Dissertation Training

at

Wadhwani AI

(A Unit of National Entrepreneurship Network)

Healthcare workers perception about the use of AI based applications to detect TB infection.

By

Name: Swadhapriya Das Chaudhuri

Enrolment No: PG/21/116
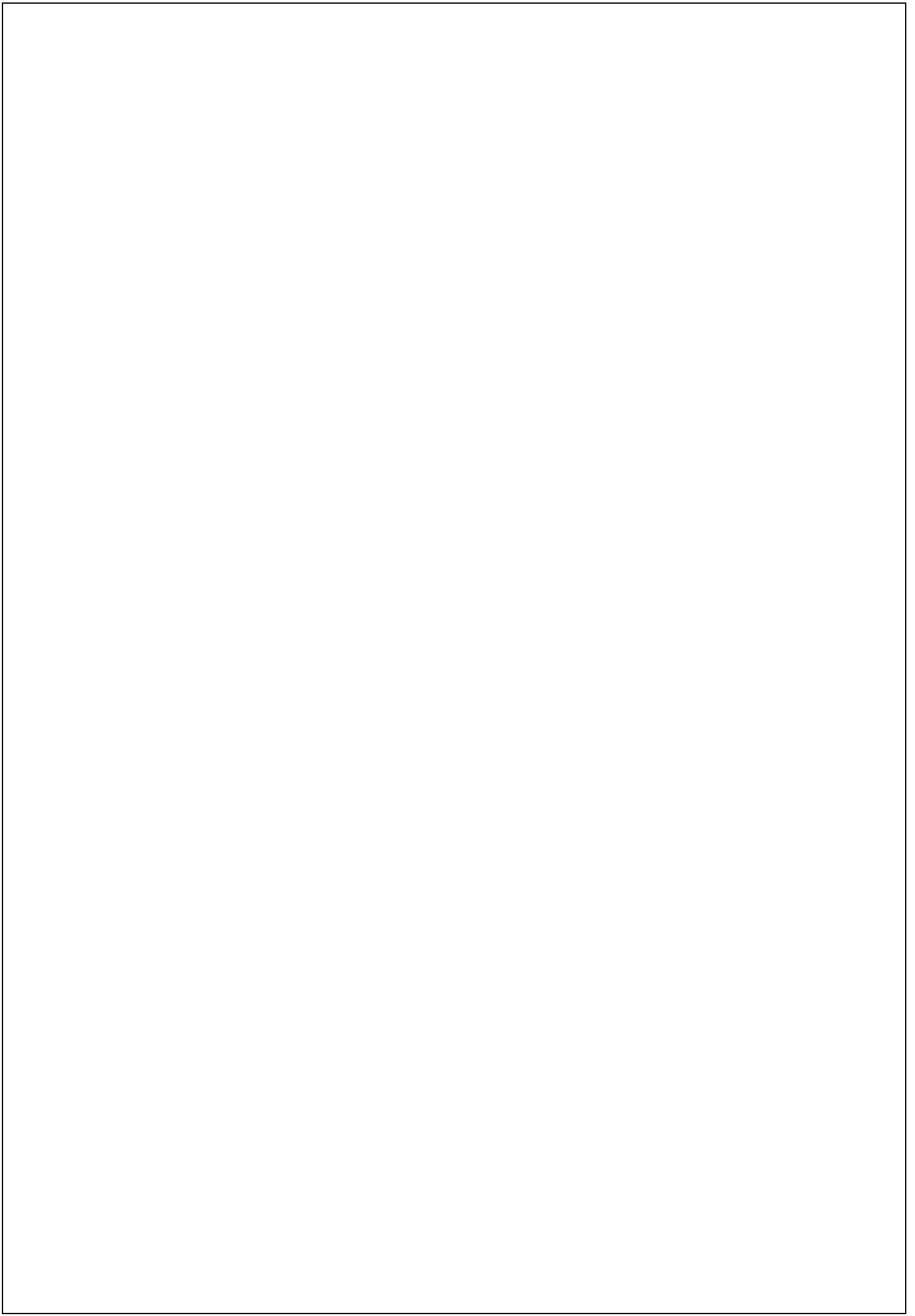
Under the guidance of

Dr. Anandhi Ramachandran

PGDM (Hospital and Health Management)

2021-2023

International Institute of Health Management Research, New Delhi

5-May-2023

To Whomsoever It May Concern

This is to certify that Swadhapriya Das Chaudhuri was associated with Artificial Intelligence Unit of National Entrepreneurship Network (hereon referred to as NEN-AI), Mumbai office from 6-February-2023 to 5-May-2023.

He was designated as a Business Analyst Intern, during his relieving. We wish him all the best in his future endeavors.

