NATIONAL DEFENCE UNIVERSITY-KENYA

THESIS

THE EFFECTS OF TUBERCULOSIS ON YOUTH PRODUCTIVITY IN PROMOTING NATIONAL DEVELOPMENT IN KENYA

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DECLARATION

I, Dr. Caroline A. Asin, do hereby declare that this research project is my original work and has not been presented for an award in any other University;

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This research project has been submitted for examination with my approval as the University Supervisor;

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DEDICATION

To my loving husband and children for their tireless moral and material support during the entire period of study.

LIST OF ACRONYMS AND ABBREVIATIONS

AIDs	Acquired immunodeficiency syndrome
CDC	Center for Disease Control and Prevention
COVID 19	Corona Virus Disease
HIV	Human Immunodeficiency Virus
TB	Tuberculosis
MDR-TB	Multi-Drug Resistant Tuberculosis
NGOs	Non-governmental organizations
NYS	National Youth Service
ODK	Open Data Kit
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
USAID	United States Agency for International Development
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

CONCEPTUAL DEFINITION OF TERMS

For the purpose of this study, the following terms have been described and defined as follows:

Youth – According to the 2010 constitution of Kenya, a youth is any person at the age of 18-34 years.

Youth Productivity- In the context of this study, productivity is the ability of the youth to render their services to promote economic development in Kenya

Development – In economic perspectives, development is a process that creates positive change or growth.

Tuberculosis Disease-This is a bacterial infection caused by the bacterium Mycobacterium tuberculosis. It usually affects the lungs but can also affect other parts of the body such as the bones, kidneys and brain.

COVID 19 – This is Coronavirus disease 2019 which is a highly contagious viral illness caused by a very infectious virus named SARS-CoV-2(Severe Acute Respiratory Syndrome Coronavirus 2).

Effects – this refers to a change or a consequence caused by an action. In the context of this study, the word 'effects' has been used to show the consequences the youth suffer when they get infected with TB.

ABSTRACT

This study looked at the effects of Tuberculosis on youth productivity in promoting national development in Kenya. The study acknowledges that the youth in Kenya suffer the burden of Tuberculosis and consequently limited job opportunities. Empirical evidence for the study has been drawn from previous research, government reports and articles from various parts of the world. The study's objectives were to investigate the effects of TB on youth productivity in promoting national development, evaluate the challenges faced in managing Tuberculosis as well as the current approaches being used to manage Tuberculosis in Kenya. The findings of this research paper were attained through cross-sectional study design. In this design, the challenges in the management of Tuberculosis amongst the youth and young adults in Kenya were investigated. The sample size was identified through the Krejicie and Morgan (1970) table which shows that when the population is over 1 million, then the sample size is 384. Further, Mugenda and Mugenda (2003) argues that sample sizes of 10 to 30 per cent are sufficient for data analysis. Therefore, this study used 15% of the sample size, which was 59 respondents. The rest, 10 respondents were caregivers, nurses and doctors from whom data was collected by use of a key informant guide. Two data collection enumerators were recruited through the TB centres and data was collected through administering digital questionnaires to the respondents. The collected data was uploaded in Kobo collect server and later exported to excel CSV file for cleaning. This was then later exported to SPSS for analysis. Descriptive statistics were generated by SPSS. The narratives were analyzed according to topics and themes. The data was presented in percentages, tables and narratives. The study found out that TB causes negative effects on the socioeconomic aspects of the youth. Some of the challenges faced in the management of TB in the youth in Kenya are poor access to health facilities, lack of income, HIV infections, substance abuse, poor housing, poverty and poor implementation of policies by the government. The study recommends awareness creation amongst the youth on the importance of adhering to TB medication and establishing sustainable partnerships with the government for implementation of policies on TB prevention and management. This study has therefore generated several recommendations. One of them is that the government should create more avenues and programs that engage the youth that are infected or affected with TB like the Kazi kwa vijana program which is specifically for the youth. The government can also introduce a program to facilitate all TB patients with finances for transport so that they do not fail to attend their clinic days. Currently, this support is only given to the MDR-TB patients through donor funds yet even those patients with drug sensitive TB face several financial hardships. The study recommends awareness creation amongst the youth on the importance of adhering to TB medication and establishing sustainable partnerships with the government for implementation of policies on TB prevention and management.

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CHAPTER ONE

INTRODUCTION

1.1 Back ground

Tuberculosis is among the top global health challenges whose transmission rate is high when cohabiting with an infected person. Globally, over 10 million people were infected with TB in 2019 where over one million succumbed to the disease. In 2020, India, Pakistan, Philippines, some parts of West Pacific, Nigeria and Southern Africa accounted for the high cases of TB burden globally.[1] Tuberculosis is ranked 9th among killer diseases in the world.[2] According to WHO, in 2021, over 1.5 million people died from tuberculosis, 180,000 of whom had HIV. In the same year, COVID 19 killed more people. Through TB diagnosis and treatment, over 74 million lives were saved in 2021. According to SDGs by the United Nations, amongst the health targets by 2030 is ending the TB epidemic.[3]

Tuberculosis amongst the young is overlooked yet it can be problematic to diagnose and treat. The youth have extensive social contacts outside the household hence at a high risk of TB infections. This historical data has shown that TB is high amongst the youth where the infections can progress. However, it is not clear whether the youth are more vulnerable to the infection than young ones because it depends on the strength of transmission.[4] Globally, there are over 2 million young adults

[1] Chakaya, J., Khan, M., Ntoumi, F., Aklillu, E., Fatima, R., Mwaba, P., ... & Zumla, A. (2021). Global Tuberculosis Report 2020–Reflections on the Global TB burden, treatment and prevention efforts. *International Journal of Infectious Diseases*, *113*, S7-S12.
[2] Floyd, K., Glaziou, P., Zumla, A., & Raviglione, M. (2018). The global tuberculosis epidemic and progress in care, prevention, and research: an overview in year 3 of the End TB era. *The Lancet Respiratory Medicine*, *6*(4), 299-314.
[3] WHO. Tuberculosis. https://www.who.int/news-room/fact-sheets/detail/tuberculosis#:~:text=Key%20facts,with%20tuberculosis%20(TB)%20worldwide.
[44] Snow, K. J., Sismanidis, C., Denholm, J., Sawyer, S. M., & Graham, S. M. (2018). The incidence of tuberculosis among adolescents and young adults: a global estimate. *European Respiratory Journal*, *51*(2).

(15-24 years) who contracted TB in 2012, contributing to 17% of new infections.[5] Adolescents are also at risk of Tuberculosis due to household exposures as a study conducted in India revealed.[6]

In Kenya, TB ranks 9th among the killer and highly infectious diseases. In 2019, over 86,000 Kenyans were reportedly treated from TB with 10% of them being children.[7] TB management in Kenya is taken care of at the government's expense in the government health facilities. However, not all TB cases are reached out to and treated. According to a study conducted in 2020 on overcrowded universities in Kenya, 8.3% of 200 students tested positive for TB. This was as a result of sharing rooms/beds with index cases.[8] TB is preventable and curable but the disease continues to ravage vulnerable populations in Kenya and across Africa.[9]

Kenya is a very youthful country with those at the age of 18-35 years making approximately 75% of the population. A large percentage of this is unemployed and feel marginalized because there are inadequate opportunities, poor representation and participation.[10] The importance of the youth in contributing to peacebuilding, national security and challenging terrorism is gaining momentum in the international community. As such, the youth need to be empowered to shift from being

[5] Laycock, Katherine M., Leslie A. Enane, and Andrew P. Steenhoff. "Tuberculosis in adolescents and young adults: Emerging data on TB transmission and prevention among vulnerable young people." *Tropical Medicine and Infectious Disease* 6, no. 3 (2021): 148.

[6] Dolla, Chandra Kumar, Chandrasekaran Padmapriyadarsini, Kannan Thiruvengadam, Rahul Lokhande, Aarti Kinikar, Mandar Paradkar, Shrinivas Bm et al. "Age-specific prevalence of TB infection among household contacts of pulmonary TB: Is it time for TB preventive therapy?" *Transactions of The Royal Society of Tropical Medicine and Hygiene* 113, no. 10 (2019): 632-640.

[7] Harausz, Elizabeth P., Anthony J. Garcia-Prats, Stephanie Law, H. Simon Schaaf, Tamara Kredo, James A. Seddon, Dick Menzies et al. "Treatment and outcomes in children with multidrug-resistant tuberculosis: a systematic review and individual patient data meta-analysis." *PLoS medicine* 15, no. 7 (2018): e1002591.

[8] Maina, Teresia, Annie Willetts, Moses Ngari, and Abdullahi Osman. "Tuberculosis infection among youths in overcrowded university hostels in Kenya: a cross-sectional study." *Tropical Medicine and Health* 49, no. 1 (2021): 1-11.

[9] MoH 2020. Kenya launches new policies to stop TB Nairobi, Tuesday June 30, 2022**. Accessed on 19th July, 2022 from**https://www.health.go.ke/kenya-launches-new-policies-to-stop-tb-nairobi-tuesday-june-30-2020/#:~:text=In%20Kenya%2C%20TB%20is%20the,the%20country%20as%20of%202019.

[10] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ohchr.org/sites/default/files/Documents/Issues/Youth/D_Odondi_Kenya.pdf

victims of violence to agents of positive change and peace.[11] One of the greatest challenges in the implementation of this framework in Africa continent is lack of opportunities for the youth.[12] In a country where there are limited job opportunities for the youth, disease burden can worsen the situation and render the youths unproductive towards national development opportunities. Kenyan youth are recruited in the National Youth Service, police, military and technical schools where they get opportunities to engage in nation building activities. This is in line with Vision 2030 that advocates for provision of appropriate technical, entrepreneurial and life skills for the youth to progress in life.[13] Youth are very key in achieving the development goals in Kenya, Vision 2030 and the sustainable development goals which advocate for education, gender equality, decent work and climate change which are agendas that the youth have to take lead in.[14]

Diseases like Tuberculosis and HIV/AIDS among others can affect the youth and consequently national development. According to UNICEF, there were about 1.71 million on average adolescents living with HIV/AIDS globally in 2021. Adolescents account for 5% out of the 11% of adults living with the diseases globally.[15] According to CDC, the youth account for over 20% of new HIV diagnoses. African youths accounts for 82% of the newfangled infections. There is a growing and worrying trend of infections amongst the youth as the advocacy for Social Change revealed.[16] The youth normally tend to experiment with drugs, alcohol, substance abuse and indulge in unsafe sexual practices. According to the National AIDs Control Council, males aged

[11] UN Security Councli resolutions

[12] Williams, M. (2016). Youth, peace, and security: A new agenda for the Middle East and North Africa. *Journal of International Affairs*, *69*(2), 103-114.

[13] GoK. Vision 2030.

[14] UN. The 17 SDG Goals. Retrieved from https://sdgs.un.org/goals

[15] Adolescents HIV Prevention. Accessed on 20th October from https://data.unicef.org/topic/hivaids/adolescents-young-people/#:~:text=Adolescents%20and%20young%20people%20represent,ages%20of%2010%20and%2019.

[16] https://www.cdc.gov/hiv/basics/statistics.html#:~:text=Young%20people%20aged%2013%20to,13%20to%2024%20in%202020.

15-35 years are more affected by the HIV disease because of their "don't care attitude".[17] These men suffer silently due to the fear of stigmatization.

The problem of HIV/ AIDS infections amongst the youth has been compounded by poverty, unemployment and cultural practices that encourage girls to be submissive. The population of the youth is burgeoning and there are no job opportunities to absorb them. Some of those that are lucky to secure jobs cannot sustain their basic needs because they live from hand to mouth; the vicious cycle of poverty. Consequently, majority of the youth lack adequate food and income to replenish their lives. This makes them vulnerable to immoralities through which they contract the disease.

Additionally, the rising infections have been driven by COVID 19, which has caused the youth to lose their sources of income and has therefore resulted to their indulgence in drugs, alcohol and substance abuse. This has equally led to the new infections. The six months lock down in Kenya that happened when COVID 19 struck the country has contributed greatly to rising cases of HIV/AIDS amongst young people in Kenya as well as gender-based violence.[18] The youth play a vital part in refreshing the current status of leadership, skills and innovations in our society. It becomes challenging to advance in these undertakings when one has health issues.

The youthful energy and capabilities are key in peacebuilding work, mediation, humanitarian work and community mobilization. In this regard, the government needs to harness the potential of the youth to develop and secure Kenya. The current challenge of rising infections amongst the youth implicates negatively on the government's agenda of empowering the youth. Recruitment of the youth with an aim of working towards various National Security aspects can be affected by

[17] GoK. Kenya HIV Estimates Report 2018. Retrieved on 20.10.22 from chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://nacc.or.ke/wp-content/uploads/2018/11/HIV-estimates-report-Kenya-20182.pdf
[18] UNAIDS. What people living with HIV should know about COVID 19. https://www.unaids.org/en/covid19

HIV/AIDS and other infectious diseases. A generation of young people suffering from infectious diseases such as HIV/AIDS cannot be fit to participate in nation building activities.

