Summer Internship Report

Department of Health and Family Welfare

(NHM Punjab)

(April 29th to June 28th, 2024)

A report by

Dr. Princy Khandelwal

IIHMR DELHI

Approved.

State Programme Officer NTEP
State Health Society-NTEP, Punjab
Directorate of Health & Family Welfare, Punjab
Room No. 315, 2nd Floor,
Parivar Kalyan Bhawan
Sector 34-A, Chandigarh

PGDM (Hospital and Health Management)

2023-25

International Institute of Health Management Research,New Delhi

CERTIFICATE OF COMPLETION

THIS IS TO CERTIFY THAT

.....Dr. Princy Khandelwal.....

has completed internship under the guidance of State Programme Officer - NTEP, SHQ.....
under National Health Mission for analysis of pre-existing comorbidities in diagnosed tuberculosis Patients
from date.....29th April 2024..... to ....28th June 2024.....

We found him/her sincere, hardworking, dedicated and result oriented.

He/She worked well as a part of the team during his/her tenure.

National Health Mission Punjab wish him/her all the best for the future endeavors.

Mission Director
National Health Mission , Punjab

Certificate of Approval

The Summer Internship Project of titled **"Study of Pre-existing Comorbidities in Patients Diagnosed with Tuberculosis: A Secondary Analysis"** at **"NHM Punjab"** is hereby Approved as a certified study in management carried out and presented in a manner satisfactorily to Warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed, or conclusion drawn therein but approve the report only for the purpose it is submitted.

Dr. Aggarwal

Name of the Mentor - Dr. Divya Aggarwal
Designation - Associate Professor
IIHMR, Delhi

FEEDBACK FORM

(Organization Supervisor)

Name of the Student: Dr. Princy Khardelwal

Summer Internship Institution: Department of Health and Family Welfare, Punjab, Chandigarh NHM Punjab.

Area of Summer Internship:

National Tuberculosis Elimination Programme (NTEP).

Attendance:

100%

Objectives met:

All given/assigned work completed on time.

Deliverables:

Conducted analysis of pre-existing comorbidities in diagnosed Tuberculosis patients.

Strengths:

Knowledgeable, good analytical skills, resilient, prefers to give attention to details. Keen to learn new things and has positive approach.

Suggestions for Improvement:

- Keep up with technological advancements.
- Read more about govt. Health Programme and protocols.

Signature of the Officer-in-Charge (Internship)

Rajesh Bhaskar
4/7/24

State Programme Officer NTEP
State Health Society-NTEP, Punjab
Directorate of Health & Family Welfare, Punjab
Room No. 315, 2nd Floor,
Parivar Kalyan Bhawan
Sector 34-A, Chandigarh

Date: 4/07/24

Place:

Department of Health & family welfare, Punjab Chandigarh.

FEEDBACK FORM

(IIHMR MENTOR)

Name of the Student: Dr. Princy Khardelwal

Summer Internship Institution: National Health Mission, Punjab

Area of Summer Internship: National Tuberculosis Elimination Program (NTEP)

Attendance: 100%

Objectives met: Yes

Deliverables: Complete the task assigned by organization on time. Weekly report

Strengths: Hardworking and scientific approach.

Suggestions for Improvement: —

Signature of the Officer-in-Charge (Internship)

Date: 10/07/24
Place: DELHI

Summer Internship Report

Department of Health and Family Welfare

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Dr. Princy Khandelwal

PGDM (Hospital and Health Management)

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ACKNOWLEDGEMENT

I am deeply grateful **Dr. Abhinav Trikha, MD at NHM Punjab**, for the opportunity to complete my summer internship at the **Department of Health and Family Welfare (NHM Punjab)**, Chandigarh. This experience has been both enriching and inspiring, and I owe its success to several individuals who have guided and supported me throughout this journey.

First and foremost, I would like to express my heartfelt gratitude to **Dr. Rajesh Bhaskar (State Program Officer), Dr. Vasudha (Medical Officer, National Tuberculosis Elimination Programme) and Dr. Manhardeep Kaur (Medical Officer, Immunization)**. Their exceptional guidance and mentorship over the past two months have been invaluable. Their dedication, expertise, and encouragement made my internship journey both easy and fruitful.

I am also immensely thankful to **Dr. Divya Aggarwal, Professor at IIHMR Delhi, who is my mentor**. Her constant support, insights, and encouragement have been crucial in helping me navigate and make the most of this experience.

A special thanks to **Dr. Pooja, Consultant WHO at NHM Punjab**, for his seamless coordination and assistance, which ensured a smooth and productive internship.

I am deeply grateful to **Dr. Meenu Lakhanpal, Consultant HR at NHM Punjab**, who has given this chance to work and grab knowledge about health programmes working and implementation in different domains of NTEP, in the state of Punjab.

Finally, I would like to thank IIHMR Delhi for providing me with the opportunity to intern at NHM Punjab. This platform has allowed me to gain invaluable practical experience and insights into the healthcare sector.

Thank you all for making this internship a truly memorable and educational experience.

Dr. Princy Khandelwal

TABLE OF CONTENT

ABBREVIATIONS

S.No.	Abbreviation	Full form
1.	NTEP	National Tuberculosis Elimination Program
2.	RNTCP	Revised National Tuberculosis Control Programme
3.	TB	Tuberculosis
4.	DOTS	Directly Observed Treatment, Short-course
5.	WHO	World Health Organisation
6.	HIV	Human Immunodeficiency Virus
7.	MoHFW	Ministry of Health and Family Welfare
8.	CTD	Central TB Division
9.	STO	State TB Officer
10.	DTC	District TB Centre
11.	DTO	District TB Officer
12.	TUs	TB Units
13.	DMCs	Designated Microscopy Centres
14.	HCW	HealthCare Worker
15.	UT	Union Territory
16.	DBT	Direct Benefit Transfer
17.	ASHA	Accredited Social Health Activist
18.	CHO	Community Health Officer
19.	NGO	Non-Governmental Organization
20.	BMI	Body Mass Index
21.	MUAC	Mid-Upper Arm Circumference
22.	OPD	Out-Patient Department
23.	IPD	In-patient Department
24.	DCM	Differentiated TB Care Model
25.	RBS	Random Blood Sugar
26.	WBC	White Blood Cell
27.	SGPT	Serum Glutamic Pyruvic Transaminase
28.	BP	Blood Pressure
29.	ART	Anti-Retroviral Therapy

GLOSSARY

S. No.	Terms	Definition
1.	Temperature	A measure of the body's warmth or heat, typically assessed to detect fever or hypothermia. The normal body temperature ranges from 97°F-99°F (36.1°C to 37.2°C).
2.	Pulse Rate	The number of heart beats per minute, with normal values typically ranging from 60-100 beats per minute in adults.
3.	Blood Pressure	The force exerted by circulating blood on the walls of blood vessels, with normal values typically around 120/90 mmHg for adults.
4.	Respiratory Rate	The number of breaths taken per minute, with normal values typically ranging from 12-18 breaths per minute in adults.
5.	Oxygen Saturation	The percentage of oxygen in the blood, with normal values typically ranging from 95%-100%.
6.	BMI (Body Mass Index)	A measure of body fat based on height and weight, with normal values typically ranging from 18.5 to 24.9kg/m^2.
7.	MUAC (Mid-Upper Arm Circumference)	A measurement of the arm's circumference used to assess nutritional status, with normal values typically above and equal to 19cm.
8.	Pedal Oedema	Swelling of the feet and ankles due to fluid retention, often associated with

		conditions like heart failure or kidney disease.
9.	General Condition of Patients	The overall health status and well-being of a patient, often assessed to determine the severity of illness.
10.	Icterus	Yellowing of the skin and eyes due to high levels of bilirubin in the blood.
11.	Haemoglobin	A protein in red blood cells that carries oxygen, with normal levels typically ranging from 12.3-17g/dL in men and 9.9-14.3 g/dL in women
12.	WBC (White Blood Cells)	Cells in the blood that fight infection, with normal values typically ranging from 4,000-11,000 cells per microliter.
13.	RBS (Random Blood Sugar)	A test measuring blood glucose levels at any time, with normal values from 79-140 mg/dL.
14.	HIV (Human Immunodeficiency Virus)	A virus that attacks the immune system, with positive or negative results indicating presence or absence of the infection
15.	Chest X-Ray	An imaging test used to view the lungs and chest cavity, assessing conditions like consolidation, hydropneumothorax.
16.	Haemoptysis	Coughing up blood, which may indicate a respiratory condition such as tuberculosis.
17.	Serum Creatinine	A waste product in the blood that indicates kidney function, with normal values typically ranging from 0.6-1.2 mg/dL.