Best Regards,

Shekar Sivasubramanian
Chief Executive Officer

Swadhapriya Das Chaudhuri

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WADHWANI AI
A program of the AI Unit of NEN

c/o The BIV, 9 A, 3rd Floor, Phelps
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New Delhi 110001
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TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Swadhapriya Das Chaudhuri**, student of PGDM (Hospital & Health Management) from International Institute of Health Management Research; New Delhi has undergone internship training at **Wadhwani AI** from **6th February 2023** to **5th May 2023.**

The Candidate has successfully carried out the study designated to him during internship training and his approach to the study has been sincere, scientific, and analytical. The Internship is in fulfilment of the course requirements. I wish him all success in all his future endeavours.

Dr. Sumesh Kumar   Mentor

Associate Dean, Academic and Student Affairs

IIHMR, New Delhi   IIHMR, New Delhi

Certificate From Dissertation Advisory Committee

This is to certify that **Mr. Swadhapriya Das Chaudhuri**, a graduate student of the **PGDM (Hospital & Health Management)** has worked under our guidance and supervision. He is submitting this dissertation titled "**Healthcare workers perception about the use of AI based applications to detect TB infection**" at "**Wadhwani AI**" in partial fulfillment of the requirements for the award of the **PGDM (Hospital & Health Management).**

This dissertation has the requisite standard and to the best of our knowledge, no part of it has been reproduced from any other dissertation, monograph, report or book.

Kowshik Ganesh

Dr. Anandhi Ramachandran   Kowshik Ganesh

Healthcare IT professor,   Chief of Party,USAID Trace TB

IIHMR Delhi.   Wadhwani AI

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled **Healthcare workers perception about the use of AI based applications to detect TB infection** and submitted by **Swadhapriya Das Chaudhuri** Enrollment No. **PG/21/116** under the supervision of Dr Anandhi Ramachandran for award of PGDM (Hospital & Health Management) of the Institute carried out during the period from 6th February 2023 to 5th May 2023 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Signature

FEEDBACK FORM

Name of the Student: Swadhapriya Das Chaudhuri

Name of the Organisation in Which Dissertation Has Been Completed: Wadhwani AI

Area of Dissertation: Tuberculosis.

Attendance: >80%

Objectives achieved: Successful deployment of AI based TB screening tool and its management.

Deliverables:
- Document PRD for the Screening App.
- Asana board for tracking of app version and app related tasks.
- DB-Nagaland clean, track, manage.
- Dashboard document for Nagaland deployment.
- App and UI/UX related modification.
- Revision of the wireframes for the application.
- Improve engagement of the CHOs and also to improve their adaptability to the app.
- Taking regular CHO feedbacks for better understanding and addressing the problems associated with the app.

Strengths: Problem solver, systematic thinker

Suggestions for Improvement: NA

Suggestions for Institute (course curriculum, industry interaction, placement, alumni):
Recommend having at least 6 months internships designed such that students are trained for the industry before graduation and have a natural pathway for placements

Signature

Kowshik Ganesh

Chief of Party – USAID TRACE TB

Date: 21-06-23
Place: Delhi

ACKNOWLEDGEMENT

ABBREVIATION

Abbreviation	Full Form
TB	Tuberculosis
DR-TB	Drug-resistant TB
HCW	Healthcare Worker
CHO	Community Health Officer
DC	Data Collector
AI	Artificial Intelligence
TU	Tuberculosis Unit
STS	Senior Treatment Supervisor
STLS	Senior Treatment Laboratory Supervisor
TBHV	Tuberculosis Health Visitor
WHO	World Health Organization
WIAI	Wadhwani AI

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SECTION 1: PROJECT REPORT

i. Introduction

As per the Global TB Report 2021, in 2020, tuberculosis was responsible for an estimated 0.5 million deaths in India with an estimated 2.6 million incidental TB cases. During the same period, 1.8. million TB patients were notified under the National TB Elimination Program (NTEP), as per the Annual TB Report, India 2021. Therefore, an estimated 0.8 million TB patients were not notified under the NTEP.(1) The global estimate of 'missing TB cases' is 4 million. One of the main reasons for these missing cases of TB is the limited accessibility and availability of screening and diagnostic methods in low-resource settings. China, India, Indonesia, Nigeria, Pakistan, South Africa, and other countries account for 87% of the world's cases.(1)

As per WHO, about 9.9 million people fell ill with Tuberculosis and around 1.5 million deaths were reported globally in 2020, despite being a preventable and curable disease. India also notified more than 2.4 million TB cases in 2019, thereby continuing to be the holding the largest share of the global TB burden. India's National Tuberculosis Elimination Programme (earlier known as Revised National TB Control Programme) has been strengthened in order to meet the goal of ending the TB from the country by 2025, five years ahead of the Sustainable Development Goals (SDG) for 2030. Furthermore the National Strategic Plan (NSP) for Tuberculosis Elimination 2017-2025 was developed in order to achieve this goal. (2)