1.2 Statement of the Research Problem

The World Health Organization (WHO) earmarks TB as one of the top infectious and killer diseases in the world. In 2020, there was an estimated 10 million people who got infected with TB. Additionally, there were approximately 1.5 million people who died from TB.[19] In Kenya, TB ranks 9th among the killer and highly infectious diseases. In 2019, over 86,000 Kenyans were reportedly treated from TB with 10% of them being children.[20] TB management in Kenya is taken care of at the government's expense in the government health facilities. However, not all TB cases are reached out to and treated. These figures stress the weighty impact of TB in the world. TB has substantial effects on the youth by affecting their physical health, leading to social and economic consequences. The youth may face challenges with employment, education, and in all aspects of life generally. Economic wise, individuals infected with TB may have challenges in covering the costs for TB treatment, lose their source of income due to disease burden leading to economic losses. Additionally, stigma may force the youth to take a break to receive TB treatment resulting to challenges in development of their skills. The disease deprives the youth off their energy, sources of income and self-esteem and they can therefore not participate optimally in nation building and promotion of national development and security.

[19] De Souza, C. D. F., H. S. Coutinho, M. M. Costa, M. A. F. M. Magalhães, and R. F. Carmo. "Impact of COVID-19 on TB diagnosis in Northeastern Brazil." *The International Journal of Tuberculosis and Lung Disease* 24, no. 11 (2020): 1220-1222.

[20] Harausz, Elizabeth P., Anthony J. Garcia-Prats, Stephanie Law, H. Simon Schaaf, Tamara Kredo, James A. Seddon, Dick Menzies et al. "Treatment and outcomes in children with multidrug-resistant tuberculosis: a systematic review and individual patient data meta-analysis." *PLoS medicine* 15, no. 7 (2018): e1002591.

In Kenya, there is a growing concern regarding the impact of tuberculosis on the productivity of the youth population, and its subsequent influence on the overall national development efforts. The youth may be constrained from undertaking their duties due to disease burden. The young people may shy away from getting diagnosed from TB or it may be difficult to get diagnosed. Those joining different sectors to support nation building such as the military, police, National Youth Service, Jua-Kali sector and others may be hindered by this disease because they cannot work since the disease is air borne and spreads very fast. Despite progress in healthcare, there is a need to comprehensively understand the specific effects of tuberculosis on youth productivity and its implications for the broader socio-economic landscape in Kenya. As such, this study investigates the effects of tuberculosis on youth productivity and its contribution to or hindrance of national development in Kenya.

1.3 Research Questions

The overall research question for this study is:

What are the effects of TB on youth productivity in promoting national development in Kenya?

The specific research questions are as follows:

1.3.1 How does TB affect youth's productivity in promoting national development in Kenya?

1.3.2 What are the challenges in managing TB in Kenya?

1.3.3 What approaches are being used to manage TB effectively towards promoting youth productivity in national development in Kenya?

1.4 Study Objectives

The following were the objectives of the study:

1.4.1 General Objective

The key objective of the study is to examine the effects of Tuberculosis on youth productivity in promoting national development in Kenya

1.4.2 Specific Objectives

1. To investigate the effects of TB on youth's productivity in promoting national development in Kenya.
2. To evaluate the socioeconomic challenges in managing Tuberculosis to attain youth productivity in promoting national development in Kenya.
3. To evaluate the approaches towards effective management of Tuberculosis to attain youth productivity in promoting national development in Kenya.

1.5 Justification of the Study

This section shows rationale or the importance of the study. It shows both the policy and academic justification of the study.

1.5.1 Policy justification

Policy and decision makers may use these research findings to rank the challenges experienced in management of TB in Kenya, and provide better planning and effective execution of TB programs. Policy makers can also use this information and recommendations in developing guidelines and policies for youth engagement in nation building and enhancing national security. This study shall

provide data back up to be used by the Ministries of Health and Devolution and also in other ministries as well as in Technical and Vocational education and trainings in decision making processes.

1.5.2 Academic Justification

The study examines the effects of TB disease on youth productivity in promoting national development. The study brings out the various challenges that the youth go through, especially those with tuberculosis. It adds to other studies on Tuberculosis and youth development such as Barriers to treatment of Tuberculosis amongst the Youth in Sub-Saharan Africa by Sullivan and others[21]; tuberculosis amongst the incarcerated youths[22]; socioeconomic effects of TB in youths[23] amongst other studies. This research paper can be used by scholars for future reference. The study findings shall add to the literature on the youth and nation-building. The study is a valuable academic paper for the researcher.

1.6 Significance of the Study

This study is significant because it documents the effects of TB on youth's productivity in Kenya. The study documents the challenges faced by the youth infected with TB in Kenya, which gives a picture of the situation in the developing countries. The findings of the study emphasize on policy implementation to attain the Kenya's vision in eradicating Tuberculosis.

[21] Sullivan, Brittney J., B. Emily Esmaili, and Coleen K. Cunningham. "Barriers to initiating tuberculosis treatment. *health action* 10, no. 1 (2017): 1290317.
[22] Risser, William Leigh, and Kim Connelly Smith. "Tuberculosis in incarcerated youth in Texas." *JAMA* 293, no. 22 (2005): 2713-2717.
[23] Gelaw, Sifrash Meseret. "Socioeconomic factors associated with knowledge on tuberculosis among adults in Ethiopia." *Tuberculosis Research and Treatment* 2016 (2016).

1.7 Assumptions of the Study

In conducting this study, there were several assumptions made to guide the methodology and interpretation of the findings. Firstly, the study assumed that TB is a significant health issue in Kenya, as based on the epidemiological data. secondly, the study assumed that TB has a measurable impact on youth productivity by reducing their capacity to perform at work. Thirdly, the study assumed that the youth are very key in contributing to national development in Kenya. Lastly, it was assumed that socioeconomic factors such as income, education and healthcare affect prevalence of TB

1.8 Study Scope

The study on the effects of TB on youth productivity in promoting national development focused on the youth in Kenya, those that have been affected or infected with TB and the challenges they may have encountered as a result of the disease burden. TB infection is a sensitive issue which the affected and infected individuals may not freely share information on unless they are dealing with a trusted health worker.

The study was undertaken in two sub counties in Nairobi county. These were Dagoretti and Langata sub-counties. The respondents were drawn from 4 hospital facilities with TB centers, two per each sub-county.

1.9 Limitations of the study

The researcher made use of the available resources to undertake the study. However, there was the challenge of getting data from the youth. In the TB centres visited, there were few youths, some of which shy away from giving information. It took a lot of internal processes to have the government of Kenya and the relevant institutions approve the research study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview of Tuberculosis in Kenya

Tuberculosis is a serious health challenge in Kenya. Every year, about 140,000 Kenyans develop TB with ¾ of the number suffering from HIV and AIDs while a ¼ of the same die from the disease.[24] Tuberculosis is ranked as the 4th cause of deaths in Kenya with nearly 2 Kenyans dying every hour from the disease despite the treatments available.[25] Kenya has made progress in the fight against TB, and was among the first countries to achieve and implement World Health Organization (WHO) guidelines in Africa.[26] Dues to these efforts, new infections and deaths have reduced and Kenya has ensured that families with TB patients are not burdened with the TB expenses.[27]

The government of Kenya spends 6.7 billion shillings each year to detect TB cases and equip health facilities to manage TB patients. This budget may seem high but any effort towards lengthening the lives of TB patients would ultimately lead to additional productive Kenyans. Life is expensive and cannot be valued because we do not know the potential of everyone. TB takes time to manifest with 5% of those infected developing active TB in eighteen months. Research has shown that the risk of contracting TB increases with HIV infection.[28]

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[24] McMillen, Christian W. *Discovering tuberculosis: a global history, 1900 to the present*. Yale University Press, 2015.
[25] Onyango, Dickens O., Courtney M. Yuen, Kevin P. Cain, Faith Ngari, Enos O. Masini, and Martien W. Borgdorff. "Reduction of HIV-associated excess mortality by antiretroviral treatment among tuberculosis patients in Kenya." *PloS one* 12, no. 11 (2017): e0188235.
[26] Graham, Stephen M. "Treatment of paediatric TB: revised WHO guidelines." *Paediatric respiratory reviews* 12, no. 1 (2011): 22-26.
[27] https://www.copenhagenconsensus.com/publication/kenya-perspective-tuberculosis
[28] Ibid

Most diagnosed cases of TB respond well to drugs. Those patients that fail to complete drugs develop drug resistance which becomes difficult and costly to treat 2.6% of TB cases in Kenya are MDR-TB. TB treatment takes months with the least duration being 6 months.[29] The TB patients may lose their livelihoods and drive their families to poverty, thereby increasing the disease burden. Poverty can discourage TB patients and their families from seeking treatment because of high costs of treatment, loss of livelihood and poor nutrition which reduces the chances of cure. It is important for the concerned departments to address TB, HIV/ AIDs and poverty amongst the TB patients and their families. Through the End TB strategy, Kenya has embraced the holistic approach of working with local communities, politicians, NGOs, governments and medical professionals towards a strengthened community healthcare provision to improve social support, counselling and taking medications as advised by the doctor.[30]

The commonly used method in testing TB is through sputum that is diagnosed through microscopy. This method may miss some tests.[31] However, there are new but expensive testing methods that can also detect drug-resistant infections. Kenya recorded an 86% cure rate for tuberculosis in the last year. HIV/AIDs infections have been found to increase TB infections and therefore the focus should be on controlling both. Kenyans infected with HIV and AIDs are at the danger of contracting TB which might increase their chances of mortality. HIV patients with TB are given preventive therapy to avoid the disease from progressing further. Similarly, expectant women are

[29] Ibid
[30] Vinny Wooding. World TB Day: Experiences of TB in Kenya. March 2022. Retrieved on 5th September from https://www.results.org.uk/blog/world-tb-day-experiences-tb-kenya
[31] Aung, Wah Wah, Mar Mar Nyein, Ti Ti, and Win Maung. "Improved method of direct microscopy for detection of acid-fast bacilli in sputum." *Southeast Asian journal of tropical medicine and public health* 32, no. 2 (2001): 390-393.

highly vulnerable to TB with some of the women developing MDR-TB.[32] Kenya has immensely benefited from the Global Fund in fighting the cases of TB, HIV and Malaria. TB patients who have benefitted from the program continue to urge the government to keep fighting to secure and allocate more funding towards provision of free of charge TB medication to the patients.

TB healthcare system in Kenya is challenged with poor logistics, stigma and inadequate community understanding of the disease. COVID -19 exacerbated the challenges further. Courtesy of the Global Fund, lab workers, doctors and nurses in Kenya go out of their way to treat TB patients so that they can resume their normal duties. Managing COVID 19 has eaten in to the funding and resources meant to treat TB with access to medical supplies for TB treatment taking longer than it used to be. COVID 19 and TB are similar in nature and symptomatology and therefore TB facilities were repurposed to deal with COVID 19.[33] It has been hypothesized that there will be more TB infections in the near future because right now, a lot of attention has gone towards fighting COVID 19 at the expense of TB.

During World TB Day on 24th March 2023, some challenges that affect Kenya in tackling TB were highlighted. There is need for improved diagnoses of TB so that we have more labs that can diagnose complex tests. This will reduce the distance and time of testing for TB. Kenya should invest more in TB programming and establish more partnerships with donors. More community sensitization is necessary to deal with stigma that may have resulted to TB patients not giving their samples for testing.

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[32] Park, Paul H., Cornelius Magut, Adrian Gardner, Dennis O. O'yiengo, Lydia Kamle, Bernard K. Langat, Nathan G. Buziba, and E. Jane Carter. "Increasing access to the MDR-TB surveillance programme through a collaborative model in western Kenya." *Tropical Medicine & International Health* 17, no. 3 (2012): 374-379.

[33] Cilloni, Lucia, Han Fu, Juan F. Vesga, David Dowdy, Carel Pretorius, Sevim Ahmedov, Sreenivas A. Nair et al. "The potential impact of the COVID-19 pandemic on the tuberculosis epidemic a modelling analysis." *EClinicalMedicine* 28 (2020): 100603.

During the upcoming UN High-Level Meeting on the fight to end Tuberculosis in September 2023, one of the important issues to be discussed is on SDG 3.3: Ending the TB pandemic by 2030. There is need for increased funding to hit the set goals set during the High-level meeting that was held five years ago. TB advocates around the world mobilize funds around the Global Fund which has seen government make commitments to end TB.

