North South University

Department of Public Health

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Course name and code: EMPH-605

Area of Internship: Tuberculosis Treatment Outcomes of Prisoners in Bangladesh

Submitted to: Dr. Afrin Ahmed Clara, Senior Lecturer, Department of Public Health, North South University.

Length: June 2021 to September 2021

Date of Submission: 07 September 2021

Declaration

I hold a copy of this internship report that I can produce if the original is lost or damaged. I hereby certify that no part of this report has been copied from any other source except where due acknowledgement is made in the report. The work presented here is my own and has not been written/ produced for me by any other person that my debts (for words, data, arguments, and ideas) have been appropriately acknowledged.

Julhas Sujan

Internship Report

On

"Patterns and determinants of tuberculosis treatment outcomes among prisoners in Bangladesh"

[Supervised by]

Dr. Afrin Ahmed Clara
Senior Lecturer, Department of Public Health,
North South University
Internship Supervisor

[Submitted by]

Name: Mohammad Julhas Sujan
ID: 2025166681
Course Name: Internship Report
Course code: EMPH-605

Letter of Transmittal

Date: 07 September 2020

To

Dr. Afrin Ahmed Clara

Senior Lecturer

School of Life Sciences, Department of Public Health, North South University

<u>Subject: Submission of the practicum report</u>

Dear Madam,

It is a great pleasure for me to submit my practicum report on the topic of "Patterns and determinants of tuberculosis treatment outcomes among prisoners in Bangladesh". I have prepared this report as partial fulfilment of the thesis. To make this report up to standard I tried my level best to fulfil the requirements by implementing the knowledge. Thank you very much for giving me the opportunity and necessary guidance as well as direction needed to prepared this type of project.

I would be honored if you go through my report and find it worthwhile as I really put in a lot of effort while preparing this report.

I express my heart full gratitude to you to go through this project and make your valuable comments. Thank you very much for your kind acceptance.

Sincerely

Mohammad Julhas Sujan

ID: 2025166681

Program – EMPH

North South University

Student's Declaration

I, Mohammad Julhas Sujan, a student of Executive Master of Public Health (EMPH), at North South University declare that this practicum report on the topic of "Patterns and determinants of tuberculosis treatment outcomes among prisoners in Bangladesh", have only been prepared for the fulfillment of the course of Master's Thesis and as the partial requirement of the Executive Masters of Public Health (EMPH) degree.

I hereby declare that this report has been solely prepared by me and to the best of my knowledge, it contains no materials previously published or written by any other person which have been accepted for the degree at North South or any other educational institution.

It has not been prepared for any other purpose, reward or presentation.

Mohammad Julhas Sujan
ID: 2025166681
Program – EMPH
North South University

Supervisor Declaration

<u>To Whom It May Concern</u>

It is hereby certifying that the work entitled "Patterns and determinants of tuberculosis treatment outcomes among prisoners in Bangladesh" was prepared by Mohammad Julhas Sujan to the best of my knowledge, is the said student's work.

I declare that this report is classified as:

☐ **Confidential** (Contains confidential information under the University Act)

☐ **Restricted** (Contains restricted information as specified by the organization where research was done)

☐ **Open access**

Dr. Afrin Ahmed Clara

Senior Lecturer

School of Life Sciences

Department of Public Health

North South University

Acknowledgement

ABSTRACT/ SUMMARY:

Internship Report Title: Patterns and determinants of tuberculosis treatment outcomes among prisoners in Bangladesh

Student's name: Mohammad Julhas Sujan

Tuberculosis (TB) is one of the major causes of death in the world for several decades. Its control is the main concern in the global public health. According to WHO, Bangladesh is a high-burden country for tuberculosis. There were several studies conducted nation-wide on tuberculosis such as drug & multi-drug resistance tuberculosis and found many associated risk factors but one of the major areas that is still obscure. As a South Asian country, Bangladesh is suffering from various problems in prison management for many years. Prison health is a critical part of public health as health problems within and outside prisons are interrelating. Every successful TB control program also requires effective TB control in prisons and failure to control TB in prisons has the potential to disrupt community TB control programs. The aim of the study is to find out the patterns and determinants of treatment outcomes of the tuberculosis patients in prisons.

