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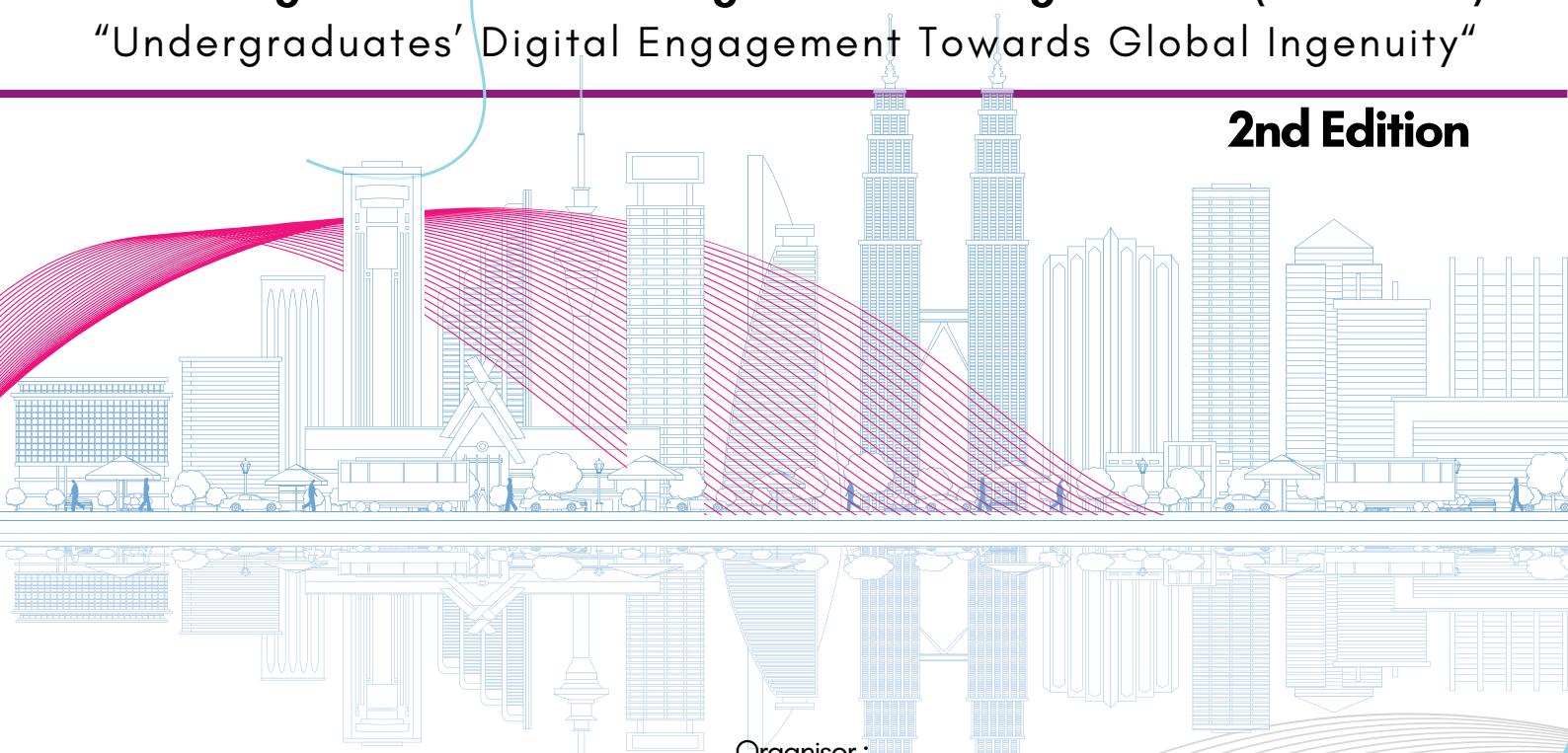
# IUGeT

## Proceeding for International Undergraduates Get Together 2024 (IUGeT 2024)

"Undergraduates' Digital Engagement Towards Global Ingenuity"

**2nd Edition**

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**Department of Built Environment Studies and Technology, College of Built Environment, UiTM Perak Branch**

Co-organiser :