2.2 Tuberculosis Effects On Youth Productivity In Promoting National Development In Kenya

Adolescents and young adults (10-24years) are a set of age group that is understudied even as the world continues to work towards ending Tuberculosis. Tuberculosis was the leading cause of global deaths due to infectious diseases prior to COVID- 19. The situation was worsened by the unavoidable mixing of the various interventions towards the management of the two diseases which belong to the same family as a result of the Covid-19 pandemic. TB care and prevention strategies do not categorically consider the adolescents and young adults but classifies them as either children or adults. This age group have a set of developmental, social and physiologic characteristics that need to be closely monitored. This section will delve in to how Tuberculosis has affected the youth, prevention and control of TB amongst the youth and young adults as well as focus on their developmental needs.

Tuberculosis is now affecting the developing countries more due to the impact of old socioeconomic determinants such as HIV/ AIDs and antimicrobial drug resistance as well as virulent strains.[34] Socioeconomic development has been pointed out to be the key determinant in fighting TB in the developing countries. Although socioeconomic factors are key components of

[34] Dye, C., K. et al "Trends in tuberculosis incidence and their determinants in 134 countries.

the TB pandemic in the developing countries, researchers are still exploring how poverty affects the spread of TB. When TB becomes resistant, it affects the poor more.

In 2017, Kenyan statistics estimated that in every 100,00 population, there are over 300 cases of tuberculosis while mortality rate was estimated at 50 people from the population.35 According to Gichuki and Mategula (2021), people infected with tuberculosis are highly susceptible to HIV/AIDs while males living in the urban areas have a higher burden of the disease. Additionally, tuberculosis burden is high in Kenya especially in the rural and informal settlements where most of the Kenyans live with poor access to proper treatment due to financial, physical and socio-cultural barriers. People with HIV / AIDs have a 15 to 22 times likelihood of having tuberculosis. Over 40% of TB cases were not necessarily detected at the health facilities which was an indicator that there could be more people suffering from the disease who have not gone for medical checkup or the diagnosis has not been done.[36]

Although the deaths resulting from tuberculosis have shown a decreasing trend from 2005 to date, majority of the deaths resulting from tuberculosis and related complications are between the ages of 30-39 years. There have been interventions aimed at addressing the challenge of tuberculosis in Kenya but the number of new infected youth and sufferings continue to increase every day due to poor health seeking behavior, poverty and substance abuse.

Pediatric cases and the youth together make over 10 % of new TB infections in Africa. Additionally, there are more children and youth infected with tuberculosis in Africa than the rest

[35] Zumla A, Petersen E, Nyirenda T, Chakaya J. Tackling the tuberculosis epidemic in sub-Saharan Africa - unique opportunities arising from the second European developing countries clinical trials partnership (EDCTP) programme 2015-2024. Int J Infect Dis. 2015; 32:46–9. Available from: https://www.ijidonline.com/article/S1201-9712(14)01757-3/fulltext. https://doi.org/10.1016/j.ijid.2014.12.039.

[36] Gichuki, Judy, and Donnie Mategula. "Characterisation of tuberculosis mortality in informal settlements in Nairobi, Kenya: analysis of data between 2002 and 2016." *BMC Infectious Diseases* 21, no. 1 (2021): 1-8.

of the other parts of the world.[37] The youth, are considered to be the most productive lot in a population. During this stage, the youth are able to define and build their careers which is very significant in enhancing the development of a nation. TB infections in schools, colleges and prisons cause devastating effects which can negatively impact on nation-building activities.

2.2.1 Tuberculosis Amongst the Youth

The Tuberculosis burden amongst the youth and young adults is unclear because WHO has historically mislaid adolescent groups and classified them either as adults (15 years) or children (0-14 years). A study conducted in 2012 indicated that close to three million adolescents and young adults had cases of TB.[38] Research has shown that TB infection increases throughout adolescents[39]. Before invention of TB medication and emergence of HIV, TB progression has been increasing amongst the youth and children. Majority of these cases were developing the disease within one year of being exposed to the infection.[40] Puberty comes with body physiological changes, among them immunity which can increase the level of progression of TB.[41] During adolescence, a disease may shift from being less transmissible to highly transmissible forms.[42]

There is no gender difference on how TB affects girls and boys. However, the risk of girls getting the TB disease increases during menarche as compared to boys. Those with both HIV and TB have

[37] Sullivan, Brittney J., B. Emily Esmaili, and Coleen K. Cunningham. "Barriers to initiating tuberculosis treatment in sub-Saharan Africa: a systematic review focused on children and youth." *Global health action* 10, no. 1 (2017): 1290317.
[38] Snow, et al. "The incidence of tuberculosis among adolescents and young adults: a global estimate." *European Respiratory Journal* 51, no. 2 (2018).
[39] Seddon, et al. "The wonder years: what can primary school children teach us about immunity to Mycobacterium tuberculosis?" *Frontiers in immunology* 9 (2018): 2946.
[40] Marais, et al., "The clinical epidemiology of childhood pulmonary tuberculosis: a critical review of literature from the pre-chemotherapy p. 278-285.
[41] Cruz et al., Adolescents with tuberculosis: p. 937-941.
[42] Chiang, Silvia S., Maria Dolynska, Natasha R. Rybak, Andrea T. Cruz, Omowunmi Aibana, Yana Sheremeta, Vasyl Petrenko et al. "Clinical manifestations and epidemiology of adolescent tuberculosis in Ukraine." *ERJ Open Research* 6, no. 3 (2020).

a higher mortality rate. A study has shown that female adolescents have twice the risk of mortality from TB than their male counterparts.[43] Research has also shown that older males are more vulnerable to TB. The reason behind these sex differences is the fact that there are high HIV infections amongst females, women are more susceptible to TB during menarche, TB is risky with pregnancy, among other reasons that may not have been identified yet.[44]

It has been hypothesized that adolescents and young adults may share similar factors for progression of TB. For instance, there is an increasing number of youths with Diabetes mellitus and obesity. There is a high abuse of alcohol and drugs amongst the youth.[45] However, there is TB preventive treatment that can stop progression of the disease and reduce transmission cases.[46] However acceptable the adolescents and young adults may be, they need to adhere to treatment and completion to realize the results. Treatment involves adherence to multiple medication under the provision of comprehensive services tailored to the needs of the adolescents and young adults. This never used to happen but is now being taken in to consideration.[47] Global TB programs do not have adolescents and young adults -specific strategies to help them complete their TB treatment.[48]

[43] Osman, Muhammad, Karen du Preez, James A. Seddon, Mareli M. Claassens, Rory Dunbar, Sicelo S. Dlamini, Alex Welte, Pren Naidoo, and Anneke C. Hesseling. "Mortality in South African children and adolescents routinely treated for tuberculosis." *Pediatrics* 147, no. 4 (2021).
[44] Seddon, James A., Silvia S. Chiang, Hanif Esmail, and Anna K. Coussens. "The wonder years: what can primary school children teach us about immunity to Mycobacterium tuberculosis?" *Frontiers in immunology* 9 (2018): 2946.

[46] Getahun, Haileyesus, Alberto Matteelli, Richard E. Chaisson, and Mario Raviglione. "Latent Mycobacterium tuberculosis infection." *New England Journal of Medicine* 372, no. 22 (2015): 2127-2135.
[47] Snow et al.
[48] Enane, L. A., J. Eby, T. Arscott-Mills, S. Argabright, C. Caiphus, B. Kgwaadira, A. P. Steenhoff, and E. D. Lowenthal. "TB and TB-HIV care for adolescents and young adults." *The International Journal of Tuberculosis and Lung Disease* 24, no. 2 (2020): 240-249.

2.2.2 Vulnerability of the Youth to Tuberculosis

A certain group of marginalized youth may be more vulnerable to TB, which increases their risk of acquiring the diseases coupled with challenges in accessing healthcare. The vulnerable categories are the homeless, those in substance abuse as well as those detained and the displaced. There is poor data to capture the efforts in measuring TB risks and outcomes of these categories of patients.[49] It has been found that displaced people are prone to TB due to overcrowding, stress, poverty, malnutrition, delayed diagnosis, delayed treatment and disruption of healthcare systems.[50]

The number of youth living with HIV and AIDS has declined over time. However, the progress is behind the global targets. For instance, in 2019, over 3 million youth globally (15-24 years) were infected with HIV and AIDs which makes them more vulnerable to TB.[51] According to the global tuberculosis surveillance dataset, TB caseload increased between early adolescent hood to young adulthood. This is consistent with the global burden of disease 2013.[52]

2.2.3 Youth in Development

According to the USAID Youth in Development policy, the youth should meaningfully participate in their communities, organizations, economies, schools, peer groups and families to enhance their

[49] Walker, Timothy M., Matthias Merker, Astrid M. Knoblauch, Peter Helbling, Otto D. Schoch, Marieke J. Van Der Werf, Katharina Kranzer et al. "A cluster of multidrug-resistant Mycobacterium tuberculosis among patients arriving in Europe from the Horn of Africa: a molecular epidemiological study." *The Lancet Infectious Diseases* 18, no. 4 (2018): 431-440.
[50] Lönnroth, K., Z. Mor, C. Erkens, J. Bruchfeld, R. R. Nathavitharana, M. J. Van Der Werf, and C. Lange. "Tuberculosis in migrants in low-incidence countries: epidemiology and intervention entry points." *The International Journal of Tuberculosis and Lung Disease* 21, no. 6 (2017): 624-636.
[51] Armstrong, Alice, Jason M. Nagata, Marissa Vicari, Cadi Irvine, Lucie Cluver, Annette H. Sohn, Jane Ferguson et al. "A global research agenda for adolescents living with HIV." *Journal of Acquired Immune Deficiency Syndromes (1999)* 78, no. 1 (2018): S16.
[52] Murray, Christopher JL, Katrina F. Ortblad, Caterina Guinovart, Stephen S. Lim, Timothy M. Wolock, D. Allen Roberts, Emily A. Dansereau et al. "Global, regional, and national incidence and mortality for HIV, tuberculosis, and malaria during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013." *The Lancet* 384, no. 9947 (2014): 1005-1070.

skills and opportunities for healthy relationships. Every state needs to engage their youth in leadership and development issues to achieve their development objectives. The skills possessed by the youth aged 10-29 years is very key in development work. Engaging the youth in development issues with exposure to the rapidly changing world is important. Every state therefore has a responsibility to invest in the youth and involve them in shaping development interventions. The youth can work together with their governments and development partners to deliver services and create opportunities.

In the world today, the youth should have rights and opportunities to pursue their goals as they contribute towards development. The youth should be facilitated to access high quality information and livelihood opportunities that facilitate them to build their skills. They should be part of the decision making to contribute to individual, household and community well-being. States should invest in systems that give the youth a stronger collective voice at all levels and promote youth development.[53]

It is known that the youth are a great asset to future development. Intelligence, hardworking and empowered youth can take a country on the pathway of success. The youth may be partners today, but may become our leaders of tomorrow. They are enthusiastic and have the ability to learn and achieve their goals. Irrespective of whatever development pathway a country wants to take, active participation of the youth is required. The youth need to be helped to undertake their roles properly.

To help the youth to achieve their potential, the state must introduce programs to fight unemployment, corruption, poor education, disease burden and other vices. Elimination of any

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53 https://www.usaid.gov/policy/youth#:~:text=The%20goal%20of%20the%20USAID,may%20build%20on%20their%20collective

form of inequalities amongst the youth is important irrespective of gender, race, caste, creed, and religion. Nepotism and favoritism must be avoided at all costs because they eat away at the various talents within a country. The youth have the power to build a nation and must be given the opportunity to tap in to their zeal, enthusiasm and energy to develop a prosperous nation. The youth need to be given equal opportunities in every field and provided with facilities that will encourage them to work towards achieving success.

According to the UN World Youth Report[54] the youth have jointly helpful roles in the new agenda. The 2030 development agenda enhances the progressive development efforts of the youth and examines policies that help accelerate youth objectives. Besides benefiting from this agenda, the youth are very active in designing progressive ideas and have continued to be engaged in the development processes including implementation, monitoring and reporting. The Civil Society organizations including youth led organizations are involved in designing specific goals and targets. Today, the world has over 1.2 billion adolescents and young adults (15-24 years) which is 16% of the global population. This big number clearly indicates the importance of engaging the youth development initiatives that are sustainable to achieve equal and inclusive societies as well as avert threats and challenges of sustainable development such as climate change, poverty, and inequalities. Education and employment are fundamental to overall youth development.

The UN Youth development agency has partnered with the common wealth secretariat to lead youth accountability in the SDGs: a guide to national action. This guide outlines the different ways to leverage youth chances and be part of government processes such as reviewing national plans.[55]

[54] United Nations. Department of Economic and Social Affairs. *World youth report: Youth and the 2030 agenda for sustainable development*. New York: United Nations Publications, 2018.
[55] Verma, Suman, and Anne C. Petersen. "Developmental science and pathways to sustainable development for children and youth." In *Developmental science and sustainable development goals for children and youth*, pp. 1-35. Springer, Cham, 2018.

