diagnostic and treatment facilities and equitable use of health care during minimum stay at health facility in hard to reach or underserved settings (STOPTB, 2011).

Another key approach is task shifting practiced in Afghanistan (Mohammad, 2012) to bridge the gaps in skill mix and over crowdedness in both public and private health facilities. Introducing also social protection interventions such as voucher practiced in some developing countries (Insua et al., 2012) to cover transportation costs for TB suspects or patients visiting facilities for TB care reduces the risks of financial catastrophe for patients.

The current public private mix initiated by the NLTCP in Liberia is weak and consist of few private health institutions with limited coordination in provision of TB services in Liberia. As such, access to and quality of TB care in some facilities remains poor. Practices as mentioned above can be carried out by strengthening existing structure supported by strong political will to make sure that agreements reach are fully supported.

Task shifting has found part of the NLTCP strategy to reduce staffing gaps in both rural and underserved areas mainly through the general community health volunteers (gCHVs). However, this approach is not optimally implemented due to poor motivation and lack of sustainability. Sustaining existing structure but incorporating the gCHVs into the formal health care system with improved incentives could yield a better outcome of task shifting at the peripheral levels. Implementing vouchers for transportation in a country where there is none requires strong advocacy, political commitment and engagement of all partners in the health sector as sustainability should be assured before initiating such an approach.

4.3 Health Services Delays

The NLTCP integrated with the national health delivery system has made progress in addressing the delays faced by patients at the point of accessing TB services. Despite current progress, there are many gaps within the current TB program implementation. The program has made efforts in hiring, training and distribution of staff, however there are still shortages of required staff and current motivation is below expectation with some of the staffs not currently on paid role. As such attrition and uneven distribution of health workers mainly in rural settings (MOH&SW, 2013) has become a major health system related problem.

The TB diagnostic protocols applied in the field are in line with national guidelines, but not consistent with the current WHO recommendations. The process appears to be highly selective with the tendency to result in both patient and health service related diagnostic delays due to rescheduling especially for smear negative TB patients. The study also reveals the collection of three smear samples instead of the WHO recommended two samples (spots-spot-morning spot) for smear microscopy.

Another challenge is to keep up an effective laboratory network that enhances the quality of TB diagnosis and minimizes errors. Despite having microscopy centres in all 90 health districts, the technicians at the counties or districts levels are not fully prepared to supervise and coordinate at the levels of the health facilities. The study reveals high workload in laboratory settings, with insufficient laboratory personnel, equipment and supplies.

At moment TB case finding is mainly passive, which is understandable in the case of Liberia with financial constraints. However, this approach is less effective alone if the idea of the program is to detect early and break the chain of transmission of TB (Shapiro et al., 2013). Moreover, screening of high risks groups within hospital settings is currently done at a minimum level with focus mostly on TB/HIV co-infected patients.

The issue of data quality, reporting and feedback system particularly at health facility levels in the counties remains a challenge. Data recorders are overloaded with several other tasks including TB as such, some facilities do not meet the deadlines for reporting. Improving training and retention of health workers currently practiced in Zambia to address the human resource gaps between rural and urban areas (Gow et al., 2013), is worth considering. This intervention increases staffing in disadvantage TB facilities by improving cash income with top-up and non-cash incentives as a motivational factor to retain health care workers.

Though similar approach is being implemented in Liberia, the motivational package and retention aspect is limited and lacks sustainability. As such, retaining health care providers in hard to reach settings remains a challenge. Even the general community health volunteers not on payroll are not being retained. Realizing the full potential of this approach will require all programs including the NLTCP, stakeholders including communities and political commitment to enhance output and sustainability.

Early case detection approach to reduce the transmission of TB mainly among vulnerable groups in all health care settings as practiced in other countries including Botswana (Bloss et al., 2012) as shown effective. The NLTCP has initiated screening in health facilities, but it is done at limited level with few staff being aware of such approach. Engaging all health care providers in both public and private facilities to screen patients at all service provision points following a standardized checklist will enhance early case detection in the country.

The use of the “same day sputum collection” with at least one acid fast bacilli in at least one sputum sample for a new smear positive case instead of collecting three samples within two days has been recommended by WHO

(WHO, 2011a). This study has shown that good quality microscopy of consecutive sputum specimens identifies (95-98%) smear positive TB patients. This approach reduces workload and long waiting time for smear positive result in low income countries with limited human resource capacity. Currently, external quality control system is not optimally practiced by all facilities offering TB services in Liberia. Using this approach will require capacity building and make available the required laboratory equipment and supplies.