The National Strategic Plan (NSP) to end TB in India 2017–25 set in motion an ambitious attempt to enhance and improve the quality, coverage, efficiency, equity and effectiveness of the National Tuberculosis Elimination Programme (NTEP).(3) The impact created by various innovations and interventions since 2017 has been seen to have increased coverage, utilization of TB services and decreasing incidence of the disease . However, the present rate of ~3% decline in tuberculosis incidence annually would need to be accelerated to ~11% in order to achieve the 2030 Sustainable development goal by 2025. Since 2017, many new policies and guidelines, new tools have been made available, extensive learnings from implementation and scale up of new programme activities has also been ongoing. While the strategic direction of the NSP 2017-2025 remains valid, there are other issues that have also gained critical importance amongst which continued access to quality TB care during complex emergencies is of utmost important, like the COVID-19 pandemic. Also in addition, the unfinished agenda of addressing the 'missed TB cases', scaling up of TB

services, providing social support for TB patients, preventive services, and addressing the social determinants of TB through a multisectoral approach continue to challenge the NTEP and remain the focus of this NSP and NTEP over the next five years.(3)

Current screening tools are expensive in the context of developing economies. They also require special skills and laboratory setups. Therefore, a major priority for TB diagnostic research at a global level is a rapid, non-invasive triaging test to screen populations for TB.(4) The WHO emphasizes that more proactive efforts are required to close this case-detection gap to move closer towards TB elimination.(5) A large proportion of persons with active TB do not have classical TB symptoms, while the abnormalities associated with TB can be detected early in the course of the disease with the help of chest radiography (CXR).(6) However, access to high-quality radiography with expert interpretation is limited in many areas due to high hardware costs, infrastructure requirements, and a centralized approach.(7) Even though the radiography access has improved, but human resources for reading radiographs are still limited, especially in rural areas in resource-limited countries.(8)

ii. Rationale

Given the condition of Tuberculosis in India, improved performance in scaling up of TB related activities is very much crucial. To reach the goal of TB eradication 5 years ahead of the global target of 2030 by 2025 requires proactive involvement of all the agencies. It is very well possible to close the case detection gaps by advanced technological solutions providing faster, non-invasive solutions which may not require relying on expert and skilled personnel.

Artificial Intelligence and Machine learning algorithms are increasingly being used in primary healthcare. They are used for prevention screening, diagnosis, treatment, prediction and in other domains as well. To gain a sustainable adoption of such tools in primary healthcare it is important to understand the perception of the end users especially the health workers. It could not only provide evidence about the perceived reliability of such solution in the absence of trained expertise but also let us know about the concerns and expectations of the healthcare workers regarding the use of such tools. This will provide valuable inputs while designing and implementing such solutions in healthcare. The current study focuses on understanding the health workers perception on use of AI tool for detecting TB cases.

iii. Research Question

A cross-sectional study on the perception of healthcare workers' regarding the use of AI-based applications for detecting TB infection.

iv. Explicit Objectives

Primary Objective:

- To understand the perception of the healthcare workers towards the use of AI.

Secondary Objective:

- To understand the perception of the healthcare workers towards the use of AI to detect TB.
- To understand the knowledge and awareness of health care workers about TB and AI.

v. Mode of data collection

Study Design– Cross- Sectional Study performed to assess the perceptions of healthcare workers on the use of AI to detect TB.

Study Sample– All Community Health Officers (CHOs) working across 4 districts of Nagaland.

Sample Size- 137 Community Health Officers (CHOs).

(As the study is being conducted across 4 districts of Nagaland which has collectively 137 CHOs, hence they are all considered in the study).

Study Location– 4 Districts of Nagaland (Dimapur, Kohima, Mon, Mokokchung)

Period of Study – 1 month.

Data Type- Survey Data.

Study tool- Web-based Google Forms to be distributed to the healthcare workers. (Tool attached below)

Inclusion Criteria- 1. CHOs working in Health and Wellness Centres.

        2. Respondents should be working in the area of Tuberculosis.

        3. Healthcare Workers who provide consent to the survey.

Exclusion criteria- Any Healthcare Worker who is not a CHO is not included in the study.

Data Analysis- Excel, OpenEPI.