Through this agency, the youth in common wealth countries have been engaged in decision making processes to support change. These countries believe that without youth power, global goals will fail.

The youth can get involved in a country's development agenda through various ways. Firstly, the youth can involve themselves in local Non-Governmental Organizations (NGOs) in supporting development efforts. There are so many examples of such NGOs in the world. For example, the butterfly project in India where marginalized and young women are empowered with skills and confidence to tell their stories. Through this forum, young women can address their issues of identity, sexuality, reproductive rights and discrimination through the media.[56] These digital stories have enabled disenfranchised young women and girls to become powerful advocates in the community to deal with inequalities and freedom from violence.

Secondly, the youth may get involved in local politics which gives them a platform to raise awareness of youth issues and demand for the change that they want. Youth can be involved in promoting and maintaining international peace and security. Youth4Peace is a UN -led initiative in supporting the youth to participate in peacebuilding initiatives.[57]

2.2.4 How Tuberculosis has affected Youth engagement in Development Agenda

Youth engagement can be interpreted in many ways e.g., enrolling the youth to be program beneficiaries, involvement of the youth in decision making, policy making, program design and in advocacy work. According to Youth leadership institute, youth engagement is the active,

[56] Mueller, Megan Kiely, Erin Phelps, Edmond P. Bowers, Jennifer P. Agans, Jennifer Brown Urban, and Richard M. Lerner. "Youth development program participation and intentional self-regulation skills: Contextual and individual bases of pathways to positive youth development." *Journal of adolescence* 34, no. 6 (2011): 1115-1125.
[57] Denstad, Finn Yrjar. *Youth Policy Manual: How to develop a national youth strategy*. Council of Europe, 2009.

intentional and empowered partnership with the youth as problem solvers, stakeholders and change agents in the community. Youth should be part of decision making in matters affecting their lives and participate rather than just benefitting, so that they are truly engaged. They must be aware of what is happening and what is expected of them. Majority of the youths that are involved in development programs are usually passionate about what they are doing e.g., advocacy, community development, education, reproductive health and sexual education. As the youth participate in these programs for nation building, it also helps with personal development.[58] If the youth are denied such as opportunities in life, this could have negative repercussions on them and their families.

In 1992, Roger Hart wrote the 'children's participation book' which has the theory of practice and involving the youth in community growth and environmental protection. The book provides a significant tool referred to as the ladder of youth participation.[59] The ladder has 8 degrees of participation. The 8th degree is about the youths initiating and sharing resolutions with grownups. The owner of the projects empowers youth allowing them to have life experience and expertise. The 7th degree is initiated and directed by the youth. This is usually youth-led activism. The 6th degree is about adults initiating ideas and sharing decisions with the youth. This degree is embodied by participatory action research.

The 5th degree is about consultation and information. This is when young people participate through advising on projects/programs that have been planned by adults. Young citizens are put on the loop on the output of their inputs and how the adults will use them. This degree is embodied

[58] Akiva, Thomas, Kai S. Cortina, and Charles Smith. "Involving youth in program decision-making: How common and what might it do for youth?." *Journal of Youth and Adolescence* 43, no. 11 (2014): 1844-1860.
[59] Hart, Roger A. *Children's participation: The theory and practice of involving young citizens in community development and environmental care*. Routledge, 2013.

in youth advisory councils. The 4th degree is about assigning the youth specific roles. The 3rd degree is Tokenism, where the young people are empowered with voices but have little or no choice on what they are doing and how they are participating.[60] The 2nd degree is when the youth help and bolster initiatives indirectly. The 1st degree is called manipulation where adults use the youth to support their initiatives and falsely claim that these causes were inspired by the youth.

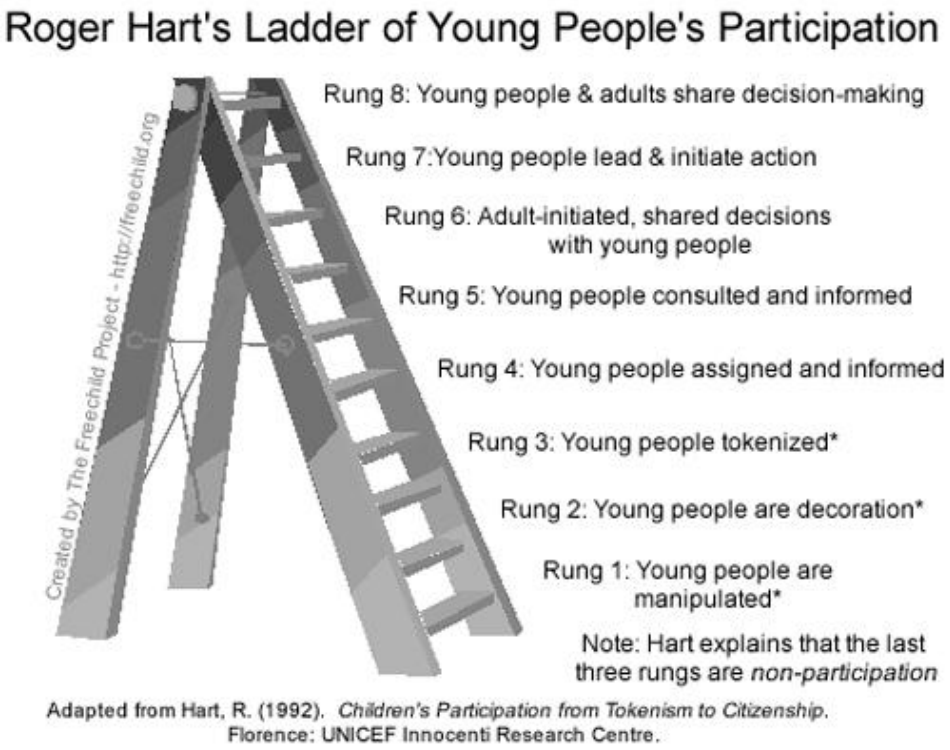

Figure 1: Roger Hart's book on Children Participation

Today, the youth are recognized and seen as key players in development and world stability. The youth are both the leaders and drivers of change that we need. Despite the bulging population of the youth and civic outcries, the youth should be recognized as important in a positive way. In

[60] Hart, Roger A. *Children's participation: From tokenism to citizenship*. No. inness92/6. 1992.

developing countries, there is the challenge of poverty, unemployment and limited access to education.[61] Therefore, the voice and actions of the youth are important in catalyzing change socially and economically.[62] Young people are very important in inclusive development. For a long time, the young and PWDs (People with Disabilities) have been excluded from decision making. The young people form the biggest population in the developing countries but have been overlooked in the project life cycles. For these projects to be relevant and address the needs of the youth, they should be part of policy formulation processes, services and programs that have results and carry out monitoring and evaluation to see the benefits accrued. Young people can better understand the challenges and needs of their peers and how to engage them. They are open and willing to take risks, thinking outside the box and coming up with innovative ideas. When adults engage the youth in programs, they get a better understanding of their needs, enhancing their energy and commitment.

Tuberculosis is a long illness that needs isolation, lighter duties for the patient and special care. This disease affecting the young energetic people has denied them the opportunity to voice their opinions, pursue their interests and get support from adult mentors. The youth are not able to engage and exercise their freedom of agreeing or disagreeing with opinions and expressing themselves. Such youth cannot be allocated with roles or given a chance to voice their expectations. They cannot be trained and supported to engage in activities due to their health condition and the fact that TB is highly infectious which makes it hard for them to mix with other youth in trainings and mentorship programs. Youth need to be trained for adulthood because some

[61] Dahlman, Carl. "Technology, globalization, and international competitiveness: Challenges for developing countries." *Industrial development for the 21st century: Sustainable development perspectives* (2007): 29-83.
[62] Kaag, Mayke, Gerard Baltissen, Griet Steel, and Anouk Lodder. "Migration, youth, and land in West Africa: Making the connections work for inclusive development." *Land* 8, no. 4 (2019): 60.

adults do not feel comfortable in entrusting the young people with some traditional tasks and in interacting with them. These trainings have been hindered by overcrowding in the training institutions where the youth are.[63]

2.3 Challenges In Managing Tuberculosis In Kenya

The youth are a unique population which the globe is trying to understand in effort to end Tuberculosis. The young adults have been overlooked yet they have unique physiologic, social and developmental physiognomies that need to be studied and understood. This chapter delves into management challenges of Tuberculosis within the young adults based on their developmental needs. There are certain groups of the young adults that are more vulnerable to TB because they have more chances of acquiring the disease as well as barriers to accessing TB care. These vulnerable groups may include, those migrating, upsurge of refugees, homelessness, substance abuse, incarceration and those living with HIV/AIDS.

Despite the efforts by the National TB program, advocacy groups, support by development partners and research, the poor developing countries and other endemic regions continue to be excessively affected by tuberculosis, engrained by issues such as stigma, poverty, no awareness, low uptake of prevention, crowded and inadequate housing, food insecurity, taboo, underinvestment, poor implementation of government policies and health programs as well as inequitable health access due to poor primary health infrastructure.[64] TB is mainly concentrated on vulnerable members of the community such as those without homes, prisoners, HIV patients and the poor. In Kenya there is stigmatization and discrimination for the infected, fear and mistrust

[63] Maina, Teresia, Annie Willetts, Moses Ngari, and Abdullahi Osman. "Tuberculosis infection among youths in overcrowded university hostels in Kenya: a cross-sectional study." *Tropical Medicine and Health* 49, no. 1 (2021): 1-11.

[64] Young, Ed, et al. "Eh! woza: intersection of art and science to engage youth on tuberculosis." *Global Health Innovation* 1, no. 1 (2018).

for health institutions. These challenges have led to delayed TB diagnosis, continuous transmission, poor treatment outcomes and low treatment completion rates.[65]

Communicable diseases and inequitable health access can push thousands of people to poverty. High population pressures, inadequate sanitation and inadequate health resources lead to increased diseases and vulnerabilities which may make people to fall in a vicious cycle of poverty. The patients suffering from communicable diseases are restricted from interacting with the public and therefore, they cannot work to feed their families which ultimately pushes them to a poverty trap.[66] On the other hand, due to poverty, these patients cannot access health care and the recommended diet and therefore continue to suffer in silence together with their families increasing the vulnerabilities and pushing them further to poverty. This has been witnessed in the low resource settings in developing countries which has led to high TB burden e.g., the slums and low set ups in Kenya.[67]

While health and political factors are important in analyzing Tuberculosis burden in Kenya, environmental influences are still important. Inadequate housing has been identified as an important factor that influences TB magnitude and effect. A study by Lee et al found out that housing affordability was more varied and advised for interventions in affordable housing to advance housing quality. According to the United Nations Declaration, suitable housing is very important in development and social equity which also entails social protection. Inadequate

[65] Jetty, Radha. "Tuberculosis among First Nations, Inuit and Métis children and youth in Canada: Beyond medical management." *Paediatrics & Child Health* 26, no. 2 (2021): e78-e81.
[66] Anser, Muhammad Khalid, Zahid Yousaf, Muhammad Azhar Khan, Abdelmohsen A. Nassani, Saad M. Alotaibi, Muhammad Moinuddin Qazi Abro, Xuan Vinh Vo, and Khalid Zaman. "Do communicable diseases (including COVID-19) may increase global poverty risk? A cloud on the horizon." *Environmental Research* 187 (2020): 109668.
[67] Szkwarko, D., T. Mercer, S. Kimani, P. Braitstein, N. Buziba, and E. J. Carter. "Implementing intensified tuberculosis case-finding among street-connected youth and young adults in Kenya." *Public Health Action* 6, no. 2 (2016): 142-146.

housing is a sign of unmet entitlement, not just a house.[68] It also encompasses, availability of services, infrastructure, habitability, affordability, accessibility and materials.[69] Housing quality refers to residential environments such as crowding, ventilation, dampness, etc. which might increase the cost burden and threaten the occupant's human rights as per the UN right to adequate housing. Majority of the youth in Kenya do not have a reliable source of income or totally lack an income source. These youths cannot afford a quality house. The burden is worst for those with diseases such as TB, HIV/AIDs and other disease burden.