The NLTCP can strengthen the use of the “gene xpert” for case detection in smear negative patient or suspects especially among HIV and MDR-TB patients as observed in South Africa, Zimbabwe, Zambia and Tanzania (Boehme et al., 2011). This approach is relative easy to use and yields fast results. Gene xpert reduces waiting time and increases opportunities for patients to initiate treatment the same day (WHO, 2011b). The TB program in Liberia is currently using the gene-xpert in only one facility out of 150 TB diagnostic facilities in the country. Expanding the use of this approach in the major laboratory diagnostic facilities, is feasible and do not require high skill or technicians to be used effectively.

The study also reveals that NLTCP does not have a guideline or protocol in place to support health workers in the implementation of contact investigation, particularly for contacts of smear positive TB cases in communities. Carrying out active case finding among high risks group and population in communities is one of the strategic objectives of the NLTCP of Liberia, but not much is being done currently to realize this objective. One of the reasons for not fully initiating active case findings among high risks groups and contacts of TB is the lack of funds despite global fund being the main funding source. Moreover, due to many program priorities, the MOH/SW is unable to currently engage fully on the TB disease from two fronts especially with poor financial commitment from Central Government.

The NLTCP has the opportunity to learn from experiences in other developing countries such as the “Home Based Approach” currently practiced in Malawi (Zachariah et al., 2006). This approach is feasible and cost effective and can improve active case detection by screening TB suspects using anti-TB checklist through volunteers.

Supporting active TB case detection by screening and referring suspects with TB signs and symptoms for further investigation is one of the core functions of the general community health volunteers (gCHVs). But the current community based TB program is weak and lacks clear referral and feedback system with facilities offering TB services. As such, motivation is poor among gCHVs.

The NLTCP could adapt the use of the “Home Based Approach” in the Liberian context and as well strength the existing community based TB program to enhance active TB case finding in the communities. However, capacity building of community health workers, involving community based organizations, leaders and strong political commitment to support the current community health structure is vital.

NLTCP could also enhance referral and notification of TB cases through store keeper-based approach (Simwaka et al., 2012). The use of store keepers has proven worthwhile in screening TB suspects and referring them for diagnosis to health centres as observed in Malawi. The NLTCP would adapt this approach with the involvement of other health care providers such as gCHVs that are already in existence. Continuous training and regular monitoring of the implementation and progress as well as community involvement are required for sustainability.

The interventions or approaches discussed are cross-cutting and can be considered and implemented complementarily to address the problems and challenges identified by this study in both the patient and the screening pathways.

4.4 Study Limitation

The analysis of the study using an adapted framework (figure 4) was based on available data which have some limitation to adequately address the framework particularly in Liberian context. Data recording and reporting are challenging issues still faced with by the NLTCP of the MOH/SW of Liberia. Information received from national level might have data gaps or limited quality which may not reveal the current reality in Liberia.

In addition, global estimates of some values lack consistencies and are not current reality of Liberia context. These conditions serve as a limitation and could as well affect the results of this study. Moreover, the lack of up to date information in Liberia regarding the study might also under estimate the current magnitude of TB in Liberia. The current national reports lack 2013 and 2014 reports which are limitation for this study. With the study searches only being done in English, language barrier further prevented access to key literature published in French by the many Francophone countries in Africa that would have contributed to the findings of this study.

Chapter V: Conclusion and Recommendations

5.1 Conclusion

This study is one of the very first carried out in Liberia to analyse factors that influence early TB case detection. This study has provided information that can be built upon to further assess specific gaps within the TB program.

The study concludes that access and health facility related delays are main contributing factors influencing early TB detection in Liberia. Though patient delays are essential gaps that need to be addressed, patient knowledge of signs and symptoms alone without equitable access to health facilities, quality diagnostic equipment and motivated staffs with willingness to receive and treat TB patients, cannot address the current problems facing the NLTCP.

NLTCP is currently heading the right direction, however, strengthening the current existing community based TB DOTs program with improved diagnostic capacities, trained health personnel especially laboratory technicians, regular quality assurance monitoring and advocacy for political commitment would be helpful in addressing current delays. The general community health volunteers are the driving forces behind the success of TB community based DOTs program. They need to be prioritized and motivated. The NLTCP should advocate for the inclusion of the general community health volunteers as part of the formal health system.

It doesn't help to train large numbers of health care providers each year without actions to retain and motivate them. The current gaps of staff attrition and uneven distribution of health care workers mainly in rural settings requires immediate attention. The national TB diagnostic protocol and guidelines need to be aligned with the current WHO recommendations and best practices in the Liberian context to enhance the program performance.

The current M&E system needs strengthening to improve data quality and reporting time so that require data are available for effective decision making to enhance program performance.