18.	Serum Bilirubin	A substance in the blood that can indicate liver function, with normal values typically ranging from 0.3-1.2 mg/dL.
19.	SGPT (Serum Glutamic-Pyruvic Transaminase)	An enzyme in the blood that indicates liver health, with normal values typically ranging from 7-60 U/L.
20.	OPD (Outpatient Department)	A medical facility where patients receive care without being admitted to the hospital.
21.	IPD (Inpatient Department)	A medical facility where patients are admitted and stay overnight or longer for treatment.

OBSERVATIONAL LEARNING

Introduction

National Tuberculosis Elimination Program (NTEP) was initially launched as the Revised National Tuberculosis Control Programme (RNTCP) in 1997. It was rebranded in 2020 to reflect its intensified efforts to eliminate TB by 2025. The program is grounded in the **Directly Observed Treatment, Short-course (DOTS)** strategy recommended by the World Health Organization. This approach ensures patients adhere to their treatment regimens through direct supervision, which is crucial for curing TB and preventing drug resistance.

The primary goal of NTEP is to achieve a **TB-free India by 2025**. The objectives include reducing TB incidence and mortality, ensuring universal access to TB care, and preventing the emergence of drug-resistant TB.

The program ensures the availability of free, quality-assured anti-TB drugs and treatment regimens to all TB patients. The program conducts extensive awareness campaigns to educate the public about TB symptoms, transmission, and the importance of completing treatment. This helps in early detection and reduces stigma associated with the disease.

NTEP collaborates with various stakeholders, including government agencies, non-governmental organizations, international partners, and the private sector. This multi-sectoral approach ensures comprehensive coverage and resource mobilization. The program prioritizes reaching vulnerable and high-risk populations, such as people living with HIV, children, and those in underserved areas. Special initiatives are designed to address the unique needs of these groups.

The program works on policy advocacy to ensure sustained political commitment and adequate funding for TB elimination efforts. It also engages with lawmakers to strengthen TB-related policies and legislation.

Objectives

- To understand program structure and comprehensive knowledge of NTEP organisational structure at various levels.
- To understand the Differentiated TB care model and how patient entries are recorded in the NIkshay Portal.

- To comprehend the necessity of the Ni-kshay Poshan Yojana for TB patients.
- To understand the necessity of assigning a family caregiver for individuals affected by TB.

Methods of Data Collection

All the data have been collected from Central TB Division Portal and shared by WHO Consultant.

Findings

Organizational Structure for the National Tuberculosis Elimination Program (NTEP)

1. **Central Level**

- **Ministry of Health and Family Welfare (MoHFW)**
  - The apex body responsible for overall policy formulation, planning, and coordination of NTEP.
- **Central TB Division (CTD)**
  - Oversees program implementation, formulates guidelines, provides technical support, and monitors performance.

2. **State Level**

- **State TB Cell**
  - Implements NTEP activities at the state level, coordinating between central and district levels.
- **State TB Officer (STO)**
  - Heads the State TB Cell, responsible for planning, execution, and monitoring of TB control activities.

3. **District Level**

- **District TB Centre (DTC)**
  - Primary unit for implementing NTEP at the district level, providing technical and managerial support.

- **District TB Officer (DTO)**
    - Oversees TB control activities at the district level.

4. **Sub-District/Peripheral Level**

- **TB Units (TUs)**
    - Cover a population of approximately 500,000, responsible for diagnosing and treating TB patients.
- **Designated Microscopy Centres (DMCs)**
    - Facilities for sputum smear microscopy for TB diagnosis, usually located within health centres.
- **Treatment Supporters and Health Workers**
    - Provide directly observed treatment and support adherence at the grassroots level.

Differentiated TB Care module in Ni-kshay

All the TB patients being reported to the National TB program and notified on Nikshay need to be followed up and counselled by HealthCare worker (HCW). As the number of HCW are limited and the number of patients is growing, it becomes essential to prioritize the TB patients to be followed up. The form would be available in Ni-kshay Reports under "Patient Management Form" tab. The access to the form is available for all States/UT.