A retrospective cohort study was conducted from 2015 to 2020 in 5 divisions across the country. We extracted past five years data with 245 tuberculosis prisons patients from the eTB manager for this study. The e-TB Manager is a web and desktop-based software for managing all the information needed by national TB control programs under Directorate General of Health Services. Data were entered, cleaned, and analyzed using the statistical data analysis software Stata Version-16.0. Our results revealed that the majority (53.06%, n=130) of the patients were cured, 9.80% (n=24) were completed treatment, 4.49% (n=11) were died, 4.49% (n=11) were failed, 10.20% (n=25) were lost to follow-up, 1.22% (n=3) were not evaluated, 7.76% (n=19) were transferred out (transferred to another health facility), 2.86% (n=7) were waiting to start treatment, and 6.12% (n=15) were on treatment.

TABLE OF CONTENTS

BACKGROUND

This internship report is submitted by Mohammad Julhas Sujan for the partial fulfillment of the requirements for the degree of Executive Masters in Public Health (EMPH) as a prerequisite of the professional carrier or further study.

Julhas Sujan is a computer science engineer and health informatics specialist currently working as country coordinator for International Vaccine Institute's (IVI), Fleming Fund Regional grants in Bangladesh. He is responsible for coordinating all in-country activities in close collaboration with the local government and institutions involved in AMR surveillance. The International Vaccine Institute (IVI) is an independent, nonprofit, international organization that was founded on the belief that the health of children in developing countries can be dramatically improved by the use of new and improved vaccines. Working in collaboration with the international scientific community, public health organizations, governments, and industry, IVI is involved in all areas of the vaccine spectrum – from new vaccine design in the laboratory to vaccine development and evaluation in the field to facilitating sustainable introduction of vaccines in countries where they are most needed.

To the internship, Mr. Sujan worked with the USAID funded MTaPS project on Tuberculosis portfolio and prepared the report. A total 245 individual patient information was extracted from an electronic platform of the National Tuberculosis Program (NTP). The MTaPS project gave a verbal consent to analyze the data and to understand the tuberculosis patient treatment success and unsuccess rates of prisoners in Bangladesh but for any publication it needs a written consent from NTP.

I. INTRODUCTION

Tuberculosis (TB) is one of the major causes of death in the world for several decades. Its control is the main concern in the global public health. Sustainable Development Goals (SDGs) set the main target for global TB control for declining the incidence rate, having TB prevalence and decreasing death rate for 1990 by 2015 (1). In 2015, 10.4 million new cases of tuberculosis were reported worldwide, which represents 142 new cases per 100,000 people, or a decline of 17 per cent since 2000. In 2015, 1.6 billion people required mass or individual treatment and care for neglected tropical diseases, a 21 percent decline from 2010 and 1.8 million died from the disease (including 0.4 million among people with HIV). Over 95% of TB deaths occur in low- and middle-income countries (2) (3).

According to WHO, Bangladesh is a high-burden country for tuberculosis. There were several studies conducted nation-wide on tuberculosis, drug resistance, multi-drug resistance tuberculosis and found many associated risk factors but one of the major areas that is still obscure. As a South Asian country, Bangladesh is suffering from various problems in prison management for many years (4). Prison health is a critical part of public health as health problems within and outside prisons are interrelated (5). Every successful TB control program also requires effective TB control in prisons and failure to control TB in prisons has the potential to disrupt community TB control programs (5). The National Tuberculosis Program (NTP) in Bangladesh aims to strengthen TB control efforts through establishing effective partnerships, mobilizing necessary resources, and ensuring quality diagnostics and treatment service under the DOTS strategy has established many DOTS in several prisons. As stated in the Department of Prisons in the Republic of Bangladesh, a total number of 83107 inmates were incarcerated in 68 prisons across the country (6).