As per WHO, the end TB strategy has three pillars; integrated, research and innovation; bold policies and supportive system.[70] Biomedical approaches call for integrated interventions in achieving this. e.g. it has been a challenge to eradicate the drug-resistant variety of TB which is caused by factors that include failure to complete treatment.[71] In poor countries such as Kenya, low income and unemployment may lead to non-adherence to the treatment.[72],[73] Many TB patients together with their kins pay for their treatment costs which is a proximal factor linked to inadequate housing, food availability among other basic needs.[74] Overcrowding due to inadequate housing leads to TB exposure therefore increased risk of transmission. Secondly, ventilation and dampness are air quality risk factors for TB.[75]

[68] https://www.ohchr.org/en/issues/housing/pages/housingindex.aspx. Accessed 14 Aug 2022.
[69] Braubach M, Jacobs DE, Ormandy D. Environmental burden of disease associated with inadequate housing: a method guide to the quantification of health effects of selected housing risks in the WHO European Region: WHO; 2011. https://apps.who.int/iris/bitstream/handle/10665/108587/e95004.pdf.
[70] WHO. The end TB strategy (no. WHO/HTM/TB/2015.19). 2015.
[71] Wingfield T, et al. Defining catastrophic costs of TB.2014
[72] Mishra P, et al. Socio-economic status and adherence to tuberculosis treatment.
[73] Cramm JM, et al. determinants of compliance with tuberculosis treatment
[74] Lönnroth K, et al. Tuberculosis control and elimination 2010-50: cure, care, and social development. Lancet. 2010;375(9728):1814–29. https://doi.org/10.1016/S0140-6736(10)60483-7.
[75] Lönnroth Ket al., Drivers of tuberculosis epidemics

Health professionals can build synergy with the government and increase awareness creation on TB literacy. This will reduce stigma and looking down on the sick as well as lead to increased uptake of TB treatment and prevention services to the community at risk. The government and stakeholders need to increase advocacy on sustainable community-driven elimination strategies to secure the vulnerable in the community. Kenya needs strong partnerships in eradication of TB and other communicable diseases.[76] There is need for collaborative interactions between medical teams, TB researchers, non-governmental organizations and the youth in Kenya. TB screening and treatment programs should be focused on in the low-income parts of Kenya.

2.3.1 Vulnerability of the Youth through Migration

Those young adults migrating, the displaced persons and the refugees do not have their experiences captured in data making it difficult to measure their TB risks and outcomes.[77] All displaced people face the challenge of contracting TB since they live in overcrowded spaces, face malnutrition, stress, poor access to healthcare, poverty and delayed diagnosis and accessing treatment.[78] Migrants transiting and spending more time in detention centers or camps are at a higher risk since these places and conditions support TB transmission.[79] Some borders have restrictions and there is no equal access to TB care for migrants. e.g., the United States- Mexico border.[80]

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[76] Colvin, Charlotte, Jackson Mugyabuso, Godwin Munuo, John Lyimo, Eyal Oren, Zahra Mkomwa, Mohammed Makame, Atuswege Mwangomale, Vishnu Mahamba, and Lisa Mueller. "Evaluation of community-based interventions to improve TB case detection in a rural district of Tanzania." *Global Health: Science and Practice* 2, no. 2 (2014): 219-225.

[77] Adepoyibi, T., L. Lilis, H. Greb, and D. Boyle. "Which attributes within target product profiles for tuberculosis diagnostics are the most important to focus on?." *The International Journal of Tuberculosis and Lung Disease* 22, no. 4 (2018): 425-428.

[78] Dhavan, P, et al., " tuberculosis and migration." *P.* 610-623.

[80] Donnan, E. J., C. Coulter, G. Simpson, J. Clark, and C. Nourse. "Pediatric tuberculosis in Queensland, Australia: overrepresentation of cross-border and indigenous children." *The International Journal of Tuberculosis and Lung Disease* 21, no. 3 (2017): 263-269.

2.3.2 Young People living with HIV and Aids

There are many young people getting new HIV/AIDs infections. According to UNICEF, there were about 1.71 million on average, adolescents living with HIV/AIDS globally in 2021.[81] Adolescents account for 5% out of the 11% of adults living with the diseases globally. According to CDC, the youth account for 20% of the rising HIV infections.[82] The youth in Africa accounts for over 80% of the newly reported TB infections. The rate of HIV/AIDS infections in the general population of Kenya has dropped significantly due to awareness creation and use of antiretroviral drugs. Kenya now has dropping numbers of HIV/AIDS infections amongst children due to increased access to Medicare, especially among expectant women. However, there is a growing worrying trend of infections amongst the youth, 15-24 years, as the advocacy for Social Change revealed.[83] The youth normally tend to experiment with drugs, alcohol, substance abuse and indulge in unsafe sexual practices. According to the National AIDs Control Council, males aged 15-35 years are more affected by the HIV disease because of their "don't care attitude". These men suffer silently due to the fear of stigmatization. The questions of concern are: Has Kenya relaxed in their efforts in awareness creation on HIV/AIDS? Does the Kenyan youth have the correct knowledge on HIV transmission and prevention?

The problem of HIV/ AIDS infections amongst the youth has been compounded by poverty, unemployment and cultural practices that encourage girls to be submissive. The population of the youth is burgeoning and there are no job opportunities to absorb them. Some of those that are lucky to secure jobs cannot sustain their basic needs because they live from hand to mouth; the vicious

[81] https://data.unicef.org/topic/hivaids/adolescent-hiv-treatment/#:~:text=Globally%2C%20adolescents%2010%E2%80%9319%20years,of%20all%20AIDS%2Drelated%20deaths.
[82] Adolescents HIV Prevention. Accessed on 4th January
[83] Joint United Nations Programme on HIV/AIDs. *Young People and HIV.* UNAIDS; Geneva, Switzerland: 2021.

cycle of poverty. Consequently, majority of the youth lack adequate food and income to replenish their lives. This makes them vulnerable to immoralities through which they contract the disease.

Additionally, the rising infections have been driven by COVID 19. Due to the effect of this pandemic on livelihoods, the youth have lost their sources of income which has therefore resulted to their indulgence in drugs, alcohol and substance abuse. This has equally led to the new infections.[84] The six months lock down that happened in Kenya has also contributed greatly to the rising cases of HIV/AIDS amongst young people in Kenya as well as gender-based violence. The youth are very key in renewing and refreshing the current status of leadership, skills and innovations in our society. It becomes challenging to advance in these undertakings when one has health issues.

The young adults living with HIV/AIDs face challenges and are underserved with HIV and TB care as compared to other groups.[85] Research has shown that among HIV/AIDs positive young adults there are more TB cases and deaths as compared to HIV/AIDS negative young adults.[86]

2.3.3 Homelessness, substance abuse and incarceration

Young adults that do not have homes, are in substance abuse or are incarcerated are vulnerable to acquiring TB and when they do, the outcomes are unfavorable. These group of young adults are exposed to immunologic, socioeconomic and health challenges that make them vulnerable to TB risks. Those that are homeless and those incarcerated are more vulnerable to TB because the

[84] Lesko, Catherine R., and Angela M. Bengtson. "HIV and COVID-19: intersecting epidemics with many unknowns." *American journal of epidemiology* 190, no. 1 (2021): 10-16.
[85] Armstrong, et al. "Research for adolescents living with HIV. P.16
[86] Enane, L. A., E. D. Lowenthal, T. Arscott-Mills, M. Matlhare, L. S. Smallcomb, B. Kgwaadira, S. E. Coffin, and A. P. Steenhoff. "Loss to follow-up among adolescents with tuberculosis in Gaborone, Botswana." *The International Journal of Tuberculosis and Lung Disease* 20, no. 10 (2016): 1320-1325.

crowded conditions under which they live are favourable for TB transmission.[87] There is limited data to show the susceptibility of young people that smoke tobacco. However, a study conducted in Brazil and Mongolia for school going children showed that those that smoke are at a risk of progressing with TB infection than non-smokers.[88] Likewise, those exposed to second hand tobacco are at a risk.[89] There is no data to define those that abuse drugs and alcohol, but the likelihood could be high. A study in Brazil showed that young adults with one vulnerability either homelessness, incarcerated, substance abuse etc. have bad outcomes of TB infection than their peers.

2.3.4 School Exposures

Children and young adults spend long periods in school where they are in groups, prolonged close contact and poor ventilation. All these conditions favour the spread of TB and make it highly transmitted in schools that are within communities with high TB infections. Transmissions of TB in schools is very high.[90] Another study carried out in Ethiopian Universities showed that crowding was one reason for high infections.[91]

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[87] Diemer, Elizabeth W., Julia D. Grant, Melissa A. Munn-Chernoff, David A. Patterson, and Alexis E. Duncan. "Gender identity, sexual orientation, and eating-related pathology in a national sample of college students." *Journal of Adolescent Health* 57, no. 2 (2015): 144-149.

[88] Stevens H., et al. Risk Factors for Tuberculosis in Older Children and Adolescents: A Matched Case-Control Study in Recife, Brazil. *Emerg. Themes Epidemiol.* 2014; 11:20. doi: 10.1186/s12982-014-0020-5.

[89] Patra J.,et al. Exposure to Second-Hand Smoke and the Risk of Tuberculosis in Children and Adults: A Systematic Review and Meta-Analysis of 18 Observational Studies. *PLoS Med.* 2015;12: e1001835. doi: 10.1371/journal.pmed.1001835.

[90] Andrews J.R., Morrow C., Walensky R.P., Wood R. Integrating Social Contact and Environmental Data in Evaluating Tuberculosis Transmission in a South African Township. *J. Infect. Dis.* 2014; 210:597–603. doi: 10.1093/infdis/jiu138.

[91] Mekonnen A., Petros B. Burden of Tuberculosis Among Students in Two Ethiopian Universities. *Ethiop Med. J.* 2016; 54:189–196.

Outbreak of TB in schools could also be due to constraints in healthcare resources.[92] Transmission of TB amongst the young adults in schools increases with duration and proximity of exposure. For instance, students that routinely sit next to infected colleagues are susceptible to getting infected.[93] Cumulative hours of contact with the infected also increases the risk of acquiring the infection of the young adults.[94]

Boarding schools present a high risk of TB transmission because of the shared teaching space and dorms. A study on boarding schools in China revealed that dormitory and classroom mates exposed pupils to conditions favourable for TB transmission.[95] A study in Uganda found out that students from distant boarding schools were more prevalent to TB as compared to community schools. This may be due to more exposure during transit.[96] These factors within the schools notwithstanding, research has also documented that socioeconomic status of the students and their households is another contributing factor.[97] Those with TB were found to have an history of household or community exposure.[98]

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[92] Schepisi, Monica Sane, Ilaria Motta, Simone Dore, Cecilia Costa, Giovanni Sotgiu, and Enrico Girardi. "Tuberculosis transmission among children and adolescents in schools and other congregate settings: a systematic review." *New Microbiol* 41, no. 4 (2019): 282-90.

[93] You, N. N., L. M. Zhu, G. L. Li, L. Martinez, W. Lu, Q. Liu, and H. T. Yang. "A tuberculosis school outbreak in China, 2018: reaching an often-overlooked adolescent population." *Epidemiology & Infection* 147 (2019).

[94] Anaraki, S., A. J. Bell, S. Perkins, S. Murphy, S. Dart, and Charlotte Anderson. "Expected background rates of latent TB infection in London inner city schools: lessons from a TB contact investigation exercise in a secondary school." *Epidemiology & Infection* 146, no. 16 (2018): 2102-2106.

[95] Dorjee K., Topgyal S., Dorjee C., Tsundue T., Namdol T., Tsewang T., Nangsel T., Lhadon D., Choetso T., Dawa T., et al. High Prevalence of Active and Latent Tuberculosis in Children and Adolescents in Tibetan Schools in India: The Zero TB Kids Initiative in Tibetan Refugee Children. *Clin. Infect. Dis.* 2019; 69:760–768. doi: 10.1093/cid/ciy987.

[96] Marquez, Carina, Mucunguzi Atukunda, Laura B. Balzer, Gabriel Chamie, Joel Kironde, Emmanuel Ssemmondo, Theodore D. Ruel et al. "The age-specific burden and household and school-based predictors of child and adolescent tuberculosis infection in rural Uganda." *PloS one* 15, no. 1 (2020): e0228102.

[97] Bunyasi, E. W., H. Geldenhuys, H. Mulenga, J. Shenje, A. K. K. Luabeya, M. Tameris, E. Nemes et al. "Temporal trends in the prevalence of Mycobacterium tuberculosis infection in South African adolescents." *The International Journal of Tuberculosis and Lung Disease* 23, no. 5 (2019): 571-578.

[98] Pan, Dongxiang, Mei Lin, Rushu Lan, Edward A. Graviss, Dingwen Lin, Dabin Liang, Xi Long et al. "Tuberculosis Transmission in Households and Classrooms of Adolescent Cases Compared to the Community in China." *International journal of environmental research and public health* 15, no. 12 (2018): 2803.