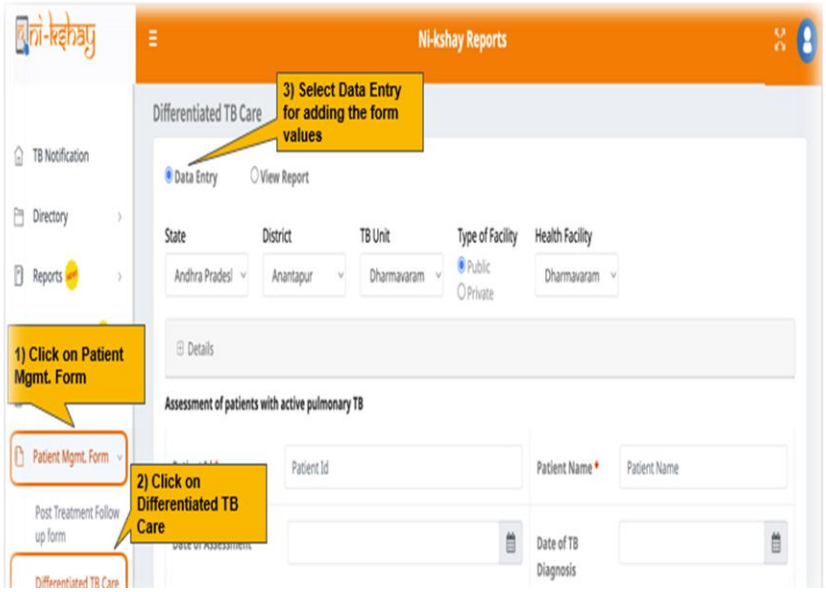


Figure 1: Steps to upload patient data on Ni-kshay portal

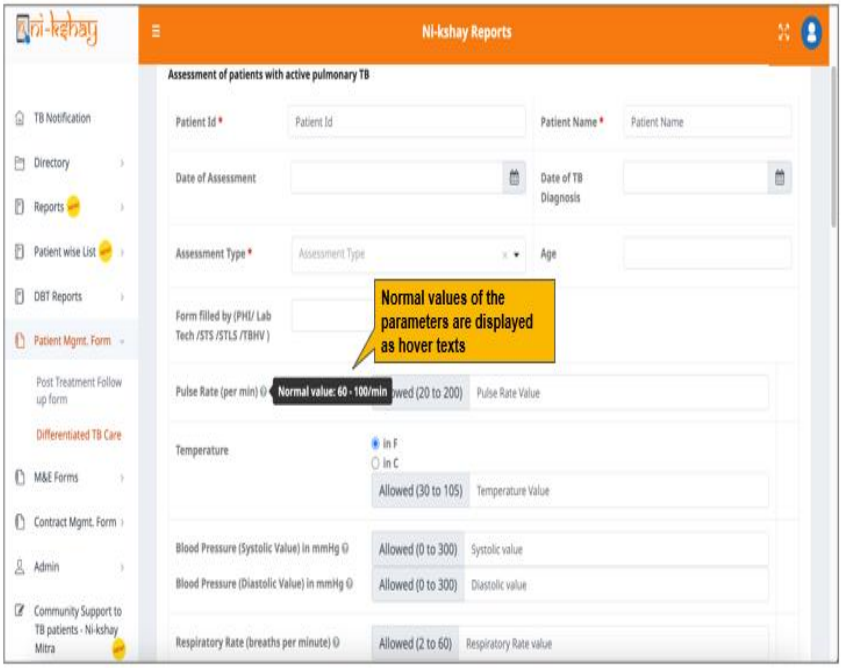


Figure 2: Showing normal values for the indicators

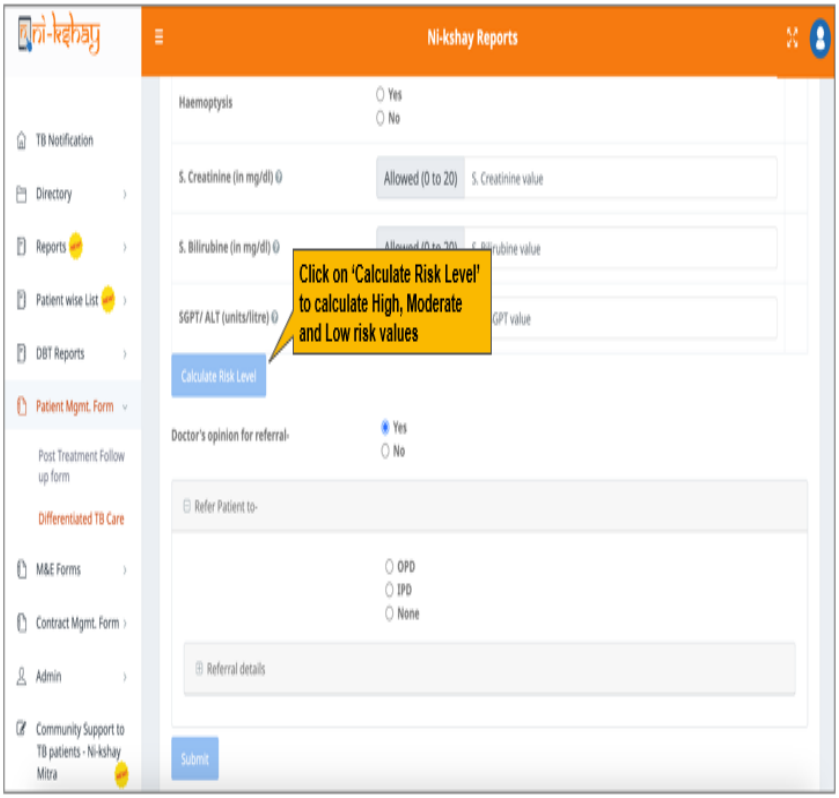


Figure 4: Auto-indication of patient Risk Level

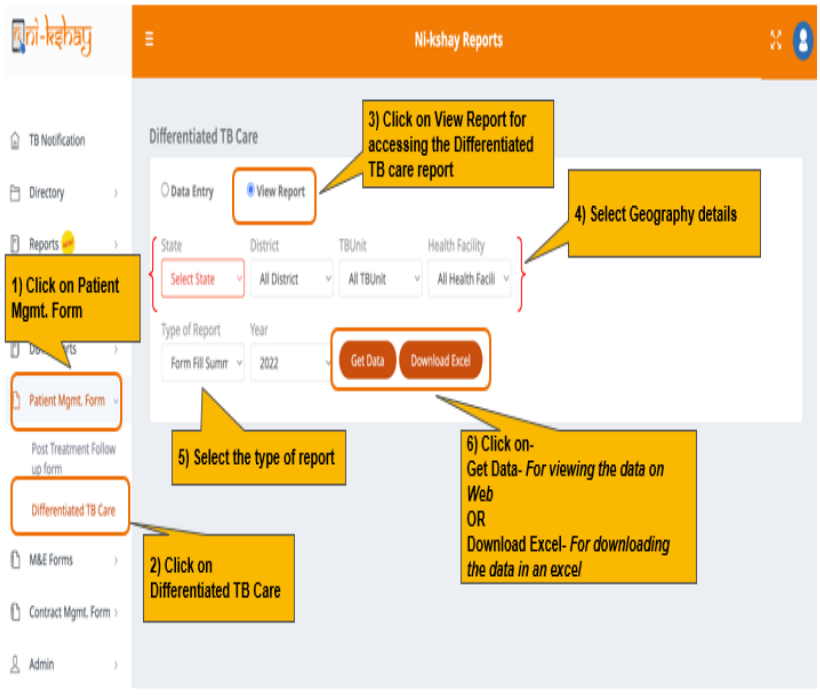


Figure 3: Showing how to download "Differentiated TB Care Report"

Ni-kshay Poshan Yojana – "Eat a nutritious and healthy diet to fight with TB"

- Financial incentive of Rs. 500/- per month for each notified TB patient for purchasing nutritious food throughout their treatment for ensuring that TB patients have access to nutritious food which is vital for their recovery and overall well-being.
- Incentives are distributed via DBT (Direct Benefit Transfer).
- Patients can get help registering for the Ni-kshay Poshan Yojana from an ASHA worker, a Community Health Officer (CHO), or another healthcare provider.
- For those living in tribal, hilly, or difficult-to-reach areas, the program also provides a one-time assistance payment of 750 rupees. This amount helps cover travel costs for both the patient and their attendant, ensuring they can access necessary care and support.

Necessity of Assigning a Family Caregiver for Individuals Affected by TB

Assigning a family caregiver to individuals affected by TB is essential for their holistic care and recovery. A family caregiver acts as the primary caretaker, offering crucial physical and emotional support throughout the patient's treatment journey. This caregiver not only provides home-based care, ensuring that the patient adheres to their medication regimen, but also creates a nurturing and supportive environment. This loving presence is vital for the patient's early recovery and overall well-being, making them feel valued and cared for in the comfort of their own home.

Who Can Be a Family Caregiver for Persons Affected with TB? - A family caregiver should be someone who is willing to take on the responsibility of caring for the TB patient and has given their consent to do so. Ideally, this caregiver should be above 14 years of age and be able to stay with the patient most of the time, ensuring constant support and supervision. This close-knit care fosters a sense of security and belonging, significantly contributing to the patient's recovery and mental health.

Conclusion

The National Tuberculosis Elimination Program (NTEP) plays a critical role in the fight against TB in India. Through its comprehensive strategy, which includes engaging family caregivers, the program ensures that TB patients receive the necessary physical and emotional support to adhere to treatment regimens. The inclusion of family caregivers not only aids in patient recovery but also helps mitigate stigma and provides a cost-effective

solution to TB care. By involving various stakeholders and employing a robust monitoring system, NTEP aims to achieve its goal of a TB-free India by 2025.

Limitations

- Stigma and Social Barriers - Despite efforts to reduce stigma, cultural and social barriers may still prevent some patients from receiving adequate support.
- Economic Factors - Financial constraints can limit the ability of families to provide necessary care and support, even with government incentives.
- Data and Monitoring Challenges - Ensuring accurate and timely data collection for monitoring and evaluation can be difficult, impacting the program's effectiveness.

General Recommendations

- Develop comprehensive training modules for family caregivers to ensure they are well-equipped to support TB patients.
- Implement strategies to enhance accessibility of TB care services in remote and underserved regions.
- Continue extensive awareness campaigns to educate the public about TB and reduce associated stigma.
- Utilize digital tools for real-time data collection and monitoring to improve the program's responsiveness and efficiency.
- Strengthen collaborations with government agencies, NGOs, and the private sector to mobilize resources and extend the program's reach.

TITLE OF RESEARCH

Study of Pre-existing Comorbidities in Patients Diagnosed with Tuberculosis: A Secondary Analysis

INTRODUCTION

TB is a worldwide disease and the top cause of death from infectious diseases globally. Until the mid-19th century, it was thought to be untreatable (Aditi, 2020). The majority of these deaths occur in patients who are not co-infected with human immunodeficiency virus (HIV), making M. tuberculosis the single organism responsible for the highest number of deaths globally. Furthermore, TB is one of the top ten leading causes of death worldwide. (Jacob & Paul, 2000).

On November 7th, the World Health Organization released its Global TB Report 2023, highlighting India's progress in TB case detection and recovery from COVID-19 setbacks. The report shows that treatment coverage in India has reached 80% of estimated TB cases, a 19% increase from the previous year. From 2015 to 2022, TB incidence in India decreased by 16%, almost double the global decline of 8.7%. TB mortality in India also fell by 18% during this period, following the global trend. The WHO revised its TB mortality estimates for India from 494,000 in 2021 to 331,000 in 2022, a significant 34% drop. (WHO Acknowledges India’s Success in Declining TB Incidence by 16% and TB Mortality Reduction by 18% Since 2015, n.d.)