There are innumerable factors associated as determinants of tuberculosis in Prisons. Among them socio economic conditions, previous treatment history, lack of treatment facility, educational status, diabetes, smoking, crowdy living, body mass index are frequently associated with active TB in prisons (7) (8) (9). The main objective of this study is to find out the pattern and determinants of treatment outcomes (successful and unsuccessful) among the prion's inmates in Bangladesh.

II. BODY

A retrospective cohort study was conducted from 2015 to 2020 in 5 divisions across the country. e-TB Manager is a web and desktop-based software for managing all the information needed by national TB control programs. It integrates data across all aspects of TB control, including information on suspected cases, patients, medicines, laboratory testing, diagnosis, treatment, and outcome. Bangladesh National Tuberculosis Program (NTP) has been using this software since 2010 under the funding of Management Sciences for Health (MSH), USAID to keep records of TB patients. We extracted past five years (2015-2020) data from the eTB manager for this study.

A total number of 245 patients were selected for this study. Patients diagnosed for each prisons were included while patients under treatment, missing information for outcome, incomplete socio-demographic information were excluded. Data were entered, cleaned, and analyzed using the statistical data analysis software Stata Version-16.0. We prepared our dataset by dropping missing observations from outcome and exposures. We changed the variables to a meaningful name, categorized age to age-groups, and generated new variables for the binary outcome. We did Chi-squared test for dichotomous variables. According to the WHO treatment outcome definition, the results were evaluated as the percentage of successful and unsuccessful among all patients. A p-value < 0.05 was considered statistically significant.

III. FINDINGS FROM THE DATA

Socio-demographic characteristics:

A total number of 245 patients were registered in this study between 2015 and 2020 from the 5 divisions across the country. Of these 91.43% (n= 224) were males and 8.57% (n= 21) were females. Most cases were reported from 15-24 years (34.29%, n=84) and 25-34 years (22.04%, n=54) age group respectively. The overall mean age and standard deviation of the cohort was 38.37± 35 years. According to geographical distribution, highest number of the patients (56.73%, n=139) took treatment from the prisons of Rajshahi division (Table 1).

Clinical Characteristics:

Among the TB patients, 92.65% (n=227) were the pulmonary and 7.35% (n=18) were extrapulmonary cases. Based on the latest treatment regimen, 80.41% (n=197) patients were Category-I, 13.47% (n=93) were Category-II, 3.67% (n=9) were Individualized, and only 2.45% (n=6) were from Retreatment (Table 1). Previous treatment history showed that a less number of the patients 2.45% (n=6) were taken at least one earlier treatment and 97.14% (n=238) were newly registered.

Table-1: Demographic and clinical characteristics of the TB patients

Characteristics	Frequency N= 245	Percentage (%)
Age group		
<=4 Years	1	0.41
5-14 Years	30	12.24
15-24 Years	84	34.29
25-34 Years	54	22.04
35-44 Years	38	15.51
45-54 Years	21	8.57
55-64 Years	17	6.94
>= 65 Years	1	0.41
Gender		
Male	224	91.43
Female	21	8.57
Geographical distributions by divisions		
Dhaka	11	4.49
Khulna	41	16.73
Rajshahi	139	56.73
Rangpur	7	2.86
Sylhet	47	19.18
Yearly patient enrollment		

2015	5	2.04
2016	32	13.06
2017	56	22.86
2018	47	19.18
2019	21	8.57
2020	84	34.29
Case definition		
Pulmonary	227	92.65
Extrapulmonary	18	7.35
Last treatment regimen		
Category I	197	80.41
Category II	33	13.47
Individualized	9	3.67
Retreatment for P+ve/EP (with Lfx)	6	2.45
Previous Treatment History		
No	238	97.14
Yes	6	2.45
Treatment outcome		
Cured	130	53.06
Died	11	4.49
Failed	11	4.49
Lost to follow up	25	10.20
Not evaluated	3	1.22
On treatment	15	6.12
Transferred out	19	7.76
Treatment completed	24	9.80
Waiting to start treatment	7	2.86