**INSPIRED 2024. Office of Research, Industrial Linkages, Community & Alumni (PJIMA), UiTM Perak Branch**

**Bauchemic (Malaysia) Sdn Bhd**

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# REVOLUTIONIZING TUBERCULOSIS CONTROL: TB, A MOBILE APP SOLUTION

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**Abstract**
Contracting an illness is universally undesirable. To prevent illness, individuals must remain vigilant of their surroundings and the potential hazards associated with contracting certain diseases. To assess the likelihood of contracting an infection, individuals typically need to conduct online research into various diseases. This could pose a significant challenge if the individual lacks access to an internet connection. This paper aims to identify those who are at risk of contracting Tuberculosis (TB) infections. The risk can be assessed by formulating a set of inquiries and administering them to the residents residing in the vicinity of Kota Samarahan, Sarawak. The risk level (on a scale of 12) can be established based on four key questions: the status of TB cases and contacts, the level of crowdedness in the surrounding region, and the quality of housing. A risk level of 4-6 indicates moderate danger, 7-9 indicates medium risk, and 10-12 indicates high risk. Prior data has also been utilised to identify high-risk locations and understand the factors contributing to the emergence of Tuberculosis hotspots. The mobile application can serve as a platform for distributing the questionnaire to evaluate the risk level of the respondents. The smartphone application, developed using Android Studio and Proto.io, has showcased its ability to identify individuals or contacts who may pose a new or probable risk of tuberculosis infections and diseases in the designated research area. The objective is to utilise regularly collected data, along with geographic information and census data, to determine specific areas with high rates of reported tuberculosis cases.

**Keywords:** *Tuberculosis, Infection, Mobile App, Solution*

## 1. INTRODUCTION

In this paper, we present a comprehensive approach to identifying individuals at risk of contracting Tuberculosis (TB) infections in the vicinity of Sarawak. The scope of this study is to develop an effective method for assessing the risk level of residents based on a set of inquiries, which will be administered to the local population. The objective is to utilize regularly collected data, along with geographic information and census data, and to determine specific areas with high rates of reported tuberculosis cases. This research aims to address the challenge faced by individuals in assessing the likelihood of contracting an infection without access to the internet. The pertinent literature has been briefly reviewed, highlighting the importance of remaining vigilant of one's surroundings and potential hazards associated with certain diseases. The methods section describes the formulation of a set of inquiries, which will be administered to residents in the designated area, to assess their risk level on a scale of 12. The risk level is determined based on four key questions: the status of TB cases and contacts, the level of crowdedness in the surrounding region, and the quality of housing. A risk level of 4-6 indicates moderate danger, 7-9 indicates medium risk, and 10-12 indicates high risk. Prior data has also been utilized to identify high-risk locations and understand the factors contributing to the emergence of Tuberculosis hotspots.

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The main results of the work showcase the development of a mobile application using Android Studio and Proto.io, which serves as a platform for distributing the questionnaire and evaluating the risk level of the respondents.

## 2. MATERIALS AND METHODS

The methodology for assessing the risk of Tuberculosis (TB) infections among residents in the vicinity of Sarawak, involves a comprehensive approach that combines the formulation of inquiries, administration of questionnaires, utilization of prior data, and integration of geographic information and census data. This methodology is designed to identify individuals or contacts who may pose a new or probable risk of tuberculosis infections and diseases in the designated research area.

Firstly, a set of inquiries will be developed to assess the risk level of residents on a scale of 12. These inquiries will focus on four key factors: the status of TB cases and contacts, the level of crowdedness in the surrounding region, and the quality of housing. The risk levels will be categorized as follows: 4-6 indicates moderate danger, 7-9 indicates medium risk, and 10-12 indicates high risk.

The inquiries will be administered to the residents residing in the vicinity of Sarawak, with a mobile application developed using Android Studio and Proto.io. This application will serve as a platform for distributing the questionnaire and evaluating the risk level of the respondents.

In addition to the inquiries, prior data will be utilized to identify high-risk locations and understand the factors contributing to the emergence of Tuberculosis hotspots. This information will be crucial in pinpointing specific areas with high rates of reported tuberculosis cases.

The study will also leverage regularly collected data, geographic information, and census data to provide a comprehensive understanding of the TB infection risk landscape in Sarawak. This data will be used to pinpoint specific areas with high rates of reported tuberculosis cases.

By following this methodology, the research aims to identify individuals or contacts who may pose a new or probable risk of tuberculosis infections and diseases in the designated research area. The findings of this study will contribute to the development of evidence-based policies and interventions that prioritize the prevention and control of tuberculosis infections, ultimately promoting a healthier and more resilient community.