The evidence of experiences that has worked in other developing countries national TB programs reveal by the study can be carefully reviewed and adapted in the Liberian context. Successful implementation requires strengthening and engaging the existing community based TB DOTs program, advocating for political commitment, strengthening public private partnerships and coordination among all stakeholders involved in the provision of health care in Liberia.

5.2 Recommendations

Below stand the recommendations derived based on problems or challenges identified in the findings and discussion. The recommendations are relevant and feasible for implementing in the context of Liberia.

1. NLTCP should develop a comprehensive ACSM community strategy

Currently, education and communication messages for TB implementation are not based on a communication strategy; as such TB messages are not based on the Liberia context of identified communication gap. The TB program should engage all stakeholders and partners including the community leaders directly or in directly involve in providing health care in the country through a participatory approach to design a comprehensive communication strategy.

2. NLTCP should focus on TB symptoms recognition and awareness messages, mode of transmission and stigma reduction messages particularly in high risk groups

Comprehensive knowledge on TB is poor among the general population. The NLTCP needs to designs and provide awareness using tailor made messages (TB signs and symptoms, stigma reduction, etc) with involvement of the national health promotion division including partners providing health services in Liberia. Multiple channels such as media campaigns using radios, TV and drama through the existing community-based structures (general community health volunteers, community health workers, patient groups, community leaders, women and men groups etc) would be the best for information dissemination.

3. NLTCP should strengthen the existing community based DOTs TB program to enhance access to TB services

The NLTCP already have in place community-based DOTs programs. Revamping the effectiveness of this program is very important to enhance access to early TB care as well as strengthening referral system and minimizing long waiting time at TB facilities. Thus, the success of the DOTs program cannot be achieved in the absence of full community engagement particularly the general community health volunteers (gCHVs) and community health workers. In addition, there is also need to put in place attractive motivation for gCHVs to sustain the quality of community based TB care.

4. The NLTCP should strengthening public private Mix to reduce the high out of pocket costs incurred by TB patients

Currently, transportation fee is the leading cost among indirect costs incurred by TB suspects and patients seeking care. Partnering with private facilities anywhere in the country to provide free services to TB suspects and patients could reduce longer distances to cover and amount spent for transport. In addition, vouchers or incentives to cover transportation would also be very useful in reducing financial catastrophe among TB patients and their families. Political will, advocacy and involvement of all stakeholders are needed for sustainability.

5. NLTCP should improve the use of other diagnostic methods to address the gap of smear microscopic

Despite smear microscopic being the widely use and effective in diagnosing highly infectious patients, there some gaps that need to be addressed simultaneously. TB case detection among HIV patients, drug susceptibility testing and diagnosis of TB among children requires strengthening. Other methods such X-ray, Xpert MTB/RIF and the gold standard culture can also be used when available. Hence, the completion of the national reference lab, infrastructure and training is required to ensure effective and early diagnosis.

6. NLTCP should strengthen case finding among patients with suspected TB in both health settings and communities

The NLTCP has initiated active case findings among high risk groups with focus particularly on HIV/TB patients; however, the process requires strengthening. The program needs to improve the tracing of patients and their family as well as health workers directly involved with TB patients to prevent further transmission of TB in communities and health care settings. Community engagement as well as involving all health care providers is the key to success.

7. NLTCP should strengthen M&E and Research to better inform program implementation

The current M&E system needs to strengthen the feedback mechanism to enhance the flow of communication as well as the quality of staff performance. As already initiated by the program, research is very important to the performance of the program. The NLTCP needs to prioritize the conduct of further research to identify current gaps in the program implementation with focus on patients related barriers; access and system related barriers and knowledge of health workers directly involved with providing TB care to identify root causes. The process requires involving all

relevant stakeholders and partners to mobilize required resources and advocate for use of the study results upon completion.

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Annexes

Annex1: The Map of Liberia



LISGIS 2011, Liberia

Annex2: Definitions of Terms	
Definitions of terms were adapted from the World Health Organization (WHO, 2013b; 2002) Revised Definition and Reporting Framework in TB Control; and the DOTs Framework for Effective Tuberculosis Control.	
Key Words	Definition
Tuberculosis	Tuberculosis is an infectious disease primarily caused by Mycobacterium. It affects mainly the lungs (pulmonary TB) but can attack any part of the body (Extra-pulmonary TB)
Active tuberculosis	Active tuberculosis refers to disease that occurs in someone infected with Mycobacterium tuberculosis. It is characterized by signs or symptoms of active disease, or both, and is distinct from latent tuberculosis infection, which occurs without signs or symptoms of active disease.
Tuberculosis suspect	Any person who presents with symptoms or signs suggestive of TB, in particular cough of long