Treatment outcome:

The frequency distribution table (Table-1) shows that the majority (53.06%, n=130) of the patients were cured, 9.80% (n=24) were completed treatment, 4.49% (n=11) were died, 4.49% (n=11) were failed, 10.20% (n=25) were lost to follow-up, 1.22% (n=3) were not evaluated, 7.76% (n=19) were transferred out (transferred to another health facility), 2.86% (n=7) were waiting to start treatment, and 6.12% (n=15) were on treatment. As age of patient increased, the trend of treatment completion showed a decreasing pattern while death rate showed an increasing pattern. The death rate is higher (n=11) among the male patients compare to the female patients.

IV. DISCUSSION

Recent studies on tuberculosis control in Prisons stated that the barriers to tackling TB in prisons are complex and linked strongly to other aspects of both the health and criminal justice system, and with the cultural, historical and economic situation of each country (10).

Our study revealed that the treatment success rate in all patients is 62.86% (n=154) as combined with cured and treatment completed. Conversely, the treatment unsuccess rate which is 37.14% (n=91) combined with died, lost to follow-ups, transferred out and not evaluated. The data suggest that pulmonary case findings are greater than extra-pulmonary this may happen due to the efficiency and commitment of the prison health workers or responsible authorities to implement systematic and effective TB-control strategies (5).

V. CONCLUSION & RECOMENDATION

Results suggest that younger age and male gender may be independent risk factors for tuberculosis in prisons. National tuberculosis control programs may target to improve screening of all new prisoners before admiring, service scope, laboratory capacity and quality in the health centers as well as implementing appropriate interventions immediately. The NTP can also focus on monitoring, evaluation, data pertaining to the baseline characteristics, and the real time data collection can improve the TB program performance in prisons.

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2. Nations U. Sustainable Development Goal 3. Available from: https://sdgs.un.org/goals/goal3

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9. Yohanes A, Abera S, Ali S. Smear positive pulmonary tuberculosis among suspected patients attending metehara sugar factory hospital; eastern Ethiopia. Afr Health Sci. 2012;12(3):325–30.

10. Dara M, Acosta CD, Melchers NVSV, Al-Darraji HAA, Chorgoliani D, Reyes H, et al. Tuberculosis control in prisons: Current situation and research gaps. Int J Infect Dis [Internet]. 2015;32:111–7. Available from: http://dx.doi.org/10.1016/j.ijid.2014.12.029

Appendix: Dossier of Julhas Sujan

MOHAMMAD JULHAS SUJAN

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Degree with Major	Full Name of Institution	Duration	Result
Master's of Public Health	North South University (NSU), Dhaka, Bangladesh	2020-2021	Appeared
B.Sc in Computer Science and Engineering	Pabna University of Science and Technology, Bangladesh.	2009-2013	CGPA 3.81/4.00 (1st Class 2nd Position)
Higher Secondary School Certificate (HSC), Science Group	Badalgachi Govt. College, Naogaon, Dhaka, Bangladesh	2007-2008	GPA 5.00 (out of 5.00)
Secondary School Certificate (SSC), Science Group	Begun Joar High School, Badalgachi, Naogaon, Dhaka, Bangladesh	2001-2006	GPA 5.00 (out of 5.00)