Ethical consideration- Since the study did not collect any personal information hence approval from the SRB was enough to conduct the study.
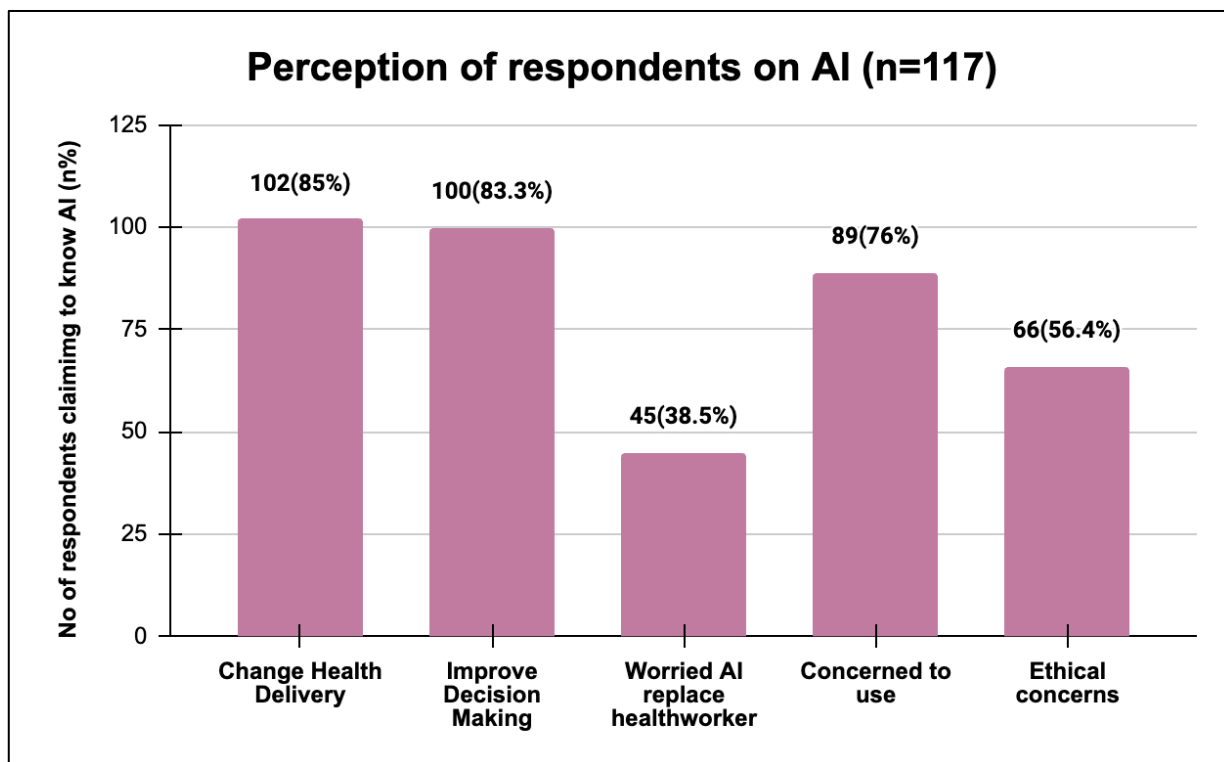
vi.   Results and Discussions

Results:

A total of 128 responses were received and the whole data was analyzed out of which 120 agreed to participate in the study, while 8 did not give consent to participate. All of the respondents were CHOs working out of various facilities across 4 districts of Nagaland. Out of 120 respondents 117 claimed they knew about AI.
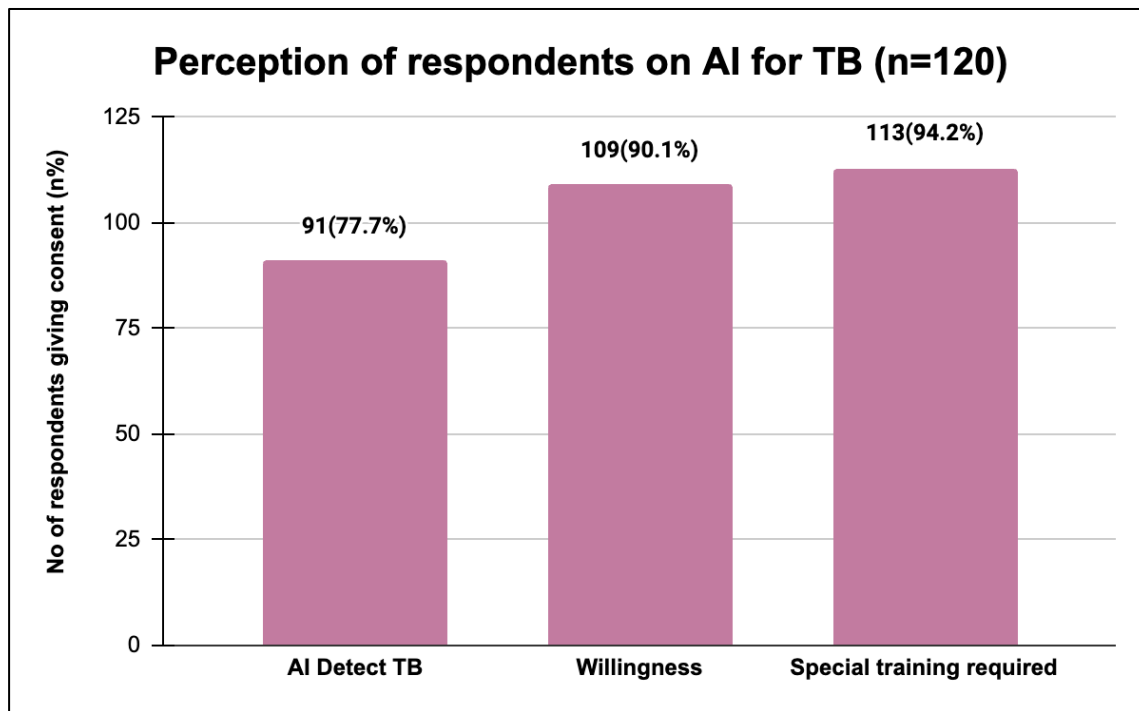
Perception towards use of AI:

Out of the 117 respondents, 102(85%) responded positively claiming that they believe AI can change healthcare delivery, while 18(15%) did not, similarly a total of 100(83.3%) out of 117 respondents believed that AI can improve decision making in healthcare. A total of 45(38.5%) out of 117 felt worried that AI would replace health workers while 72(61.5%) respondents did not believe as such. Out of the 117 respondents who claimed to know about AI 89(76%) were concerned to use AI and 66(56.4%) raised ethical concerns on its use.