According to the TB India report, the national death rate from tuberculosis is 4.4%, whereas Punjab's state death rate is 5%. (SHRI V.K. SREEKANDAN, 2021)

India accounts for 37% of global TB mortality, yet the focus is often on TB incidence rather than mortality. Co-morbid conditions significantly contribute to both morbidity and mortality. (Vikaspedia Domains, n.d.)

To decrease TB deaths in resource-limited areas, a differentiated care approach can triage patients at high risk of severe illness (such as those with severe undernutrition, respiratory insufficiency, or inability to stand unaided) at diagnosis, referring them for thorough assessment and inpatient care. (Shewade et al., 2023)

The National TB Elimination Program has launched crucial initiatives to reduce TB mortality in India. One notable effort is the implementation of the "Comprehensive Package

for Differentiated Care of TB Patients" by the Central TB Division. This package focuses on early detection, assessing severely ill patients, and improving outcomes for TB patients at various health facilities across the state under a differentiated TB care approach. In Punjab, the DCM Model was inaugurated by the esteemed Secretary of Health and MD of NHM on December 21, 2023, during the State Review and Workshop for DTOs. ("Roll Out of Differentiated TB Care Model in the State Aimed at Reducing TB Deaths Under NTEP.," n.d.)

("DIFFERENTIATED TB CARE MANAGEMENT," n.d.) Under this initiative patient's assessment is done on the basis of some indicators:

Clinical Examination

- Vital parameter – Temperature, Pulse Rate, Blood Pressure
- Respiratory Rate
- Oxygen Saturation
- Icterus
- Oedema
- General condition: bedridden /ambulatory, conscious /drowsy

Laboratory Investigation

- Haemoglobin levels
- Complete blood count (Total Count, Differential Count, Platelet Count)
- HIV
- Random Blood Sugar
- SGPT
- S. Creatinine
- S. Bilirubin

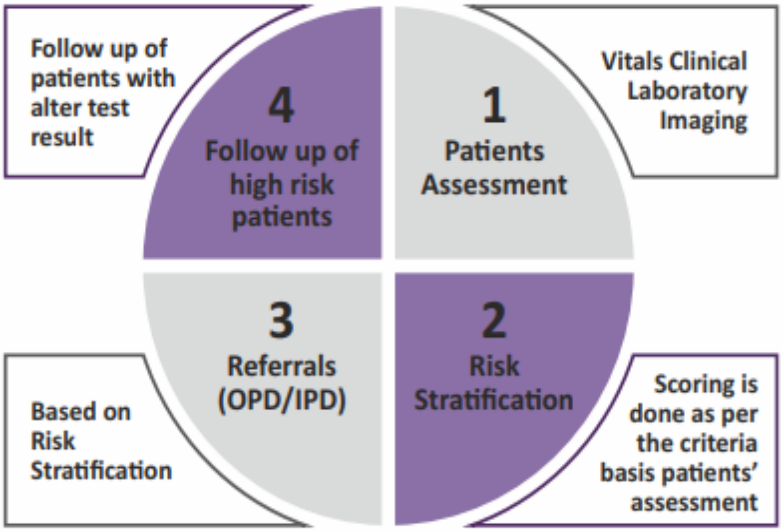
Imaging

- Chest X-ray

Nutritional Assessment

- BMI
- MUAC

Intervention Workflow of this initiative:



RATIONALE FOR STUDY

The prevalence of pre-existing comorbidities in patients diagnosed with tuberculosis (TB) as a secondary analysis. Comorbidities such as HIV, diabetes, chronic liver disease, and malnutrition are prevalent among TB patients and can significantly affect their immune response and overall health. By analysing the prevalence of these conditions in TB patients, healthcare providers can better anticipate complications and tailor treatment plans to address multiple health issues concurrently. Identifying and managing comorbidities effectively can lead to improved TB treatment outcomes, reduced mortality rates, and enhanced quality of life for patients. This study will benefit TB programs and patients by optimizing the differentiated TB care model, which emphasizes patient-centred care and tailored interventions, through the integration of strategies for managing comorbidities. This approach will enable healthcare providers to deliver more comprehensive and effective care, ultimately improving treatment outcomes and patient well-being.

REVIEW OF LITERATURE

A cohort study conducted in South India in 2018 identified several risk factors contributing to unfavorable outcomes among TB patients. The study revealed that TB patients with multiple risk factors had a significantly higher risk of death (Adjusted Odds Ratio [AOR]: 4.19; 95% Confidence Interval [CI]: 2.47-7.11) and unfavorable outcomes (AOR: 2.21; 95% CI: 1.56-3.12) compared to those with no identified risks. Patients with a single risk factor also faced an increased risk of death (AOR: 3.28; 95% CI: 2.11-5.10) and unfavorable outcomes (AOR: 1.71; 95% CI: 1.29-2.26). Additionally, the study found higher odds of death and unfavorable outcomes among males with lower education levels, under nutrition (initial weight below the national median), co-existing HIV infection, previous TB treatment, drug-resistant TB, and regular alcohol use. For patients over 60 years old, the risk of death was also elevated. (Washington et al., 2020)

A cohort study conducted in Malaysia from 2014 to 2017 examined the determinants of unsuccessful outcomes and mortality among tuberculosis patients. The study found that various social and clinical factors were associated with unfavourable TB treatment outcomes and deaths. These factors included older age, being male, foreign nationality, living in urban areas, lower education levels, passive TB case detection, absence of a Bacilli Calmette-Guerin (BCG) scar, underlying diabetes mellitus, smoking, extra pulmonary TB,

previous TB treatment history, advanced chest radiography findings, and HIV infection. (Tok et al., 2020)

A 2021 study in Gujarat titled "Screening Adults with Tuberculosis for Severe Illness at Notification: Program Experience from Gujarat, India" revealed that many deaths occurred early in treatment. This was primarily due to delays in conducting comprehensive assessments of severely ill patients over the age of 15, highlighting diagnostic and clinical capacity gaps in peripheral health institutes (PHIs). (Patel et al., 2022)

OBJECTIVES OF THE STUDY

- **PRIMARY OBJECTIVE**
- To study various health indicators such as respiratory rate, blood pressure, oxygen saturation, X-ray, BMI, HIV and general condition among TB patients.
- **SECONDARY OBJECTIVE**
- To determine the proportion of patients requiring IPD referrals after examination.

MATERIALS AND METHODS

- **STUDY DESIGN**
    - Analysing secondary data from the “Differentiated TB Care Report” accessed through the Ni-kshay Portal in Punjab, covering the period from January to June 2024.
- **STUDY SETTING**
    - Punjab has a population of 31,623,274 people which is divided into 23 administrative districts.

- **STUDY DURATION**
    - The study is planned to be completed in 2 months.
- **STUDY POPULATION**
    - Diagnosed TB patients who are assessed using various indicators under the Differentiated Care Model (DCM) to identify any comorbidities that could influence the severity of TB.
- **STUDY SAMPLE**
    - Data collected from patients assessed under the Differentiated Care Model (DCM) at various health facilities in Punjab, including 23 District Hospitals, 41 Sub-District Hospitals, 162 Community Health Centres, and 522 Public Health Centres. This data has been compiled on the Ni-kshay Portal under the Patient Management Forum.

SELECTION CRITERIA

- **INCLUSION CRITERIA**
    - Diagnosed TB patients who are assessed using various indicators under the Differentiated Care Model (DCM) to identify any comorbidities that could influence the severity of TB.
    - Patients were the residents of Punjab.
- **EXCLUSION CRITERIA**
    - Incomplete data
- **METHOD OF SAMPLING**
    - Data set
- **STUDY VARIABLES**
    - We have 18 study variables:

        1. Pulse Rate
        2. Temperature
        3. Blood Pressure
        4. Oxygen Saturation Level
        5. BMI
        6. MUAC
        7. HIV Status
        8. Serum Creatinine

9. Serum Bilirubin
10. Hemoglobin
11. RBS
12. WBC Count
13. Pedal Edema
14. General Condition of patient
15. Icterus
16. Chest X-Ray
17. Hemoptysis
18. SGPT

METHOD OF DATA COLLECTION AND THE TOOL

We obtained data from the Ni-kshay Portal in Punjab, encompassing the period from January to June 2024. The data was collected from districts where patient triaging was conducted at District Hospitals (DH), Sub-District Hospitals (SDH), Primary Health Centres (PHCs), and Community Health Centres (CHCs) across Punjab during this timeframe. The information was organized into a structured spreadsheet, which is available as extended data.