2.3.5 Other Community Exposures

Public transit has been found to be a significant contributor in TB spread especially in the crowded urban areas. A study in Lima in Peru revealed that travelling in mini-buses was risky and contributed to TB transmission.[99] Transport has prolonged hours of close contact therefore increasing the risk of TB transmission and infection. In Dar es Salaam, Tanzania it was found that the annual infection for drivers was 10 times more than that of transit riders because of long hours spend in poorly ventilated buses.[100]

There is no data to show TB transmission under the setting of social gatherings such as markets, community gatherings and worship places where individuals spent significant time. But based on the fact that there have been transmissions from crowded places, there is need to look at the social networks of young adolescents. There was an incident of TB transmission in a gaming center in Singapore.[101] In the United Kingdom, there were reported infections in barber shops, internet cafés and football clubs.[102]

It is worth mentioning that the military and national youth service, where recruits worldwide are young adolescents are important areas for TB transmission. TB infection within these setups is lower because of the 'healthy warrior effect'- Recruits are well screened of any infections.[103] However, outbreaks can occur within the soldierly and National Youth Service training setups consequently affecting their outputs. Youth in the soldierly camps can develop TB through

[99] Zamudio, Carlos, Fiorella Krapp, Howard W. Choi, Lena Shah, Antonio Ciampi, Eduardo Gotuzzo, Jody Heymann, Carlos Seas, and Timothy F. Brewer. "Public transportation and tuberculosis transmission in a high incidence setting." *PLoS One* 10, no. 2 (2015): e0115230.

[101] Chee et al. "Multidrug-resistant tuberculosis outbreak in gaming centers, Singapore, 2012." *Emerging infectious diseases* 21, no. 1 (2015): 179.

[103] Mancuso, James D. "Tuberculosis screening and control in the US military in war and peace." *American journal of public health* 107, no. 1 (2017): 60-67.

recurrence of an earlier infection or acquired in the camp. Military camps are at a risk of transmission because of overcrowding and exposure to humanitarian operations where there is high prevalence of the disease. The stressful conditions under which the military operates could also compromise their immune function increasing susceptibility of the young adolescents.[104]

2.4 Approaches Towards Effective Management Of Tuberculosis To Attain Youth Productivity In Promoting National Development In Kenya

This section confers to the different approaches towards the management of Tuberculosis. It discusses both treatment and preventive therapies for the disease, especially amongst the youth with an aim of enhancing youth productivity in promoting national development in Kenya.

The global goals by 2035 are that the world attains 95% reduction in TB deaths and 0% families facing TB catastrophes. According to WHO, Kenya is among the 30 countries with high TB burden. The government has invested a lot in fighting the disease but it still remains the 4th killer disease in Kenya. Kenya should work harder to find the TB infected people and treat them. Kenya last conducted a national TB prevalence survey in 2016, and since then, it has been relying on WHO TB estimates. The other recently conducted TB estimates were in the HIV prevalence areas, some with limited geographic scope leading to generalization of findings. However, the results indicate that Kenya has underestimated TB incidences.[105] Therefore, the first step in the effective management of TB is conducting another national survey to get proper estimates of the TB cases in Kenya.

[104] O'Shea M.K., Wilson D. Tuberculosis and the Military. J. R Army Med. Corps. 2013;159:190–199. doi: 10.1136/jramc-2013-000115.

[105] The *PLOS ONE* Staff (2019) Correction: Kenya tuberculosis prevalence survey 2016: Challenges and opportunities of ending TB in Kenya. PLoS ONE 14(1): e0211593. https://doi.org/10.1371/journal.pone.0211593

Kenya has a shortage of healthcare providers, even as it continues to record increasing number of non- communicable diseases. Recruitment and empowerment of more community health workers is important to encourage people to get tested, promote primary care and educate the community. Additionally, the community health workers should be trained on technical and confidentiality matters of the community health needs. Rachlis Beth et al noted that empowered community health workers can be catalysts of change in increasing the community knowledge on tuberculosis and other communicable diseases.[106]

According to Jenniffer Furin et al, tuberculosis remains a global gravely threat that has been shaped by poverty, HIV and urbanization. Even though diagnosis and treatment remain a challenge, today there are advancements in screening of the populations at risk and new treatment options for the millions suffering from Tuberculosis.[107] Kenya has adopted the immunologic and nucleic acid-based techniques in treatment of Tuberculosis. A lot of research is being conducted progressively to improve on TB management.

2.4.1 Treating and Managing Active TB

According to the Kenya latent tuberculosis infection policy, the government of Kenya needs effective engagement and support from community, healthcare providers, private sector and effective policies that ensure accessibility to primary healthcare and reduced financial barriers in diagnosing and treatment of tuberculosis.[108] In line with this policy, Kenya has made progress in the management of active tuberculosis. Active TB is treated by mixing recommended antibacterial medications for a period between 6-12 months. Commonly, healthcare professionals recommend

[106] Rachlis, Beth, Violet Naanyu, Juddy Wachira, Becky Genberg, Beatrice Koech, Regina Kamene, Jackie Akinyi, and Paula Braitstein. "Community perceptions of community health workers (CHWs) and their roles in management for HIV, tuberculosis and hypertension in Western Kenya." *PloS one* 11, no. 2 (2016): e0149412.
[107] Furin, et al., "Diagnosis and management of tuberculosis." *pg* 189-194.
[108] MoH. Kenya Latent Tuberculosis Infection Policy 2020.

the use of Isoniazid together with rifampin, ethambutol and pyrazinamide drugs. The effects after using the drugs can be felt after a few weeks of taking the drugs. The patient should continue taking the prescribed medication for the time indicated otherwise they might relapse in the future and spread it to others. They could also develop the drug-resistant TB.

2.4.2 Treating and Managing Drug-Resistant TB

When TB becomes drug resistant, it means that the patient can no longer use the drugs they used initially to fight the TB disease in their body. This kind of TB is very dangerous and its treatment might take longer, around 24 months to treat and the patient may experience more side effects.

2.4.3 Treating and Managing Tuberculosis

For TB to be properly treated, the patient must take medication as prescribed by the doctor. If a patient stops taking the drugs, they become sick again and are likely to spread the disease. Additionally, if the drugs are taken incorrectly, one may become drug-resistant making it hard for them to get over the disease. When one is undergoing treatment for active TB, they need regular checkups to confirm whether the drugs are working or not. Taking TB medication may be associated with side effects such as nausea, loss of appetite, numbness in the hands, blurred vision, yellowish skin and eyes, itchy skin, bruising, rashes, fatigue, dark urine and fever. Once a patient develops these signs, it is important to inform the doctor because these medications can damage the liver. Tingling and numbness may be sorted by intake of Vitamin B supplements.

When taking TB medication, it is important to adhere to the same time of the day, mark the calendar, use a weekly dispenser to put your pills, let a person close to you to be giving you a reminder, and ask your doctor what happens in case you skip a day. When taking the longer treatment options for DRTB, there is a Directly Observed Therapy, whereby a healthcare worker will visit the patient to administer the medication so that they don’t forget.

2.4.4 TB preventive Treatment

Many people are infected with TB in the world but are not sick or contagious. People are at risk of getting infected with TB when their immune system is weak. Preventive management of TB can prevent such people from becoming sick and transmitting the disease. Globally, over ten million people have been infected with TB while over one million have died. The world has a goal of ending TB by 2030 and to achieve this, preventive treatment is very important.[109]

Patients with active TB should take their medication and isolate themselves from other people for at least few weeks so that the disease does not spread to others. They should hold on until their doctors advises that it is safe to get back to their daily routines so as protect their loved ones. To prevent the spread of TB, medical directives must be followed to the latter, covering the mouth with tissue paper whenever coughing or sneezing, avoiding contact with people until you are safe, airing out your room so that other people using the room are not infected.[110]

On the commemoration of the World TB Day in March 2020, the leaders discussed the importance of the world committing to preventive measures of TB, in the era of COVID 19. The leaders noted that there has not been much progress in the application of prevention strategies. They committed to ensure that the millions of contacts with active TB are able to access preventive treatment by 2022. The world is still far from this target because countries have managed to track less than 430,000 household contacts for those living with HIV and Tuberculosis.[111]

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[109] WHO. New WHO recommendations to Prevent Tuberculosis aim to save millions of lives. 24th March 2020. Accessed on 22nd January 2023 from https://www.who.int/news/item/24-03-2020-new-who-recommendations-to-prevent-tuberculosis-aim-to-save-millions-of-lives

[110] American Lung Association. Treating and Managing Tuberculosis. Accessed on 21st Jan 2023 from https://www.lung.org/lung-health-diseases/lung-disease-lookup/tuberculosis/treating-and-managing

[111] Ibid.

Preventive treatment of TB, accompanied by antiretroviral therapy can prevent TB and save lives. Preventive treatment should therefore be improved and increased. To ensure this, WHO recommended to governments to scale-up their TB preventive treatments for their populations. TB preventive treatment can prevent communities and households from sliding into poverty and hence saving the entire community. Researchers are continuously working on cost-effective ways of treatment and saving lives.

2.4.5 Realizing the Promise of Innovative Technologies to Save Lives from Tuberculosis

Pai noted that the world has been fighting TB with anti-equated inefficient tools, hence leading to loss of many lives.[112] The sputum smear microscopy test that is still used today was invented in 1882 by Robert Koch. The Calmette-Guerin vaccine that was first used on humans in 1992 has been highly ineffective in controlling the epidemic. There has been concerted efforts by donors and the industry in developing new diagnostics and TB drugs for patients in the developing countries.[113] It is reported that over 41% of the newly reported cases of TB were not reported or diagnosed. This has increased the transmission of TB and contributed to the development of resistance to drugs.

There are several other TB diagnostics technologies that have emerged in the market and endorsed by WHO. It is important to have accurate diagnostics for timely start of TB treatment. Even with the many technologies, many people have struggled to access them, especially for the initial diagnosis. About over 40% of TB patients were not diagnosed. Additionally, those detected with

[112] Pai M, Thomas B, Chaddha V, Rade K, Swaminathan S, Mayer K. 2016. The tuberculosis cascade of care in India's public sector: recent estimates and gaps in knowledge. PLoS Medicine 13: e1002149. doi: 10. 1371/journal.pmed.1002149

[113] 70032-9, PMID: 25104145 Furin J, Brigden G, Lessem E, Rich M, Vaughan L, Lynch S. 2016. Global progress and challenges in implementing new medications for treating multidrug- resistant tuberculosis. Emerging Infectious Diseases 22. doi: 10.3201/eid2203.151430, PMID: 26885674

TB have not had universal access to drug-susceptibility testing. The inadequate access and lack of high sensitivity diagnosing has made patients to make multiple visits, increasing expenditures and morbidity.[114] Access to these diagnosis efficient technologies which have also been endorsed for children is important for children who are very vulnerable to TB.

The big question is on why these efficient and WHO endorsed technologies are not reaching the people who need them most. Albert highlights the major implementation gaps of these technologies which have caused them to have limited impacts on the patient. These gaps are in high cost making them unaffordable by the poor countries. There is also the challenge of high costs of treatment which have resulted in high numbers of multi-drug resistant TB in these high burden countries.[115] These technologies have been frustrated by weak health systems, that prolong diagnosis and treatment. e.g., in India, on average, a TB patient is diagnosed two months after seeing three providers.[116] Diagnosis is a challenge in the public sector mainly and there is a long delay between sample collection and starting of TB treatment.

There is also a big challenge in patients accessing new TB drugs. The introduction of these drugs into the market does not meet the demand, especially for the patients with prolonged treatment and poor outcomes. Studies have shown that patients with TB will be benefit greatly from the newly invented drugs. Some however will continue to suffer and probably die from the disease. Even in

[114] Chavan D. 2017. Fighting TB requires empowered patients. BMJ 356: i6344. doi: 10.1136/bmj.i6344, PMID: 28179263

[115] Albert H, Nathavitharana RR, Isaacs C, Pai M, Denkinger CM, Boehme CC. 2016. Development, roll-out and impact of Xpert MTB/RIF for tuberculosis: what lessons have we learnt and how can we do better? European Respiratory Journal 48:516–525. doi: 10.1183/13993003.00543-2016, PMID: 27418550

[116] Sreeramareddy CT, Qin ZZ, Satyanarayana S, Subbaraman R, Pai M. 2014. Delays in diagnosis and treatment of pulmonary tuberculosis in India: asystematic review. The International Journal of Tuberculosis and Lung Disease 18:255–266. doi: 10.5588/ijtld.13.0585, PMID: 24670558

countries where some drugs are donations, TB patients are forced to buy them paying up to 3000 USD for a six-month treatment. These costs are almost impossible to bear.

The private sector has not been involved in the use of the new drugs because of the complicated pharmacovigilance requirements that delay their usage.[117] Most countries feel compelled to follow WHO guidelines, which can lag behind safety and efficacy of the data and delay access to life-saving drugs for TB patients. There should be plans to allow for the use of the newly invented drugs by children and pregnant women if their benefits outweigh their risks.