Perception of respondents on AI (n=117)

	Responses Received	
Q. Do you think AI will change how healthcare is delivered?	**Q. Please mention your concerns (ethical) and worries.**
• It will give more accurate and precise data • Proper treatment even in absence of health worker • Automate things • operate complex machine without involvement • reduce treatment time • hassle free diagnosis • More feasible with less time consume	• AI will have sensitive information, can be misused • Personal data needs to be given • Misuse personal details • share patient information • it is not fully accurate • Consent needs to be taken before patient's data is being used

Perception towards use of AI to detect TB:

Out of 120 respondents who gave consent to the study, around 91(77.7%) believed that AI can help detect TB while 26(22.2%) did not believe as such. A total of 109(90.1%) of 120 respondents showed willingness to use AI based solutions for TB, while around 113(94.2%) believed that they would require special training to use such solutions.

Perception of respondents on AI for TB (n=120)

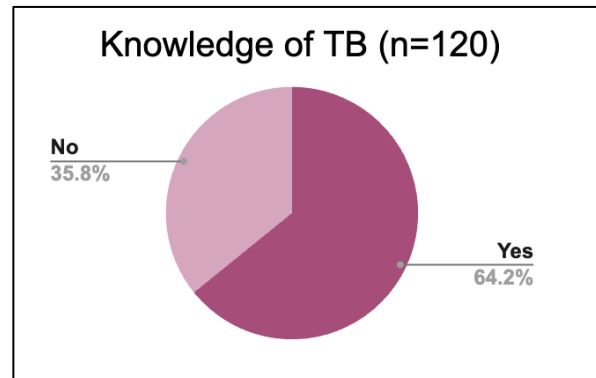| Responses Received	
Q. Do you think AI can be used to detect TB? Mention how	**Q. What factors do you think would affect the adoption and use of AI?**
- Automatic screening - To see who are more prone to get TB, to track TB patients and provide warning alerts for protection of other people - On the spot screening - Cough sound - Actively find cases in population - Portable X-Ray - Reducing diagnosis or screening time - Read tb reports fast - I think AI can detect the data that is present in the form of reports in a better way to provide a treatment for the same by clinicians.	- On spot identify and management of patient. - Quality, Quantity, computing power of data - Greater knowledge on the subject - Easy and less time consuming - Knowledge on the subject - Point of care identift - Awareness, security - Security, confidentiality, awareness - Easy to use, fast and reliable - Management of patient, at the spot identify

Knowledge about TB and AI:
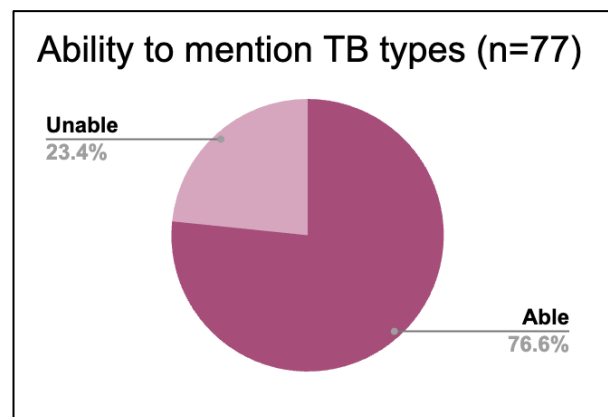
Knowlegdge of respondednts on TB:

Out of the 120 respondents, 77(64.2%) responded positively claiming to know about TB, whereas 43(35.8%) claimed they did not know about TB.

Knowledge of TB	Respondents n (%)
Yes	77 (64.2%)
No	43 (35.8%)
	N=120

Knowledge of TB (n=120)

No 35.8%

Yes 64.2%

Furthermore, it is seen that from amongst the 77 respondents who claim to know the various types of TB present only 59(76.6%) were correctly able to answer, while the remaining 18(23.4%) could not.