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Figure 1: Rapid Prototyping

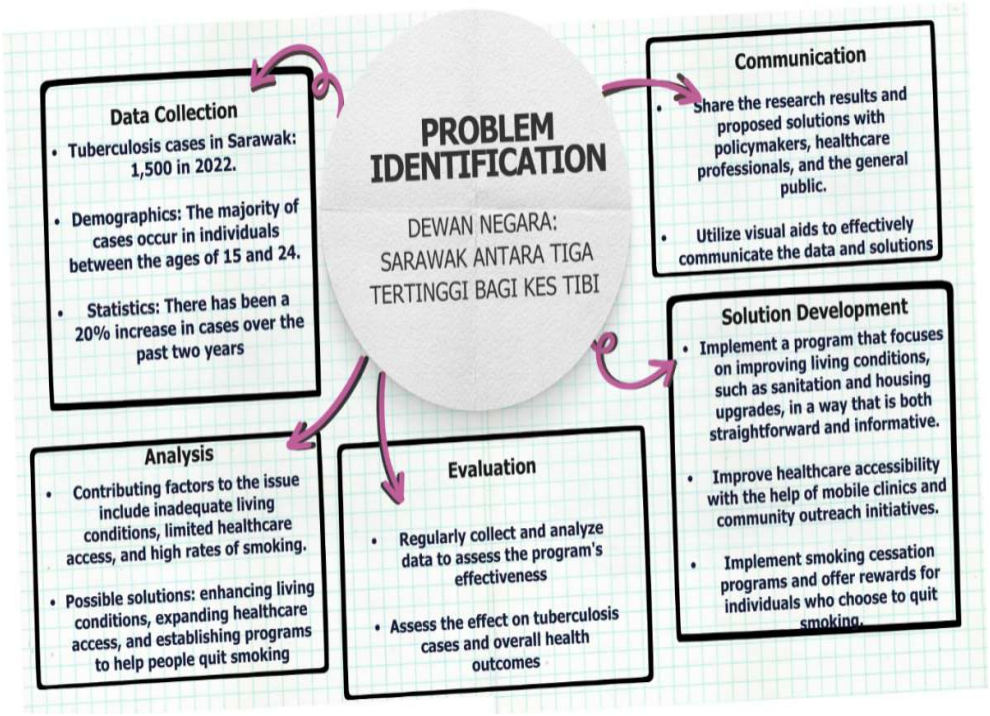

Figure 2: concept visualization.

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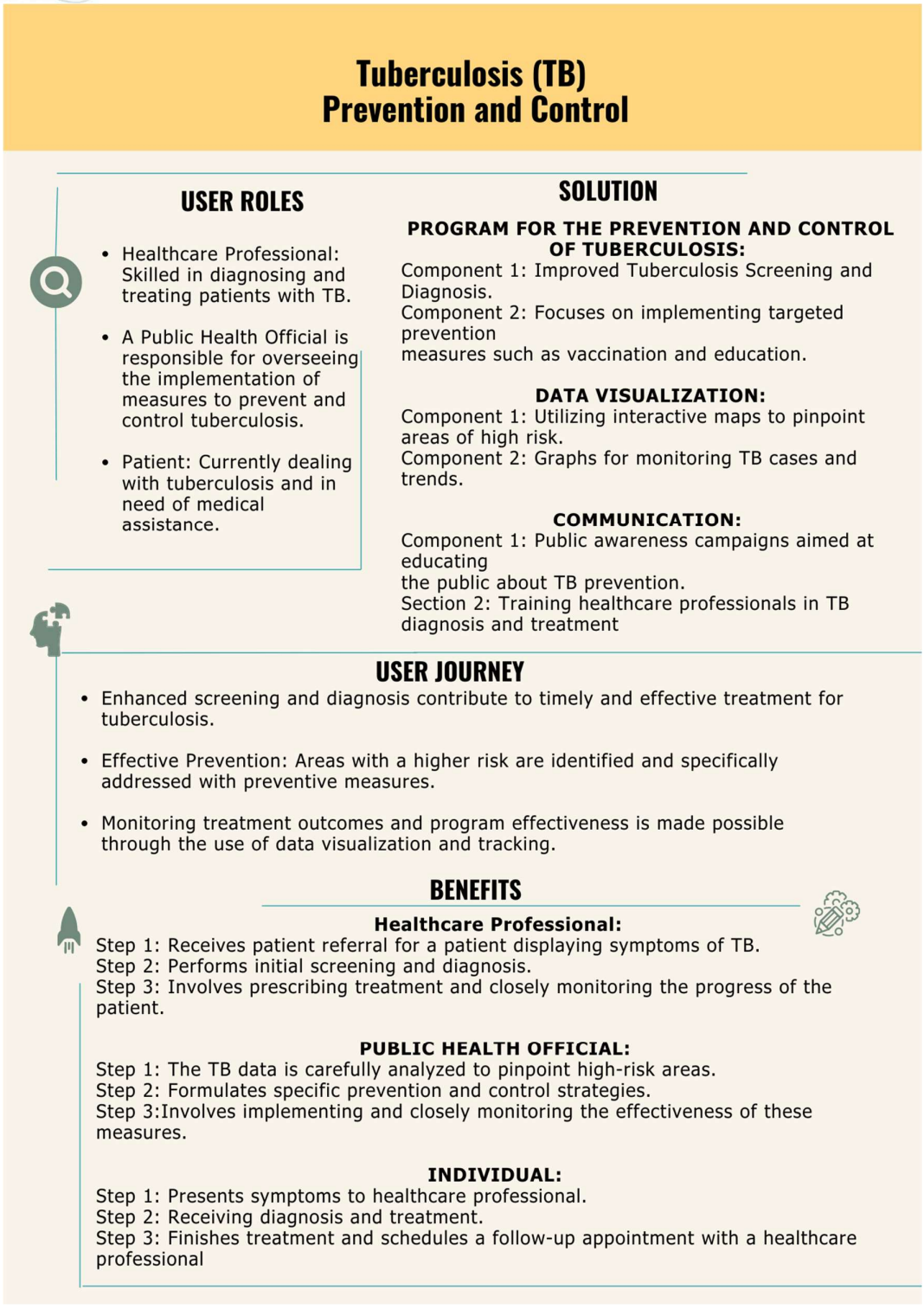