DATA MANAGEMENT PLAN

- DATA COMPILATION - All the data that has been obtained from district hospitals has compiled and entered in Excel.
- DATA CLEANING - The data then cleaned by removing incorrect, corrupted, and incorrectly formatted, duplicate or incomplete data.
- The clean data then analysed using Excel functions and percentage change was determined for each objective.
- Our result has been expressed in the form of frequencies and percentages.

ANALYSIS AND RESULTS

To analyze trends and prevalence of comorbidities among TB-diagnosed patients across different districts of Punjab, various indicators were examined such as pulse rate, temperature, blood pressure, oxygen saturation, BMI, MUAC, HIV status, serum creatinine, serum bilirubin, hemoglobin, RBS, WBC count, pedal edema, general condition,

icterus, chest X-ray, hemoptysis, and SGPT. This analysis will provide insights into the severity of TB.

No. of patients assessed in each Districts

- Data from 17 districts was analyzed, revealing a total of 1,864 patients. This information was then segmented by district, providing details on the number of patients evaluated under the Differentiated TB Care Model (DCM) for each district. ***Figure 5*** displays this district-wise data on patients assessed under DCM.

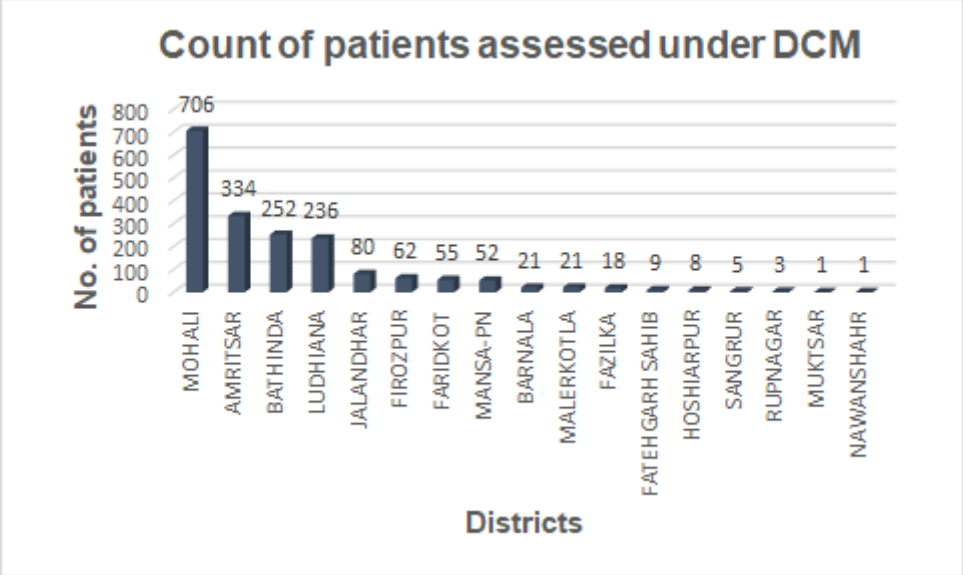


Figure 5: District wise distribution of TB patients

To study the various indicators in Diagnosed TB patients like Blood pressure, Respiratory rate, Oxygen Saturation, BMI, X-Ray, HIV and General Condition of the patients etc.

- ***Figure 6*** depicting the **Distribution of Blood Pressure in both Systolic and Diastolic** terms representing that 996 (53%) no. of patients had a normal systolic range, but 677 (36%) showed elevated systolic BP (>120 mmHg). Diastolic BP results were predominantly normal in 1576 no. of patients (85%), with 219 (12%) no. of patients having elevated diastolic BP (>90 mmHg).

  Normal Range of Diastolic Blood Pressure = 60-90 mmHg

  Normal Range of Systolic Blood Pressure = 90-120 mmHg

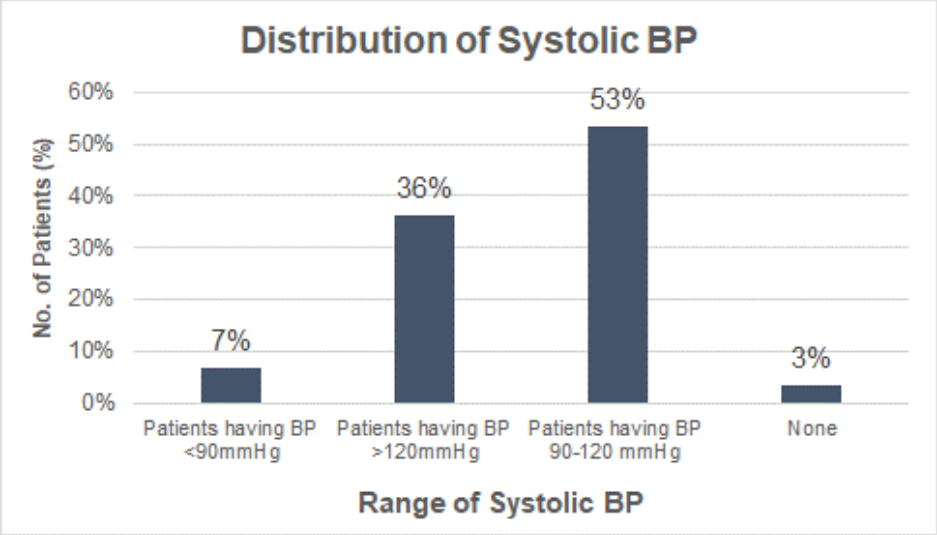


Figure 6: Distribution of Systolic BP in Diagnosed TB Patients

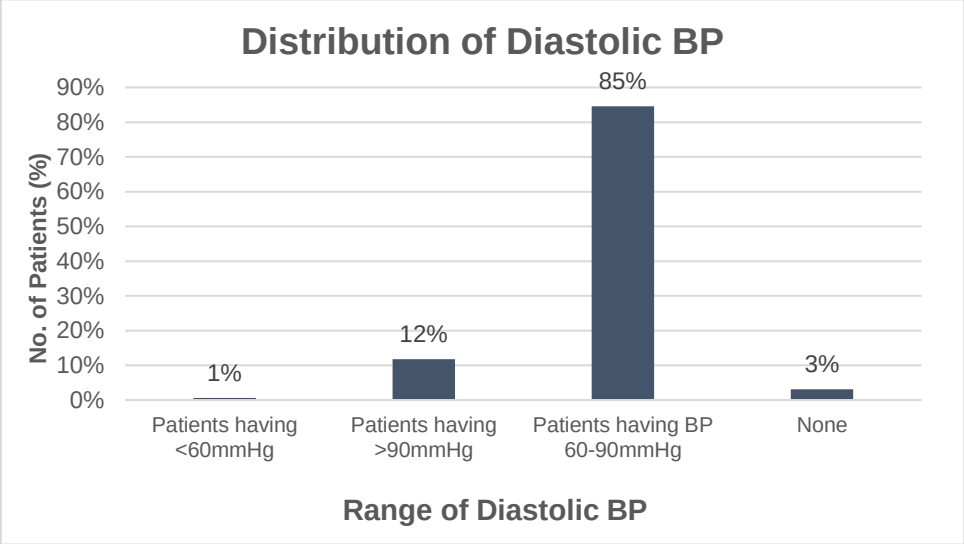


Figure 7: Distribution of Diastolic BP in Diagnosed TB Patients

- Another indicator that was used to assess under DCM was the **Distribution of Respiratory Rate**. ***Figure 8*** represents that 890 (48%) no. of patients fell within the normal range, whereas 820 (44%) no. of patients had an increased rate (>18/min) at the time of diagnosis.

Normal range of Respiratory Rate = 12-18/min.