Ability to mention Types of TB	Respondents n (%)
Able to mention	59 (76.6%)
Unable to mention	18 (23.4%)
	N=77

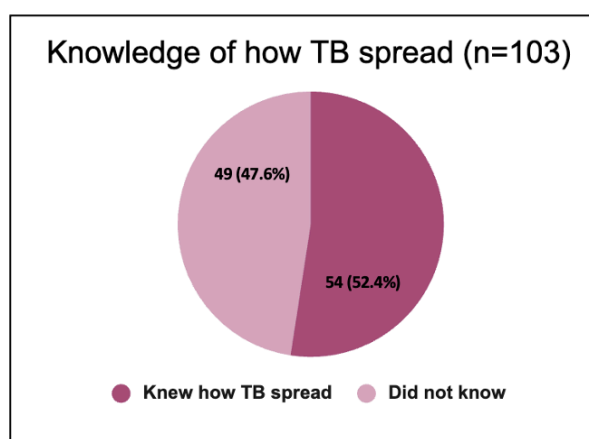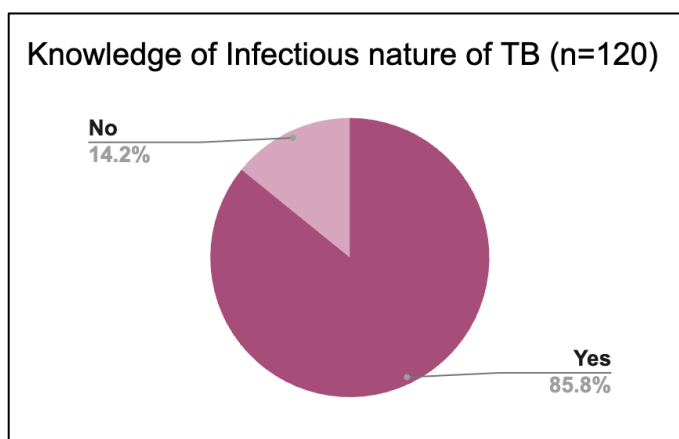Ability to mention TB types (n=77)

Unable 23.4%

Able 76.6%

Knowledge of Infectious nature of TB:

Out of 120 respondents 103(85.83%) responded that they knew that TB is infectious while 17(14.2%) claimed they don't know. Also, among the 103 respondents only 54(52.4%) were able to correctly answer and 49(47.6%) couldn't answer on the mode of spread of the disease.

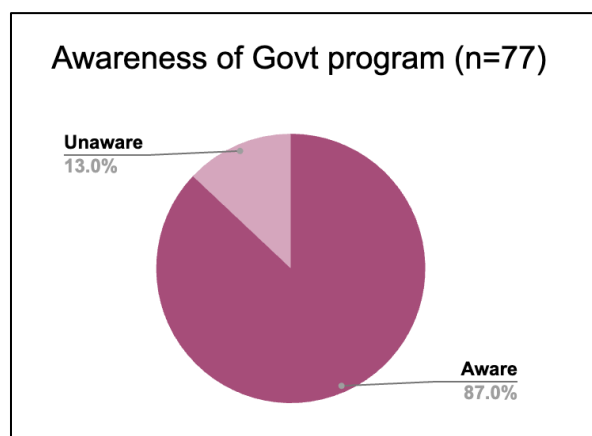| Knowledge of Infectious nature of TB	Respondents n (%)
Yes	103 (85.83%)
No	17 (14.2%)
	N=120

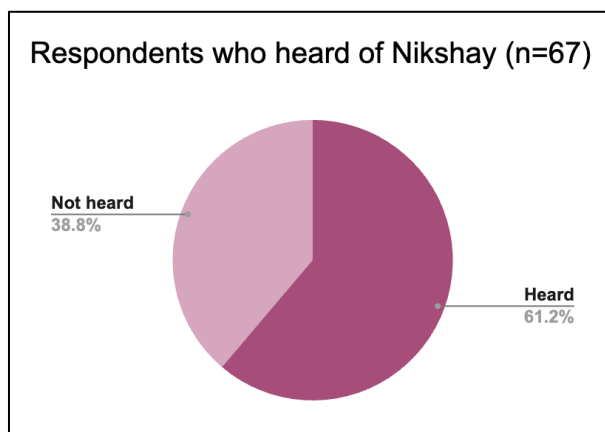| Knowledge of how TB spread	Respondents n (%)
Knew how TB spread	54(52.4%)
Did not know	49(47.6%)
	N=103

Knowledge of Govt program and heard of Nikshay:

It is seen that 77 out of 120 respondents who said to know about TB, 67(87%) were aware of Govt program while 10(13%) did not. However, among the 67 respondents only 41(53.2%) have heard of Nikshay while 26 did not(47%).