2.4.6 Opportunities

Even with the challenges faced in the management of Tuberculosis, there are good examples of success. For instance, South Africa is leading in the upscaling of TB diagnosis using the efficient technologies due to their forward-thinking National TB program that is supported by their ambitious health ministry, academic and non-governmental organizations.[118] Other countries have been successful in introducing new TB medicines because they have prioritized innovations and established partnerships for support. Recent innovations in TB diagnosis and new medication have renewed engagements in TB research, coming up with systems for steering trials and advocating for policy revision and realignments to revitalize health workers and CSOs. Countries have bold ambitions and are trying to be concrete with their implementation plans. There is however a need for a comprehensive approach in implementation e.g., increased engagement of patients, policy makers, CSOs and demand creation of tools and diverse stakeholders.[119]

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[117] Furin et al.
[118] Ndjeka N. 2016. Incorporation of bedaquiline in the South African National TB program. Abstract Number 754. 2016 Conference on Retroviruses and Opportunistic Infections, Boston, USA
[119] World Health Organization. 2017c. WHO Meeting Report of a Technical Expert Consultation: Non-Inferiority Analysis of Xpert MTB/RIF Ultra Compared to Xpert MTB/RIF. Geneva, Switzerland: World Health Organization. http://apps.who.int/iris/bitstream/10665/254792/1/WHO-HTM-TB-2017.04-eng.pdf

2.5 Theoretical Framework

This research study is guided by health securitization theory, a Copenhagen school of thought. The theory was adopted in the 1990s by Wæver and Buzan. The theory gives a framework for analyzing how security issues evolve and how threats can be framed. This theory allows political analysis of given realities like health. It is a tool that can be used to observe what is taking place besides political interventions and use the information and evidence gathered to reach a normative judgement of any given case.[120] This way, securitization theory carves from traditional security studies and is applied with interesting results.

In the past years, matters of health security have attracted a lot of attention and resources as well as being linked to Global health security and the military.[121] Targeting Carriers (or potential carriers) of diseases have been perceived as a human rights issue since it increases stigmatization. Institutions have shifted their focus from supporting affected communities and individuals, as the norm should be, to protecting institutions. Priority is given to the states that can defend themselves such as the Western states. Diseases that have a higher chance of impacting the North and the West are prioritized over those that pose development challenges and cause global deaths and health suffering e.g. Cholera.[122] In similar context, politicians in Kenya will push for political agenda based on self-interest and not what affects the citizens such as disease burden. The low income and the majority of youth who lack descent jobs suffer from poor living conditions, disease burden and poverty in silence. Given these implications, is health security a political agenda? Wæver

[120] Balzacq, et al. "'Securitization'revisited: Theory and cases." *International relations* 30, no. 4 (2016): 494-531.
[121] Dembek, Zygmunt F., Tesema Chekol, and Aiguo Wu. "The opioid epidemic: challenge to military medicine and national security." *Military medicine* 185, no. 5-6 (2020): e662-e667.
[122] Fan, Li-Juan, Yan Zhang, and Wayne E. Jones. "Design and synthesis of fluorescence "turn-on" chemosensors based on photoinduced electron transfer in conjugated polymers." *Macromolecules* 38, no. 7 (2005): 2844-2849.

posits that the negative implications of not considering a threat as political can emerge when security label is applied. He insists that security comes with a conceptual baggage.

Politicians can make use of securitization to gain control of an issue that they have personal interests in and therefore, claims of security should be treated with skepticism. There is the danger of dealing with issues as normal politics. Ideally, we need healthy people to be recruited in nation building activities, etc.

2.6 Research Gaps

The reviewed works show that the young are highly affected by TB because of socioeconomic conditions such as poverty and inadequate policies in addressing the challenges. These issues have been explored in various studies but there are some limitations. First, there is limited framework to guide the relationship between TB and the youth and second, there is unclear measurement of how TB affects the output of youth towards development. There are also limited studies to document and rank the barriers in facilitating TB control programs in Kenya. TB is a social disease and social factors such as housing, poverty, gender, education, religion, lifestyle, work place, and healthcare system influence vulnerability and ill health.

Secondly, Research has shown that treatment of TB amongst the adolescents and young adults require provision of comprehensive services tailored towards their needs. Yet global TB programs do not have specific strategies per say to help this age group complete their treatment. There is therefore need for research and implementation of strategies for TB treatment amongst the adolescents and young adults.

In view of the above, it is therefore imperative to undertake a case study in Kenya to investigate the effects of TB on youth productivity in promoting national development. Kenya is a country

with a high population of youth who can be banked on for nation building. TB seems to be prevalent among the youth and with inadequate policies to address the challenge, Kenya's development trajectory may not be as per the potentiality of the country.

CHAPTER THREE

RESEARCH METHODOLOGY

This section covers the research process that was applied in the entire study. It shows the approach adopted in executing the entire study.

3.1 Research Design

The study employed cross-sectional research design in investigating the youth in various sectors and how they have been affected by Tuberculosis. This design was appropriate in understanding the prevalence of tuberculosis amongst the youth. The design has been used in epidemiology in assessing prevalence of diseases in a particular population. The study focused on the youths in Kenya, those that have been affected or infected with TB and how this has affected them socially as well as the challenges they may have encountered as a result of the disease burden. Cross-sectional design was employed because the study was looking at the youth 14-29 years in relation to Tuberculosis and their productivity.

Additionally, published reports articles and books were reviewed for empirical evidence on the effects of TB on youth's productivity.

3.2 Research Target Population

A population should include all elements exhibiting a common characteristic. The target population is the entire group used in drawing research conclusions.[123] The target population for this study comprised of youth affected or infected with TB and the challenges they face in their

[123] Turner, D. (2010). Qualitative Interview Design: A Practical Guide for Novice Investigators. Fort Lauderdale, Florida USA: Nova Southeastern University

productivity and engaging in nation building activities. There were no other criteria regarding other demographic characteristics.

3.3 Sample Size and Sampling Techniques

The total population of the youth infected with or affected by TB is not known. Therefore, the sample size was derived from Krejicie and Morgan 1970 which shows that when the population is over 1 million, the sample size is 384 (Krejice RV and Morgan DW, 1970). However, Mugenda and Mugenda (2003) argue that sample sizes of 10 to 30 per cent are sufficient for data analysis (Mugenda O & Mugenda A, 2003). Therefore, this study used 15% of the sample size, which was 59 respondents.

Table 1: Krejcie and Morgan Table

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

3.4 Study Area

The study was conducted in TB health centers located in Langata and Dagoretti sub counties of Nairobi

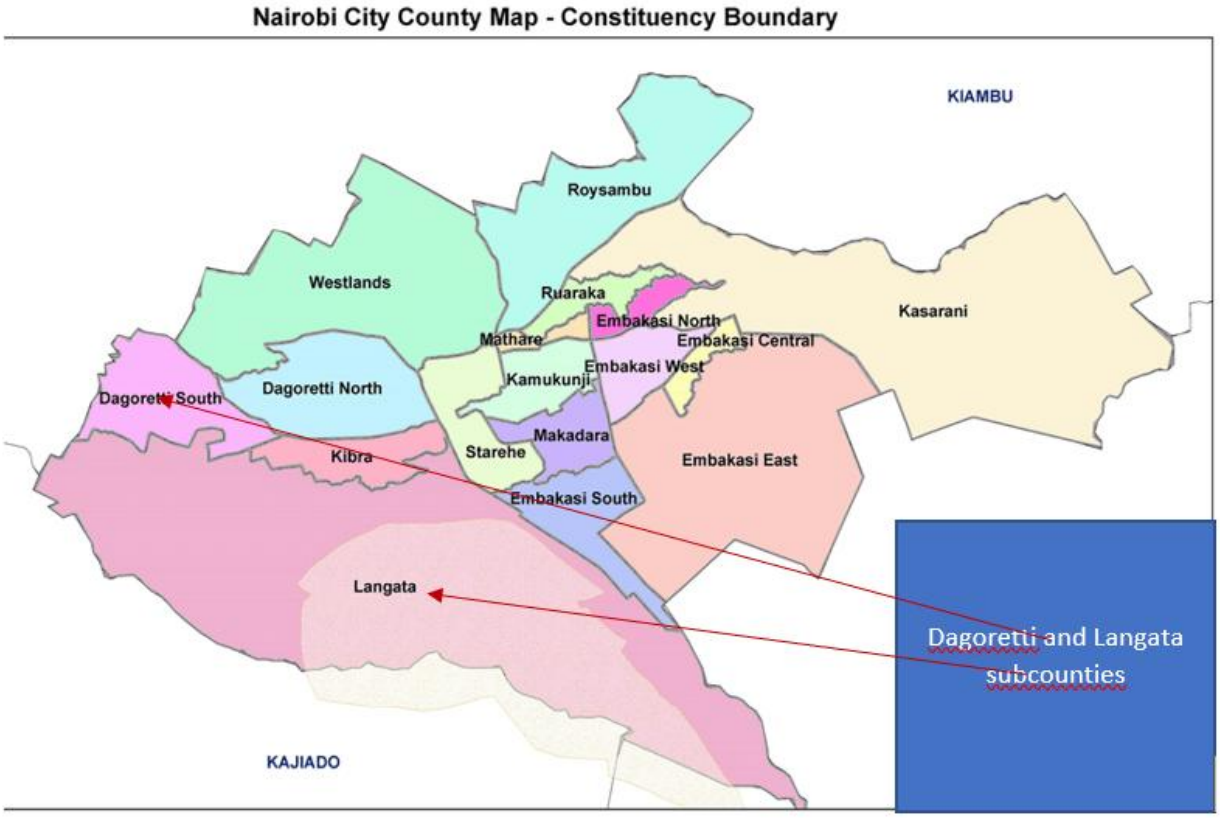

Figure 2: Map of Nairobi County constituencies

Source: https://www.researchgate.net/figure/Nairobi-City-County-map-showing-constituencies-and-associated-boundaries_fig1_343801544

3.5 Data Collection Method

Primary data was gathered digitally by use of structured questionnaires for the TB patients and Key informant guide for the key informants. The structured questionnaire and the key informant guide were uploaded in Kobocollect, an open source android application, making it easy to use

android devices in collecting the data. A total of 59 respondents were interviewed. This composed of 49 TB patients and 10 key informants which were clinical officers, and patient care givers.

3.6 Validity and Reliability

Validity and reliability of the data collection tools was done by piloting the questionnaire. The content of the questionnaire was reviewed by the supervisor and colleagues to ensure that the questions were relevant to the study and that the respondents understood the questions, so they did not take much time answering.

3.7 Data Analysis and Presentation

The collected data was uploaded in Kobocollect server and later exported to excel CSV file for cleaning. It was later exported to SPSS version 25 for analysis. Descriptive statistics were generated by SPSS. The qualitative data was Tran scripted and organized according to themes such as reasons given on why poverty, lack of income, delayed diagnosis, poor housing, HIV and substance abuse were challenging to the patients. The key informants were giving their opinions on why they thought that the youth are vulnerable to TB and how the youth are involved in decision making processes. The data was presented in percentages, tables and narratives.

3.8 Data Dissemination Plan

The findings of this study will be disseminated through a journal article and policy brief. This thesis will be shared with the hospitals where data was collected. The Nairobi County TB coordinator is urged to ensure that these findings are presented in all the hospitals in the county and during meetings.

3.9 Ethical considerations

To ensure that the study was undertaken with less challenges there were specific ethical considerations that were taken into place. A research permit was obtained from NACOSTI after examining whether the study was worth undertaking. The National Defence University issued the researcher with a letter permitting the researcher to undertake the study. The data collection enumerators were given a letter of introduction and approval from the county TB control Center based at the County headquarters so as to authorize them to collect data. The final report for the study will ultimately be shared with the county, and the TB centers where data was collected.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Research Findings

4.1.1 Demographic Information of the Respondents

Response Rate

In the study, 49 (83%) patients and 10 (17%) key informants were interviewed. The study purposed to interview 115 respondents but interviewed 59 of them. This is equivalent to 50.43%. A sample size exceeding 50% is adequate enough to give a representation of the total.[124] All the 115 respondents could not be reached due to time constraints and failed appointments that were booked with the patients and clinicians. The study also targeted the youth and it was not easy to get a clinic attended exclusively by the youth .

Gender of the Respondents

The study purposed to know the number of patients interviewed by gender; Females comprised of 49% of the participants while men were 51%.

Table 4.1: Respondents segregated by Gender (Male and Females)

	Frequency	**Valid Percent**
Male	25	51
Female	24	49.
Total	**49**	**100**

Education Level of the Respondents

From the selected sample, 47% had attained primary academic qualifications while 20.4 % had secondary education. 6.1% had no education, but were literate based on the fact that they could communicate. A few, 10.2% had attained a university degree while 16.3% had attended college level.

[124] Mugenda Mugenda, 2008.