PROFESSIONAL EXPERIENCE

Total experience: 8 years
Organization: International Vaccine Institute, CAPTURA Project, South Korea (https://www.ivi.int)
Position: Bangladesh Country Coordinator
Duration: April 2020 - Present
Working partners: MoHFW, DGHS, CDC, IEDCR, DGDA, WHO, ICDDR'B, USAID-MTaPS, Public and Private Medical Colleges, Universities, Hospitals and Diagnostics Centers, Fleming Fund Partners, DAI, Big Data Institute, University of Oxford, Public Health Surveillance Group-USA, Brigham's and Women's Hospitals-USA (WHONET).
Focus Working Areas:
1. CAPTURA project in Bangladesh, coordinating and supporting activities necessary for the successful set up and conduct of the project in accordance with the overall CAPTURA project outline and Bangladesh's Country Implementation Plan (CIP).
    a. Facilitating in obtaining in-country approvals and/or data transfer agreement (DTA) for signing between the IVI on behalf of the consortium and relevant authorities in Bangladesh.
    b) Engagement with stakeholders: Closely engaging with MoH, DGHS, CDC, IEDCR, DGDA, Public and Private Hospitals, Medical Schools, Pharmacies, Professional

Scientific Associations and International Organizations including WHO icddr,b, and other Fleming Fund grantee on behalf of the CAPTURA consortium, following up on activities and communications in the country.

c) Lead and coordinate in-country facility assessment and grading activities, data collection and cleaning for CAPTURA in close cooperation with the IVI's Biostatistics & Data Management team and other consortium partners as required.

d) Training: participate and assist in conducting training of local in-country staffs as required

e) Coordinate and hire local field staff in collaboration with CAPTURA project team as deemed necessary for the successful conduct of the project

2. Participate in regional and in-country activities including workshops, trainings, data collection and other relevant follow up visits and communicating with consortium partners and funders and other relevant stakeholders as necessary

3. Participate in telephone, Skype or in-person conference calls or meetings with CAPTURA team as appropriate.

4. Travel to field sites as required for the success of the project

5. Provide periodic updates on project progress to International Vaccine Institute/Point of Contact/Project Lead

6. Project risk identification and coordination for mitigation of unforeseen events if any encountered during the project period.

7. DHIS2-WHONET Interoperability application development with WHONET team.

8. Web based integrated AMR surveillance system development for the Directorate General of Health Services.

9. Interoperability development with existing AMR surveillance system.

Organization: Department of Informatics, University of Oslo, Norway (http://www.uio.no/english/)
Position: DHIS2 Developer
Duration: September 2017 to January 2020
Working partners: MIS-DGHS Bangladesh, UNICEF, HISP India, HISP Bangladesh, Ministry of Health-Indonesia, Ministry of Heath-Palestine

Organization: Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program, Management Sciences for Health (MSH), USAID, Dhaka, Bangladesh (https://www.msh.org)
Position: Senior Java Programmer
Working partners: MIS-DGHS, DGFP, DGDA, NTP, UNICEF, Save the Children
Duration: May-2015 to September-2017

Organization: Infosys Limited, MySore, India (www.infosys.com)
Position: In service training on "Enterprise Application Development Using Java and Oracle"
Duration: January 2015-April 2015

Organization: Bashundhara Group, Dhaka (www.bashundharagroup.com)
Position: Software Developer
Duration: December 2013-December 2014

Organization: Dhrubok Infotech (www.dhrubokinfotech.com)
Position: Web Application Developer
Duration: June 2013-November 2013

- **Programming Language** : Java, PHP, Node JS
- Web Technology : React JS, Express JS, Object Oriented PHP, Laravel-5, JavaScript, AJAX, XML, JSON, HTML5, CSS3, Bootstrap, Wordpress, SEO, MySQL, PostgreSQL, UX/UI Design and Development, Wireframe and MocUp Design for website and application, REST API, Webpack, Babel, SASS, Git, Mapbox, Leaflet JS, Microservices using Node JS.
- **Java Technology** : Java, JSP, JSF, UI Component, Usecase and Sequence Diagram, PMD, Exceptions, Log4J, Collection Framework, JSON, XML, Hibernet, Servlet, jUnit Testing, Oracle, JPA, ORM, JPSQL, Query API, ANT.
- **ERP Software's** : SAP ABAP, ISPERP.
- **Frameworks** : JSF, PHP Laravel, Twitter Bootstrap, React JS
- **Database** : Oracle, MySQL, Postgresql
- **Open Source Platform** : DHIS2, OpenMRS, OpenELIS, SHR, RHIS, D2LMIS
- **New Technologies** : Blockchain, Bigchain DB
- **Server administration** : Apache Tomcat, Linux, Digital Ocean, Name Cheap, Hostgator as well as shared server