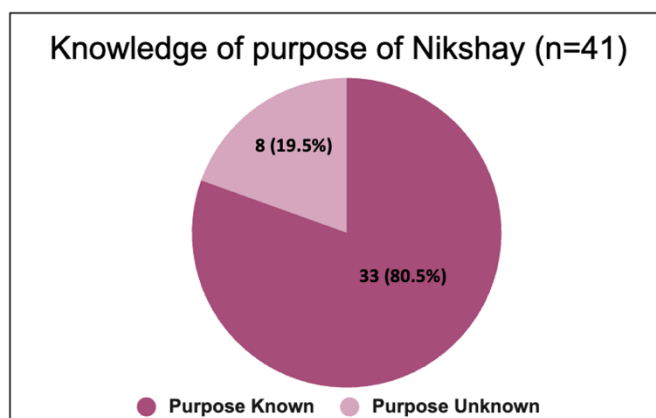| Awareness of Govt program	Respondents n (%)
Aware	67(87%)
Unaware	10(13%)
	N=77

Heard of Nikshay	Respondents n (%)
Heard	41(53.2%)
Not heard	26(47%)
	N=67

Respondents who heard of Nikshay (n=67)

Not heard 38.8%

Heard 61.2%

From all the 41 respondents who stated they have heard of Nikshay and knew or were aware of the govt program only 33(80.5%) were able to correctly mention the purpose of nikshay, while the rest 8(19.5) could not state its purpose.

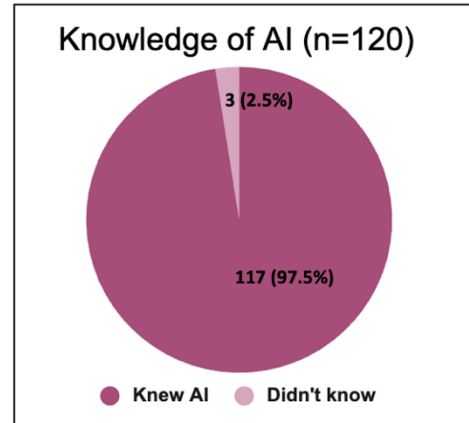| Knowledge of purpose of Nikshay	Respondents n (%)
Known	33(80.5%)
Unknown	8(19.5%)
	N=41

Knowledge of purpose of Nikshay (n=41)

8 (19.5%)

33 (80.5%)

● Purpose Known ● Purpose Unknown

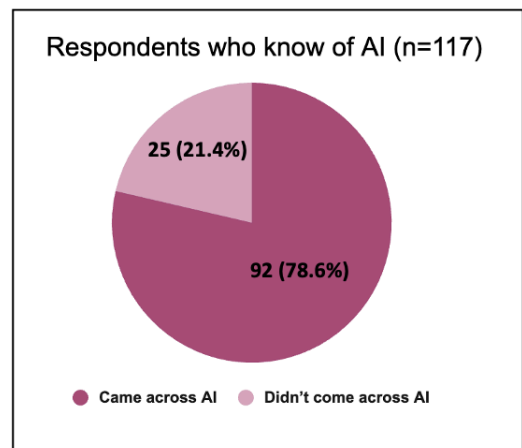| Responses related to knowledge about TB		
Q. Mention Types of TB	Q. Which types of TB is considered infectious and how do they spread.	Q. Mention purpose of Nikshay?
• Pulmonary and Extra-pulmonary • Active TB and latent TB It could be - Pleural, GIT, Brain, Skeletal, Miliary, Bladder and Kidney TB • lungs and other area • PTB and EPTB	• Miliary TB, bacteria spread very rapidly to the lungs in this kind of TB. • droplets, communicable • Pulmonary Tuberculosis • air, cough, sneeze • TB disease in the lungs or throat can be infectious. • Through air one person to another person	• Patient management system for TB control • TB Patient Management • Adherence • Patient Identify and give medicine • Tracking tb patients and treat all • Patient reporting and treatment monitoring • register cases, monitor treatment

Knowledge of respondents on AI:

It is found from the study that out of the 120 respondents who gave consent, almost all of them i.e 117(97.5%) respondents knew or were aware of AI (artificial intelligence) while only 3(2.5%) responded that they did not know.

Knowledge of AI	Respondents n (%)
Knew AI	117(97.5%)
Didn't know	3(2.5%)
	N=120

From among the 117 who claimed they knew about AI around 92(78.6%) said that they have come across or have used AI applications while 25(21.4%) did not. But out of the 92 who came across or have used AI applications only 76(82.6%) knew or claimed to know of AI in healthcare while the rest 16(17.3%) did not.

Respondents who know of AI	Respondents n (%)
Came across AI	92(78.6%)
Didn't come across AI	25(21.4%)
	N=117

Respondents who came across AI	Respondents n (%)
Came across AI in health	76(82.6%)
Didn't come across AI in health	16(17.3%)
	N=92

Discussion:

The results of this survey show that majority of the healthcare workers were aware of artificial intelligence and had optimistic views towards it. The majority of people showed that they believe that AI can bring about a reform in the healthcare industry. Around 85% claimed that AI can bring about a change in the healthcare delivery while around 83.3% stated that it can also bring about improved decision making in healthcare reducing errors in the treatment. They believed that Ai can automate the healthcare process and also can read or perform tests faster and can also be used to run complex machineries. However, it was found that about 38.5% felt worried on using of AI in health and around 76% raised concerns both general and ethical on the use of AI, where the major concern was the misuse of confidential patient information.