Figure 3: User Scenario

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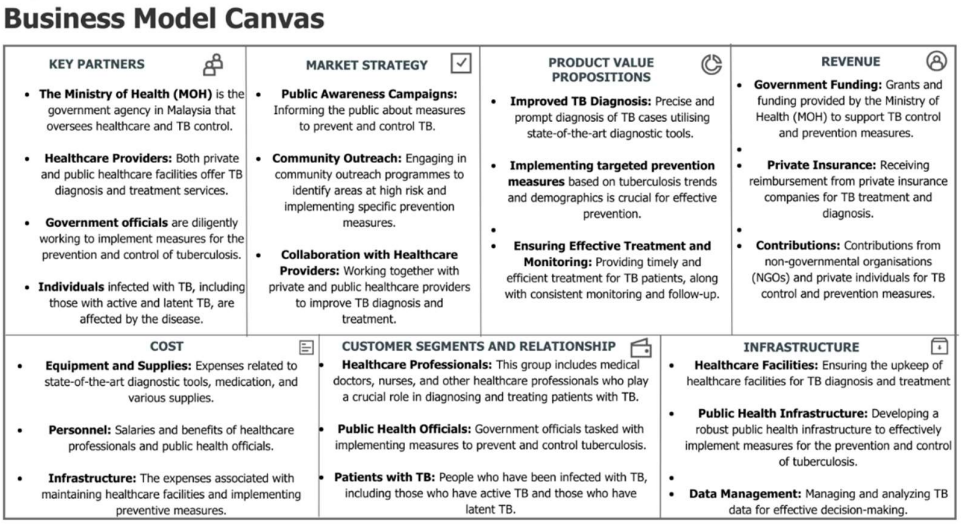


Figure 4: Business Model Canvas

## 3. RESULTS AND DISCUSSION

The study introduced a comprehensive risk assessment model to evaluate the likelihood of tuberculosis (TB) infection among residents of Kota Samarahan, Sarawak. The model employs a straightforward yet effective formula, **R = Q1 + Q2 + Q3 + Q4,** where Q1 represents the status of TB cases and contacts, Q2 indicates the level of crowdedness in the surrounding region, Q3 assesses the quality of housing, and Q4 reflects additional factors identified during data analysis. Each factor is scored based on specific criteria, with higher scores indicating higher risk levels. The cumulative risk score (R) ranges from 0 to 12 and is categorized as moderate danger (4-6), medium risk (7-9), and high risk (10-12).

A distribution of risk levels among the residents was found using the risk assessment model. According to the findings, a sizable section of the population was classified as being at medium to high risk, indicating areas that needed to be addressed right now. The study highlighted regions with high population densities, poor housing, and a history of tuberculosis cases as indicators of heightened risk levels. Targeted public health actions require this knowledge. The combination of GIS, census data, and regularly gathered data allowed for a thorough picture of the TB risk environment. By taking a comprehensive approach, it was possible to identify the underlying causes of tuberculosis (TB) and use that information to design tailored control tactics.