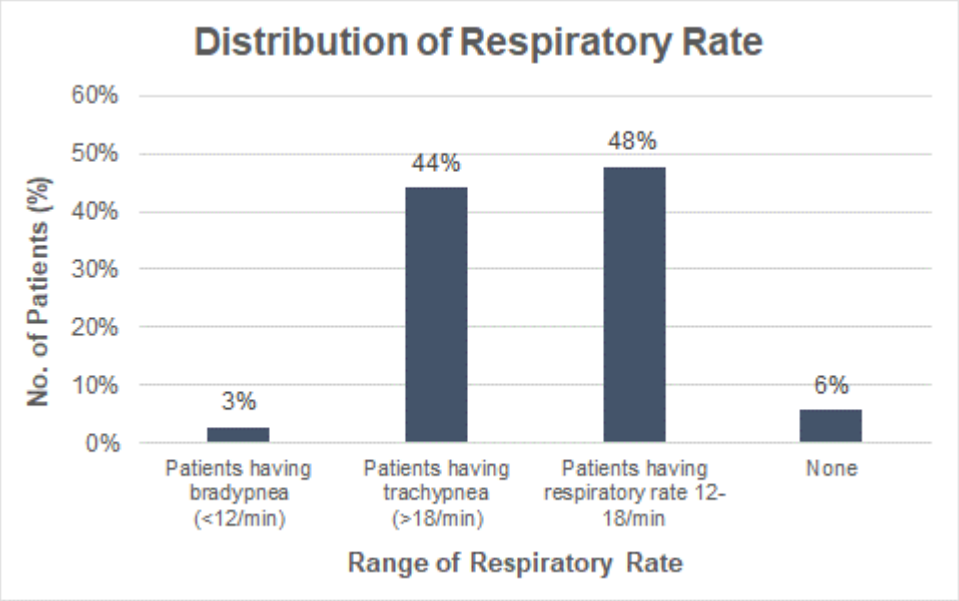


Figure 8: Distribution of Respiratory Rate in Diagnosed TB patients

- Among all the indicators **Oxygen Saturation Level** was assessed in diagnosed TB patients to evaluate the severity of patient at the time of diagnosis. Oxygen saturation was normal in 1517 (81%) no. of patients, with 205 (11%) no. of patients having levels below 95% as depicted in the ***Figure 9***.

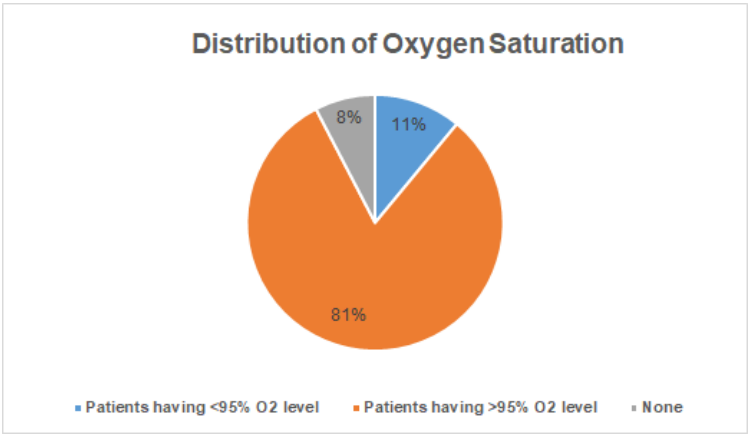


Figure 9: Distribution of Oxygen Saturation Level in Diagnosed TB patients

Normal Range of Oxygen Saturation level = between 95% and 100%

- **Body Mass Index (BMI)** is the most imp indicator which shows the nutritional status of the individual, in case of TB an individual experiences rapid decline in BMI. ***Figure 10*** representing 645 (35%) no. of patients were underweight, and 580 (31%) no. of patients were within the normal range at the time of diagnosis.

Normal Range of BMI = 18.5-24.9 kg/m2

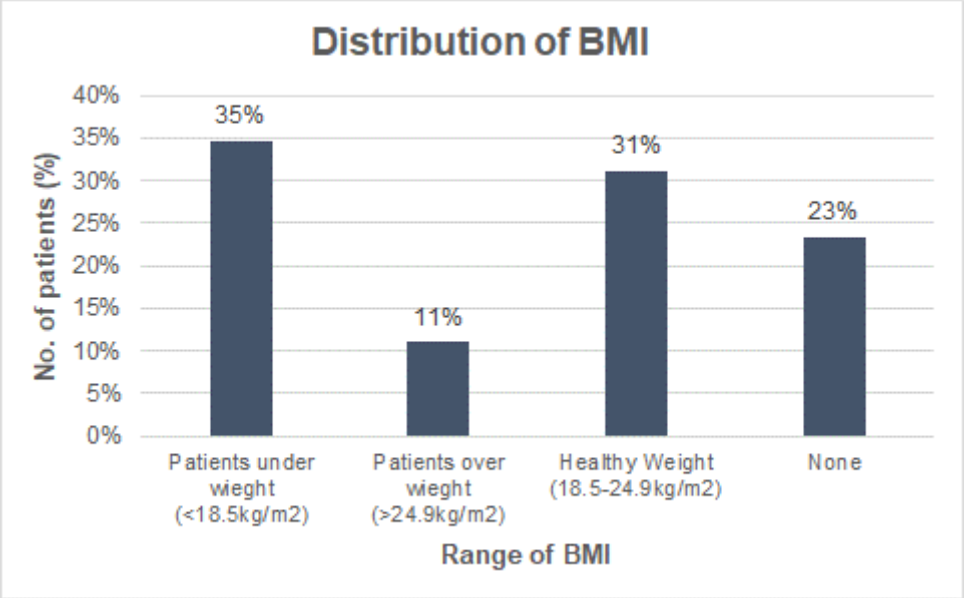


Figure 10: Distribution of BMI in Diagnosed TB patients

- **HIV** is one of the most common co morbidity that occurred along with TB and vice versa. The data of all the 17 districts was obtained from the Ni-kshay portal which represents that 1842 (99%) no. of patients tested negative for HIV, 19 (1%) no. of patients was found to be positive and were on ART and only 2 (0.1%) were positive but not getting any Anti-Retroviral therapy, as depicting in the ***Figure 11***.

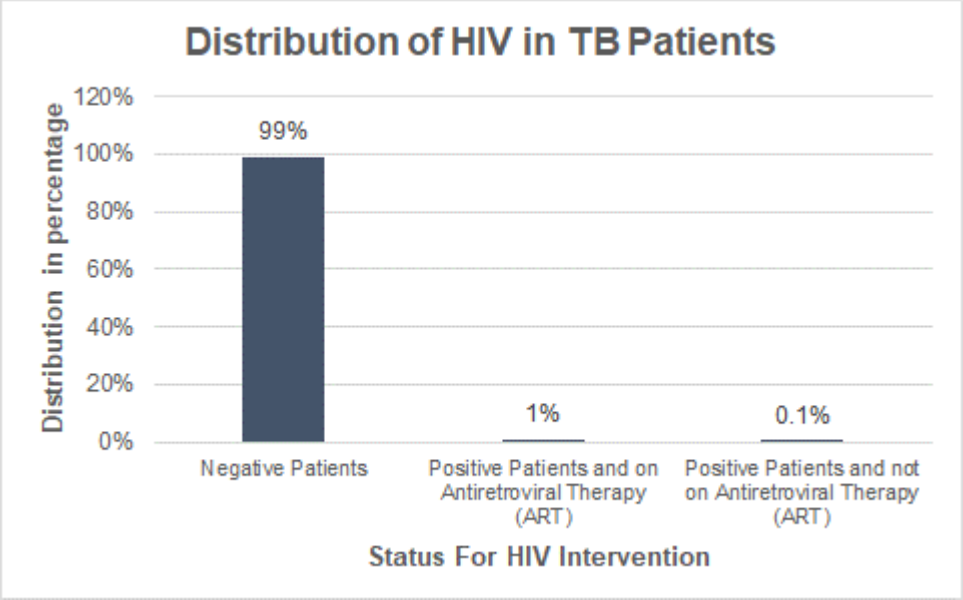


Figure 11: Distribution of HIV in Diagnosed TB patients

- **Clinical Chest X-Ray** is done at the time of diagnosis of patients. 1864 patients were assessed under DCM for the Clinical Chest X-Ray. It was found that 1100 (59%) no. of the patients were showing no abnormality, 361 (19%) no. of patients were having chest consolidation and only 33 (2%) were hydro pneumothorax as represented in the ***Figure 12***.