	duration.
Pulmonary TB	Pulmonary TB defined as a laboratory confirmed case (positive smear, histology, or culture) with or without radiological abnormalities consistent with active pulmonary TB or a decision taken by a physician that the patient's clinical and/or radiological features were compatible with pulmonary TB.
Extra-pulmonary TB:	Extra-pulmonary TB defined as a patient with a smear culture, or histology specimen from an extra-pulmonary site positive for M. Tuberculosis complex or with clinical signs of active extra-pulmonary disease who was treated with a full curative course of anti- Tuberculosis chemotherapy.
Pulmonary tuberculosis Smear positive (PTB+):	Pulmonary tuberculosis Smear positive one sputum smear examination positive for Acid-Fast bacilli plus radiographic abnormalities consistent with active pulmonary tuberculosis as determined by a clinician or one sputum smear positive for Acid-Fast bacilli plus sputum culture positive for M. Tuberculosis.
Pulmonary tuberculosis Smear negative tuberculosis (PTB-)	Two Case of pulmonary tuberculosis which does not meet the definition of smear positive tuberculosis. Diagnostic criteria should include at least three sputum negative for Acid-Fast bacilli, and radiographic abnormalities consistent with active pulmonary tuberculosis and no response to a course of broad spectrum of antibiotics, and decision by a clinician to treat with a full course of anti-tuberculosis chemotherapy.
Risk groups	A risk group is any group of people in which the prevalence or incidence of TB is significantly higher than in the general population.
Passive Tuberculosis Case-Finding	Passive Tuberculosis case-finding may involve an element of systematic screening if the identification of people with suspected TB is done systematically for all people seeking care in a health facility or clinic.
Active tuberculosis Case-Finding	Active case-finding is synonymous with systematic screening for active TB, although it normally implies screening that is implemented outside of health facilities.
Patient delay	Patient delay has refer to in this thesis, is the time between the onset of symptoms and the recognition of those symptoms as a disease that needs care
Health care Service delay	Health Service delay as refer to in this thesis is the time taken from the first health care visit to the

initiation of diagnosis

Annex 3: Partners for NLTCP in Liberia	
Names of Partners	Support Provided
World Health Organization	Technical support to all programme activities (TB and leprosy)
Global Fund	Financial support: Human resources Facility renovations Community based DOT Programme management
Clinton Health Foundation	Technical Support to TB/HIV Laboratory Strengthening
Merlin	Community-based TB care providers
Brac	
Africare	
Faith- Based Institutions (Ganta Methodist hospital)	Ganta treatment site

Annex 4: National TB Strategy (2007-2012) Goals and Objectives	
Vision	Liberia free of TB
Goal	To reduce the national burden of TB in Liberia by 2015, consistent with and support of the Millennium Development Goals and the Stop TB Partnership targets.
Targets	<ul style="list-style-type: none"> ❖ To halt and begin the reverse of the incidence of TB by 2015. ❖ By 2015, at least 70% of infectious TB will be diagnosed (under the DOTS strategy) ❖ By 2015, the global burden of TB (disease prevalence and deaths) will be reduced by 50% relative to 1990 levels
Strategic Objectives	
Objective 1	Pursue high-quality DOTS expansion and enhancement through decentralised laboratory and DOT services, thereby improving access to services and increased case detection

Objective 2	To assess the status of MDR-TB in the country in 2010, based on its findings appropriately prepare for the establishment of diagnostic facilities and start treating MDR cases from 2011.
Objective 3	To establish community TB care in at least three districts per county in the first two years and 80% of total districts by 2012.
Objective 4	To have at least 80% of private health care providers participating in DOTS by 2012.
Objective 5	Expand and implement an effective TB and HIV collaborating mechanism reducing the burden of TB in PLWHA and HIV in TB patients by increasing access to integrated TB/HIV services to cover 65% of the population by 2012. Health systems strengthening by supplementing technical staff, capacity building of the existing and recruited staff in the technical and management areas related to TB control.
Objective 6	Increase and sustain IEC/BCC activities in all 15 counties and 90 districts to reach 80% of the population by 2012, to increase knowledge and awareness of TB and foster amongst community positive attitudes and practices around TB prevention, suspect identification and treatment support
Objective 7	Strengthen central supervision, monitoring and evaluation and research unit's capacity in order to conduct ARI survey, MDR-TB assessment, HIV-TB co-infection assessment and need based operational research.
Objective 8	Strengthen the managerial and technical capacity of the National Tuberculosis Program through training at all levels.