DEVELOPED PROJECTS

- ➢ Interoperability between WHONET Antimicrobial Resistance (AMR) and DHIS2
- ➢ DHIS2 TB Tracker and Custom Application Development
- ➢ DHIS2 Implementation for Activity Tracking including budgeting and expenditure
- ➢ DHIS2 User's Activity Capture and Research App
- ➢ DHIS2 Validation Results App
- ➢ Master Health Facility List (MFL) Map Visualization
- ➢ Facility Registry Interoperability App in DHIS2
- ➢ DHIS2 Middleware Apps
- ➢ Routine Health Information System (RHIS) for the Ministry of Health and Family Welfare, Bangladesh
- ➢ Khulna Shishu Hospital Automation System
- ➢ Interoperability between RHIS and DHIS2

- ➢ Nationwide supply chain development (eLMIS) for DGHS, MoHFW, Bangladesh
- ➢ Interoperability between Electronic Tuberculosis Manager (e-TB Manager) and DHIS2

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PROFESSIONAL TRAINING

- ❖ Building Microservices with Node.js
- ❖ Blockchain Programming using Node JS
- ❖ Web Apps Development using React and Redux Framework
- ❖ DHIS2 Web Apps Development
- ❖ Procurement and Supply Chain Management
- ❖ Java Spring Framework
- ❖ Enterprise Application Development using Java & Oracle
- ❖ PHP and MySQL

NATIONAL & INTERNATIONAL ACADEMY

- ❖ Poster Presentation at the Annual Conference, Public Health Association Bangladesh, September 2021
- ❖ DHIS2 Global Digital Conference, University of Oslo, Norway, July 2021
- ❖ Conference on AMR Data Management in Animal Health Sector, DAI, Fleming Fund Country Project, UKAID, March 2021
- ❖ Webinar | Evidence to Action: Advancing the Antimicrobial Resistance Agenda during a Pandemic, Co-hosted by the International Vaccine Institute (IVI), International Centre for Antimicrobial Resistance Solutions (ICARS), Embassy of Denmark in Korea, December 2020
- ❖ DHIS2 Symposium, BAO System, Washington DC, USA, April 2020
- ❖ APNIC Asia-2019
  Institution: JBRSOFT
  Location: Thailand
- ❖ DHIS2 Expert Academy-2018
  Institution: Department of Informatics, University of Oslo
  Location: Oslo, Norway
- ❖ Asia Electronic Health Informatics Network, AeHIN-2019
  Institution: HISP Sri Lanka
  Location: Colombo, Sri Lanka
- ❖ Assessment and Interoperability Visualization of DHIS2-2019
  Institution: University of Oslo, Ministry of Health, Indonesia
  Location: Central Jakarta, Indonesia
- ❖ CEBIT Asia-2019
  Institution: Bangladesh Hi-Tech Park Authority
  Location: Bangkok, Thailand
- ❖ DHIS2 Level-1 Academy
  Institution: HISP Bangladesh and Ministry of Health
  Location: Dhaka, Bangladesh

❖ DHIS2 Level-2 Academy-2017
  Institution: University of Oslo and HISP Tanzania
  Location: Dar-es Salaam, Tanzania

PROFESSIONAL CERTIFICATE

❖ DHIS2 Experts Academy-2018: For presenting at the Experts Academy in June 2018 in Oslo, Norway. The presentation topic was from a successfully chosen abstract following a competitive review process.
❖ DHIS2 Web Apps development, Dar es Salaam, Tanzania, November-2017
❖ ZEND Certification, Yellow page: http://www.zend.com/en/yellow-pages/ZEND026171
❖ Enterprise Application Development Using Java Certification, Infosys Limited, India

PERSONAL DOSSIER

Date of Birth   : 10-10-1990
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REFERENCES

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