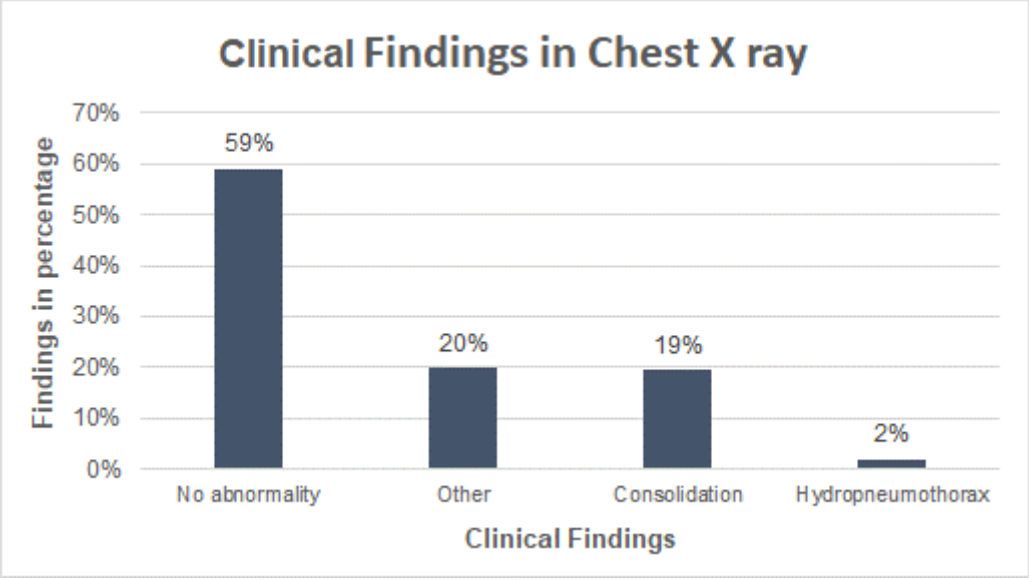


Figure 12: Clinical findings in X-Ray in Diagnosed TB patients

- Out of 1864, patients assessed on the basis of **General Condition** under DCM, 1803 (97%) no. of patients were conscious and active, 17 (1%) no. of patients were

conscious but not oriented and 9 (0.5%) were drowsy and unconscious with comatose as represented in the ***Figure 13***.

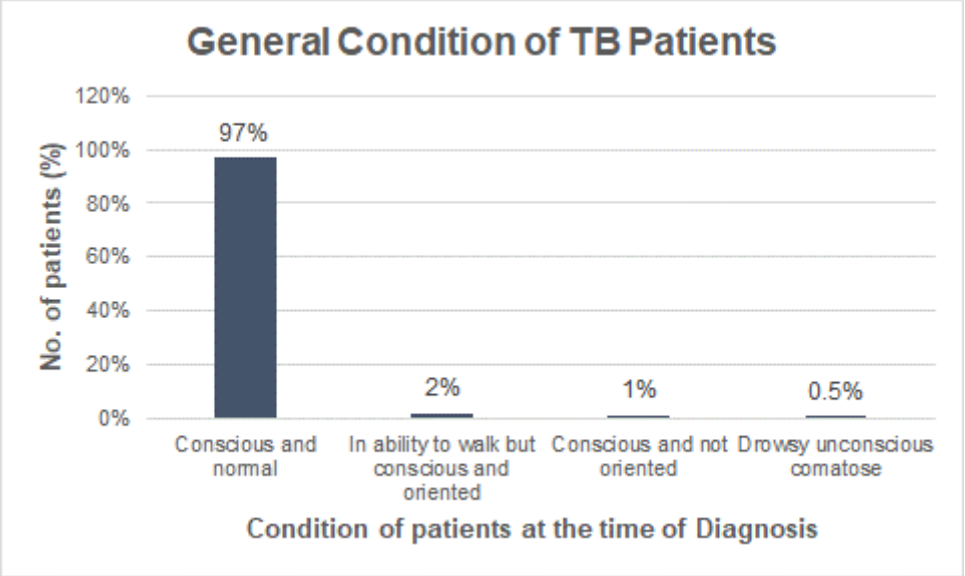


Figure 13: Condition of Patients at the time of Diagnosis

- After the assessment of 1864 pre diagnosed TB patients on the various indicators under DCM like BP, BMI, HIV and RR etc. It was found that only 0.3% patients were referred to IPD.

  The severity of indicators was further classified into three categories namely **low risk**, **medium risk** and **high risk**.

- The percentage of most frequently occurring indicators in **Low-Risk Category** is depicted in the following ***Figure 14***. After analysing all the indicators under the low-risk category, Blood Pressure was found to be the highest i.e. 64% and Chest X-Ray was the lowest i.e. 0% while there was significant proportion was also contributed by BMI and Respiratory Rate with 57% and 31% respectively.

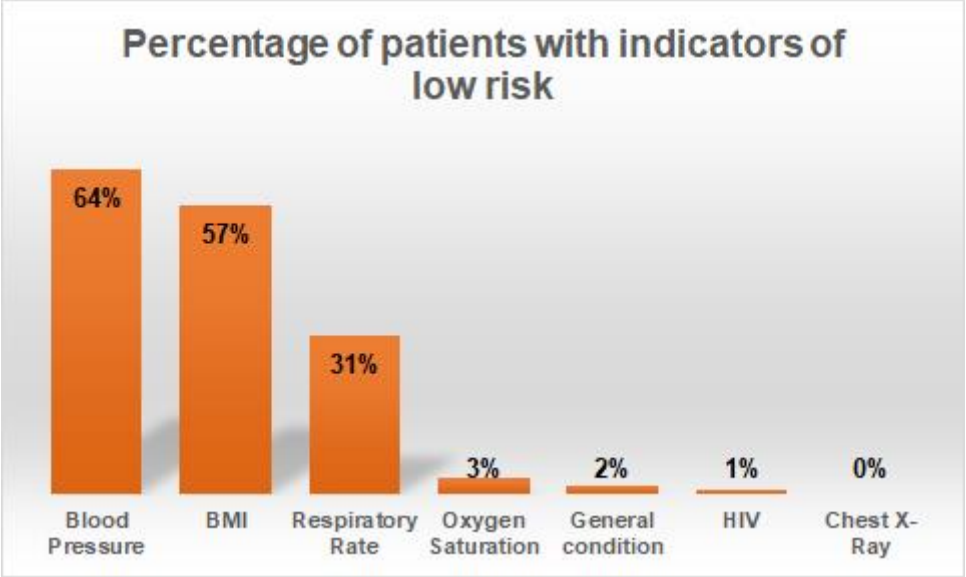


Figure 14: Showing Percentage of patients with indicators of Low Risk

- The percentage of most frequently occurring indicators in **Medium Risk Category** is depicted in the following ***Figure 15***. After analysing all the indicators under the medium risk category, Chest X-Ray was found to be the highest i.e. 19.2% and HIV was the lowest i.e. 0.1% while there was significant proportion was also contributed by BMI and Respiratory Rate with 12.1% and 6.7% respectively.