The implementation of a mobile application for TB risk assessment is a noteworthy development in disease control and public health surveillance. The real-time data collection and analysis capabilities of the app have various advantages. Firstly, the mobile app makes sure that locals may take part in TB risk assessments no matter how far they live. Because the software can work offline and sync data when connectivity is available, this is especially crucial in areas with spotty internet access. Second, the time and resources needed for conventional tuberculosis surveys are decreased by the automated data gathering and processing. Health officials can promptly identify locations and people at high risk, which facilitates urgent actions. Thirdly, the app encourages better community knowledge and participation in TB control efforts by incorporating residents in the risk assessment process. For public health efforts to be successful, this involvement is essential. Lastly, the app's comprehensive risk profiles make it possible to create focused, empirically supported solutions.

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For instance, funding for TB screening, treatment, and education initiatives can be given priority in high-risk locations.

One innovative method of disease control in Sarawak is the creation and deployment of a mobile application for TB risk assessment. The study effectively illustrated how the app may be used to promote community participation, TB surveillance, and evidence-based public health interventions. A number of actions are advised to guarantee this initiative's long-term viability and sustainability. These include expanding the app's reach to cover more areas and demographics, which will increase its impact, enhancing its usability and accessibility even further, integrating artificial intelligence and machine learning to improve data analysis and predictive capabilities, and securing continuous funding and resources to support the upkeep and growth of the mobile clinics and app infrastructure. In general, the amalgamation of digital instruments and community engagement holds promise for propelling tuberculosis control endeavours in Sarawak and other regions.

## 4. USING THE TEMPLATE FOR SEVERAL COMPONENTS

The risk level ***R*** for each resident is calculated using the following formula:

- ***R = Q1 + Q2 + Q3 + Q4***

where:
- ***Q1*** : is the score based on the status of TB cases and contacts.
- ***Q2*** : represents the score related to the level of crowdedness in the surrounding region.
- ***Q3*** : indicates the score based on the quality of housing.
- ***Q4*** : reflects any additional factors identified during data analysis.

Each *Q* score is determined based on specific criteria derived from the inquiries, with higher scores indicating higher risk levels. The risk level ***R*** ranges from 0 to 12, categorized as:
- **R = 4-6: Moderate danger**
- **R = 7-9: Medium risk**
- **R = 10-12: High risk**

This structure incorporates a basic formula for calculating the risk level based on the inquiries administered to residents.

## 5. CONCLUSION

As a conclusion, the primary goal of the project was to address the tuberculosis (TB) crisis in Sarawak through the development of a comprehensive and technologically advanced TB management system. The solution aimed to enhance communication, streamline processes, and encourage community cooperation, leading to better health outcomes. The solution was developed through multiple phases, including business canvas, rapid prototyping, user scenario, and concept visualization. One of the solutions was a health tracking app that tracked tuberculosis symptoms, medication compliance, and local medical facility information.

The significance of the project is it has the potential to use digital tools to revolutionize the way tuberculosis is managed in rural regions. This project has enhanced TB treatment and early detection, raised resident awareness, and improved the coordination of TB control activities. The project has broad practical ramifications since it provides a model that may be used to other areas with comparable health issues. However, the project faced several limitations.

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These included potential opposition from the community due to cultural beliefs, logistical difficulties in reaching remote areas, and sustaining funding and resources for mobile clinics. Additionally, limited internet connectivity and digital literacy in rural areas posed significant challenges.

Subsequent developments might concentrate on improving the app's usability and reaching additional locals. For the initiative to be successful eventually, it is imperative that the logistical issues associated with mobile clinics be resolved and that ongoing financing and resources are secured. Better monitoring and diagnostic capabilities can be achieved by integrating increasingly sophisticated technology, such as artificial intelligence, through further research and development. Overall, the study showed how crucial it is to use technology and community involvement together to effectively address health challenges. It can significantly affect TB control in Sarawak by resolving the issues and making ongoing improvements to the system.

## 6. ACKNOWLEDGMENT

In the pursuit of excellence in our project, *"REVOLUTIONIZING TUBERCULOSIS CONTROL: INTRODUCING TB, A MOBILE APP SOLUTION",* we humbly acknowledge the divine guidance and strength that enabled us to navigate this innovative endeavour successfully.

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## 7. REFERENCES

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*nar*

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