The results received from the study also states that the CHOs have a fair amount of knowledge or exposure to AI and related apps even in healthcare. Respondents claimed to have come across applications like Google Assistant, ChatGPT, Alexa, Siri etc. and also quite a few could relate its usage in healthcare like – reading test results/X-Rays, Siri3D imaging apps like Lenskart, Arogya Setu, Fitness apps etc. This signifies that not necessarily they would come across or have used AI apps but could atleast understand its values or impact that it could make.

The study however showed a general lack of knowledge on the subject of TB. A significant number of the CHOs did not have proper exposure or knowledge of Tb, even the officers claiming to know TB around 64.2%, about 76.6% could not properly mention its various types or about its infectious nature. Even the respondents who claim to know TB around 87% were aware of Govt program related to TB but only 53.2% have heard of Nikshay but only 80.5% of out of the. Correctly could mention the purpose of Nikshay.

Limitations:

As the study was conducted in various districts of Nagaland it had to be done online due to limitation to travel. Responses for a similar study could have been better validated if had been conducted offline on the ground.

Conclusion:

In conclusion to the above study a good training and awareness on various aspects in the field on TB, extent of Govt Interventions, could surely create readiness for solution adoption leading to better case finding approach and TB eradication. A detailed understanding and training on Nikshay might be necessary, its purpose, usage, identification and enrollment of patient following through the entire TB care cascade. Also taking into consideration all the views, beliefs and concerns of the healthcare workers for better acceptance of an AI based solution and therefore better scalability and usability.

Overall, these findings reinforce the importance of understanding knowledge, awareness, perceptions of the people in their respective field for which any technological solution is to be developed for better acceptance and impact.

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Annexure

CONSENT FORM

Hello, I am Swadhapriya Das Chaudhuri, a student at a health management institute in Dwarka, New Delhi, named IIHMR. I would like to ask you some questions related to the knowledge about AI based solutions which I am working on under Wadhwani AI. This project is regarding Perception of Healthcare Workers about the Use of AI based applications to detect TB Infection.

Your participation in the survey is voluntary. The questionnaire would usually take about 5-10 minutes to complete. All the answers you give will be confidential and will not be shared with anyone other than the members of our survey team. Your name and identity will not be recorded. You may refuse to take part in the research or exit the survey at any time without any consequences. You are free to decline to answer any particular question you do not wish to answer for any reason. You will receive no direct or indirect benefits from participating in this research study. However, your responses may help us to learn more about the subject which may also be beneficial to you in terms of technological solutions in your area in the future. Thereby we request you to please participate in this study.

In case of any query, you may contact the institute at 01130418900 or IIHMR, Plot no 3, Sector 18 A, Dwarka Phase II, New Delhi 110075.

Informed Consent by Participant

"I understand that my participation in the study is purely voluntary, and I may choose to withdraw from the study at any point if necessary. I also understand that the information provided by me will be kept confidential and will be used for this research only.

The details of this study have been explained to me. I hereby provide my voluntary consent to participate in the above research study."

(The sign of the participant)

Study Tool

	Questions	Response
	1. Do you know about TB?	Y/N
	1.1. If Y, please mention its types.	-
	2. Is TB an infectious disease?	Y/N
	2.1. If Y, which type of TB is considered infectious?	-
Knowledge about TB?	2.2. How do they spread?	-
	3. Do you know about any Govt programme related to TB?	Y/N
	4. Have you heard about Nikshay?	Y/N
	4.1. If Y, what is its purpose?	-
	4.2. Do you know how to generate a presumptive Id?	Y/N
	4.2.1.1. If Y, please mention.	-
	5. Do you know what AI stands for?	Y/N
	5.1. If Y, please mention	-
	6. Have you come across any AI application?	Y/N
	6.1. If Y, please mention.	-
Knowledge about AI	6.2. Enlist if you used any of the mentioned application?	Y/N
	7. Do you know any AI based application being used in healthcare?	Y/N
	7.1. If Y, please mention.	-
	7.2. Enlist if you used any of the mentioned application in your line of work?	Y/N

	8. Do you think AI can be used to detect TB?	Y/N
	8.1. f Y, how?	-
	9. Do you think AI will change how healthcare is delivered?	Y/N
	9.1. If Y, how?	-
	10. Do you think AI will help improve the decision taken by healthcare worker?	Y/N
	11. Do you think healthcare workers need special training or education to use AI based solution?	Y/N
View / Attitude towards AI	12. Are you concerned about the use of AI in healthcare?	Y/N
	13. Are you worried that AI will replace you at your job?	Y/N
	14. Please mention your concerns and worries.	-
	15. Are you willing and ready to use AI based solution?	Y/N
	15.1. If Y, what factors do you think would affect the adoption and use of AI?	-
	15.2. If N, please mention reasons.	-
	16. Do you feel any ethical concerns in the use of AI?	Y/N
	16.1. If Y, please mention.	-

Swadha P D report