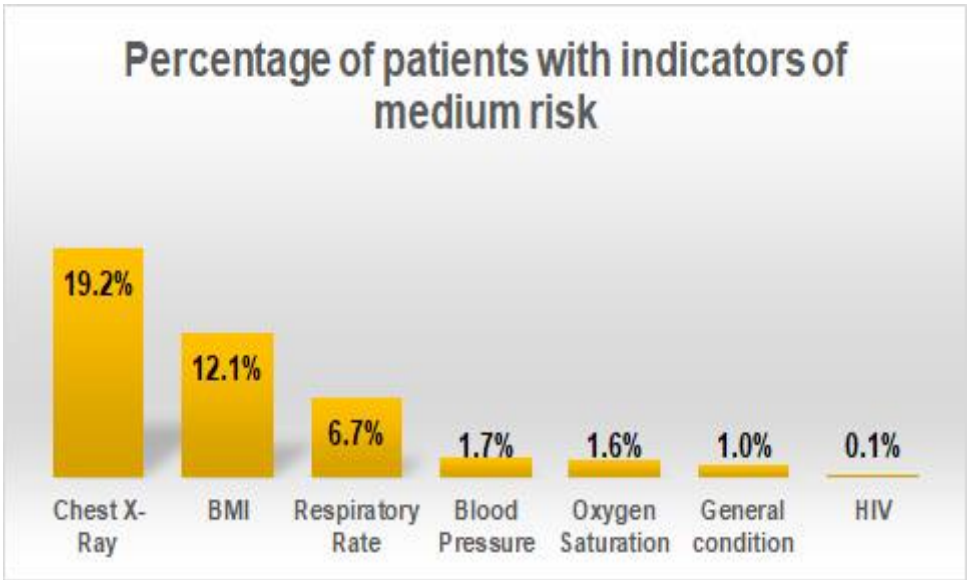


Figure 15: Showing Percentage of patients with indicators of Medium Risk

- The percentage of most frequently occurring indicators in **High-Risk Category** is depicted in the following ***Figure 16***. After analysing all the indicators under the high-risk category, Respiratory Rate was found to be the highest i.e. 18% and Blood Pressure, General Condition and HIV was the lowest i.e. 0.1% while there were two indicators i.e. Oxygen Saturation and Chest X-Ray representing 2% each.

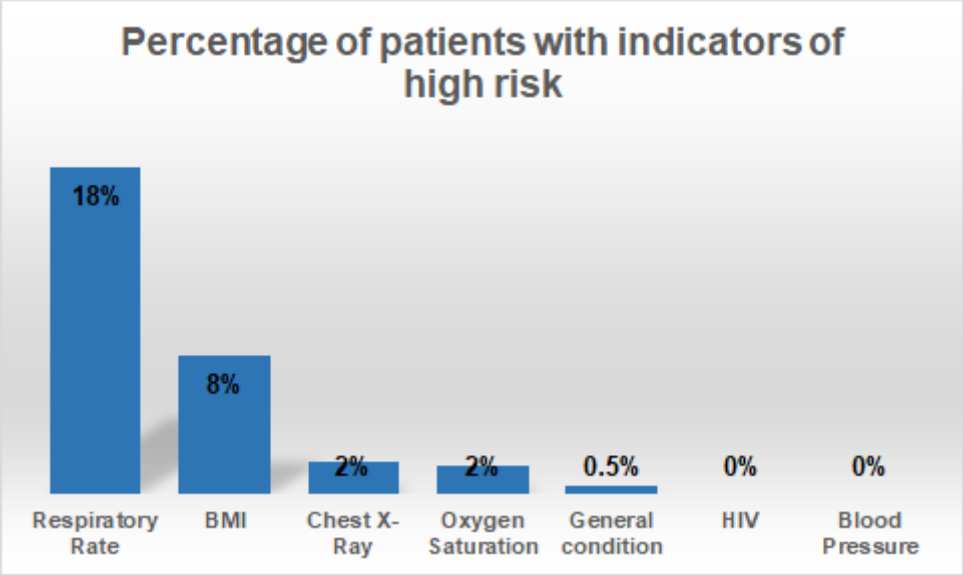


Figure 16: Showing Percentage of patients with indicators of High Risk

DISCUSSION

The study analysed various health indicators among TB-diagnosed patients across different districts of Punjab. The indicators assessed included blood pressure, respiratory rate, oxygen saturation, BMI, HIV status, chest X-ray results, and general condition at the time of diagnosis.

Key findings revealed that a significant proportion of patients exhibited elevated systolic blood pressure **(36%)** and increased respiratory rates **(44%)**. A notable percentage of patients were also underweight **(35%)**, which aligns with the known impact of TB on nutritional status. The analysis also indicated that while the majority of patients had normal oxygen saturation levels, a small percentage **(11%)** had levels below the normal range, indicating the severity of TB in those cases.

The distribution of HIV status among the patients highlighted that TB co-morbidity with HIV remains a concern, though the majority of patients tested negative for HIV **(99%)**. Chest X-ray findings showed varying degrees of lung involvement, with a portion of patients exhibiting chest consolidation or hydro pneumothorax.

General condition assessment suggested that most patients were conscious and active **(97%)** at the time of diagnosis. However, a small percentage were found to be in critical condition, necessitating immediate medical attention.

The categorization of indicators into low, medium, and high-risk categories provided further insights into the severity and management needs of TB patients. Blood pressure and respiratory rate were frequently occurring indicators in the low-risk category, while chest X-ray findings and HIV status were predominant in the medium and high-risk categories.

The integration of the Differentiated TB Care Model (DCM) within the Ni-kshay Portal has demonstrated its effectiveness in identifying and managing high-risk patients. The model's emphasis on comprehensive patient assessments, including respiratory rate, blood pressure, oxygen saturation, and BMI, enables healthcare providers to prioritize patients requiring urgent care and referrals. Furthermore, the Ni-kshay Poshan Yojana initiative has played a vital role in supporting the nutritional needs of TB patients, which is crucial for their recovery.

Despite these advancements, challenges remain in ensuring consistent and timely access to healthcare services, particularly for patients in remote areas. The role of family caregivers has emerged as a pivotal factor in providing continuous support and adherence to treatment regimens. Strengthening community engagement and support systems is necessary to mitigate stigma and enhance the effectiveness of TB care programs.

CONCLUSION AND RECOMMENDATIONS

The study provides valuable insights into the health status of TB-diagnosed patients in Punjab. The findings highlight the importance of comprehensive health assessments at the time of diagnosis to identify patients at higher risk of severe outcomes. The presence of co-morbidities such as HIV and the impact on nutritional status underline the need for integrated care approaches that address both TB and associated health conditions.

While the majority of patients were not in immediate need of hospital referral, the study emphasizes the need for ongoing monitoring and support to manage TB effectively. The categorization of patients based on risk levels can aid in prioritizing healthcare resources and ensuring timely interventions for those at higher risk.

The study underscores the critical role of thorough health assessments in improving TB management and outcomes. By identifying key health indicators and understanding their prevalence, healthcare providers can better tailor their approaches to meet the needs of TB patients, ultimately contributing to the goal of TB elimination in the region.

Future efforts should focus on enhancing early detection protocols, expanding inpatient care facilities, and integrating nutritional support within TB care programs. Strengthening health systems, improving infrastructure, and engaging communities in TB care efforts will be vital in achieving a TB-free India by 2025.

Here are few recommendations for improving DCM care model which includes:

- **Strengthen Early Detection**: Enhance screening protocols to identify high-risk TB patients at the earliest stage possible. Utilize community health workers to improve reach and efficiency.

- **Implement Differentiated Care**: Adopt the differentiated care model across all health facilities to ensure high-risk patients receive timely and appropriate care. Training for healthcare workers on this model is essential.

- **Improve Access to Inpatient Care**: Increase the availability of inpatient care facilities for severely ill TB patients. Ensure these facilities are well-equipped to handle complex cases.

- **Integrate Nutritional Support**: Provide nutritional support as part of TB care to address severe undernutrition, which is a significant risk factor for poor outcomes.

- **Enhance Health System Support**: Strengthen health systems by improving infrastructure, supply chains for medications, and support systems for healthcare workers.

- **Community Engagement**: Engage communities in TB care efforts through awareness programs and support groups to reduce stigma and improve treatment adherence.

LIMITATIONS

- **Data Limitations**: The study may be limited by the availability and quality of data, which can impact the accuracy of findings and generalizability of results.
- **Resource Constraints**: Resource limitations in terms of funding, infrastructure, and trained personnel can affect the implementation and effectiveness of the differentiated care model.
- **Follow-up Challenges**: Ensuring consistent follow-up with TB patients, particularly in remote or underserved areas, remains a challenge and may affect long-term outcomes.
- **Variability in Implementation**: Differences in how the differentiated care model is implemented across various health facilities can lead to inconsistencies in patient care and outcomes.
- **Behavioural Factors**: Patient adherence to treatment regimens can be influenced by various factors, including socio-economic conditions, which are difficult to control and measure comprehensively.

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