Table 4.2: Level of Education of the Respondents

	Frequency	Valid Percent
Primary Education	23	47
Secondary Education	10	20.4
College	8	16.3
University	5	10.2
No Education	3	6.1
Total	**49**	**100**

Age of the Respondents

The age of the patients (respondents) was classified in to three; below 18 years, 18- 35 years and over 35 years. There was none below 18 years while those at the age of 18 -35 years were 63.3%. The study purposively targeted on the youth. Those over 35 years were 36.7%.

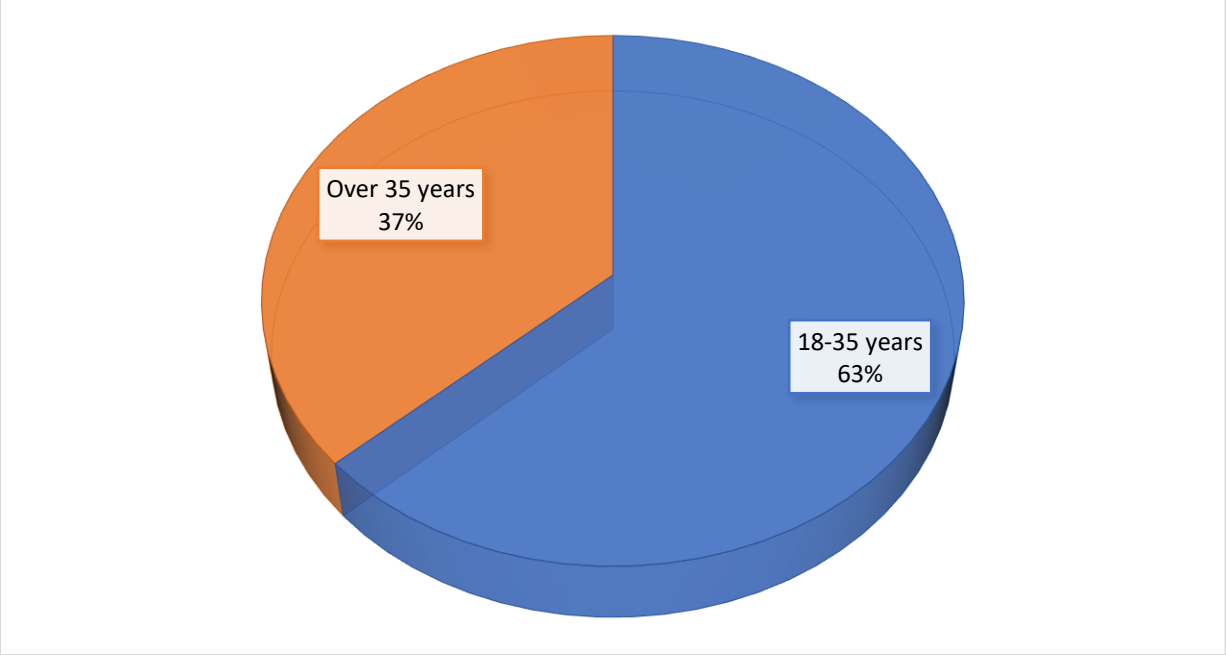

Figure 3: Age of the Respondents

4.1.2 Effects of TB On Youth Productivity and National Development

Source of Income for the TB Patients

Based on the youth engagement opportunities in Kenya, the study sought to know the sources of income for the youth. The findings were as shown in the table below:

Table 2.3: Source of Income for the youth

	Frequency	Percent
Business	9	18.4
Employment	16	32.7
None	16	32.7
Others	8	16.3
Total	**49**	**100**

A good number, 33% did not have a source of income. This raised the question of how they take care of their basic needs. The response was as shown in the table below:

Table 4.4: What patients depend on for a living

	Frequency	**Percent**
Depend on my family (parents, spouses)	19	38.78
Own income	30	61.22
Total	**49**	**100**

Engagement of the Youth in Decision Making

The study also sought to understand whether the youth have been involved in development of programs, policies or services. 73.5% responded that they have never been involved while 26.5% said that they have been involved.

This was followed by the question on whether the youth have platforms/opportunity to voice their opinions. 67.3% of the respondents reported that they had the opportunity while 32.7% reported that they did not have. Those reporting that they had the opportunity / platform to voice their

opinions reported that it was through free interactions with doctors and nurses, follow up phone calls by the health facility personnel, good interaction at the hospital allowing free expression of concerns, interactions with NGOs, invitation to government forums, hospital /clinic, community health groups and the use of a toll-free number for calling as well as suggestion boxes to voice their concerns and opinions.

The respondents agreeing that they had been involved in the development of policies, programs and services gave the following ways / reasons why they felt so:

Respondent 11, *"I have been involved through Kazi mtaani program."*

Respondent 27, *"Our current county government is involving the youth in decision making processes."*

Respondent 32, "*The county engages the young a lot like in public participation."*

Government Engaging the Youth in Development Opportunities

Many of the respondents (67.3%) believed that the government of Kenya has done less in engaging the youth in development opportunities in Kenya while 32.7% were of the opinion that the government has tried creating opportunities for the youth.

Those of the opinion that the government has created opportunities for the youth had the following reasons:

Table 4.5: How the government has provided Opportunities for the Youth

1. The government has provided free resources for the screening and treatment of TB
2. Youth have been engaged through *Kazi mtaani* projects
3. Free education programs and vocational training

4. Most youths are both in formal and informal employment
5. The government is encouraging more investments and industries where the youth can be absorbed
6. The number of vocational training institutes has increased to benefit the youth
7. Devolution created opportunities at the county governments
8. The government gives education loans for youth
9. The few available opportunities have been distributed evenly to the youth.
10. Government is giving loans to engage in self-employment

According to respondent 12, "*I think the government is doing well in trying to create opportunities for the youth. I am one of them and I am being treated TB for free."*

Respondent 14 further posited that*, "Government is doing well because when one is sick, they get tested and access free drugs"*

According to respondent 32*, "the government has started employing the young people especially at the county."*

Respondent 33 insinuated that he was happy*, "the government has set up vocational centres for skills training for the youth and also setting up industries such as slaughter houses where the youth can be employed."*

Respondent 52 insinuated that*, the government is giving loans and affordable education for the youths at the higher institutes of learning.*

*Res*pondent 36 backed up this argument when he said that, *"those with chances of getting employment are those with advanced education"*

Respondent 41 said that*, "through the Kazi kwa vijana initiatives, all the jobs are going to the youth."*

Those of the opinion that the government had not done much in creating opportunities for the youth were over 67% and gave the following reasons:

Table 4.6: Why the youth feel that there are no opportunities for them to engage in national development

1. Youth are idle and have turned to drugs
2. Government is engaging the old people, forgetting the youth
3. There are no opportunities for the youth
4. The youth are struggling with life

Respondent 2 posited, "*There's a lot of harassment from police and there are no opportunities from the government."*

According to respondent 16, "I don't think so beacuse many are jobless. Respondent 59 was of the same opinion that so many youths were jobless. According to respondent 39*, as a result of being jobless,* respondent 39 noted that*, "most youths have turned to idleness and drunkenness"*

According to respondent 12*, "The government has not provided these spaces for the youth. And if available, the youth is misrepresented."*

Respondent 53 noted that, *"there are no innovative agendas from the government to support the youth"*

4.1.3 Challenges Faced by the Youth Infected with TB

Access to healthcare

Majority of the respondents (79.6%) reported that it was not challenging to access healthcare. The reasons given for this were that TB treatment and screening were free, the health facilities managing TB were well equipped with medication, the health facilities were accessible, there is no discrimination and stigmatization at the health facility, healthcare facility attendants are kind and respectful and all patients are treated equally. For instance,

Respondent 9 noted that, "*facilities that provide TB services are available."*

Respondent 14," *There is no biasness they treat us equally."*

Respondent 17*," They are very respectful."*

Respondent 22," *I have never missed a pill even a single day and they love me."*

Respondent 29*, "Been treated well and have schedules for the treatment."*

The 20.4% who reported that healthcare access was challenging gave the reason of lack of transport to attend their clinic days, lack of income and at times lack of medicine at the health facility.

Stress

Stress was found to be extremely challenging to majority of the respondents (40.8%). Those challenged with stress were 28.6%. The findings on stress were as shown in the table below:

Table4.7: Level of stress as a challenge to TB patients

	Frequency	**Percent**
Challenging	14	28.6
Extremely challenging	20	40.8
Neutral	2	4.1
Not Challenging	13	26.5
Total	**49**	**100**

The findings above indicate that those that found stress extremely challenging and challenging were 69.4%. The explanations for this were that because of stress, some youths have turned to alcoholism and stopped TB treatment, stigma from the family and public, others have not accepted the TB sickness as well as other health complications such as difficulties in breathing as a result of TB and TB resulting to conflict in families.

> Respondent 7 lamented that, *"stress affects how one takes medications and with stress, youth turn to alcoholism and end up quitting treatment."*
>
> Respondent 8 reported that, *"my son left the house in the fear of getting infected with the disease from me."*

Some of the youth were worried whether they shall get over the TB infection. They had challenges with breathing, difficulties in taking drugs on a daily basis, body being weakened and being isolated by family members and neighbors. The infected patients also have the fear of infecting their family members. Stress has caused ulcers in some patients making them not to feed well. Additionally, the early stages of TB are very stressful coupled with medication side effects and one has to spend extra money in purchasing appetite boosters and supplements which are not provided for free in government facilities. These challenges can be overcome by accepting the

disease condition, having supportive family members, attending guidance and counselling sessions and being positive.

Poverty

Poverty was identified to be an issue of concern amongst the youths infected with TB. The data in the table below shows how poverty levels were scored.

Table 4.8 : Level of Poverty as a challenge to TB patients

	Frequency	**Percent**
Challenging	11	22.4
Extremely challenging	15	30.6
Neutral	4	8.2
Not Challenging	19	38.8
Total	**49**	**100**

The data shows that poverty was rated at 53% as being both extremely challenging and challenging. Poverty made it challenging for the TB patients to afford good food and nutrition as they undergo TB treatment. One has to go to work in their condition because they have to provide for their food, education and other needs for their families. A few responses were record as quoted below:

> Respondent 7," *You cannot afford transport to the health centres and proper food and nutrition"*
>
> Respondent 8, *"Contributes to stress, and you cannot afford healthy food and nutrition."*

Respondent 9*, "poverty affects how one affords good food and nutrition, cater for extra medication costs."*

Respondent 32, *"Stress from high cost of living and basic needs like food are becoming hard to afford"*

The other 47% cited poverty as not a challenge because medication was free by the government, health facilities were accessible and family members and spouses were supportive. For example,

Respondent 52 acknowledged, *"Although I lost my job after testing positive for TB which is sad, I currently I get support from my parents."*

Respondent 47, *"Am being provided for by my parents."*

Respondent 46, *"I'm not working it's only husband supporting us."*

Delayed Diagnosis

One of the challenges as to why TB infections are increasing and becoming resistant is as a result of delayed diagnosis and misdiagnosis. 59.2% of the respondents acknowledged this as a challenge that was extreme while 40.8% reported it as not being a challenge. Respondents cited that delayed TB diagnosis had made them incur extra costs towards managing various early symptoms of the disease resulting to damage to their bodies. The disease was also confused with HIV and AIDs making them spend money treating a wrong disease which was expensive and weakened the immune system.

According to respondent 7, *"delayed diagnosis is extremely challenging because it adds to extra costs to manage the disease at this stage."*

Respondent 10, *"Your body is already weak so treating it has an added cost."*

The 40.8% was properly diagnosed and started medication on time to treat the disease. This shows that Kenya has adopted the new technology in diagnosis and treatment of TB. The respondents reported that when tested, the results came out positive, as anticipated.

Lack of Income

Lack of income was also found to be very challenging scoring 69.4% and those that did not find it challenging at 30.6%. These figures are shown in the table below:

Table 4.9: Level of lack of income as a challenge to TB patients

	Frequency	**Percent**
Challenging	9	18.4
Extremely challenging	25	51.0
Neutral	3	6.1
Not Challenging	12	24.5
Total	**49**	**100**

Unemployment is a big challenge amongst the youth in Kenya. Women felt that they had laid a big burden on their husbands who had to provide the household needs alone. Lack of income contributed to lack of access to good nutrition and others completely lacking food and especially those under medication. They also reported that they could not afford good housing and getting extra medical care such as doing x-rays. They also experienced the challenge of not being able to visit the health facilities because of lack of transport. As posited by respondent 7, *"You cannot afford extra critical healthcare services like access to X-rays, or proper food and nutrition, or even enough transport to reach your health centre"*

Poor Housing

Good Housing is very key for TB patients. The house has to be spacious and well aerated so that the chances of infecting family members are minimized. The findings for housing were as shown below:

Table 4.10: Level of lack of income as a challenge to TB patients

	Frequency	**Percent**
Challenging	9	18.4
Extremely challenging	16	32.7
Neutral	9	18.4
Not Challenging	15	30.6
Total	**49**	**100**

Congested work places make TB to spread fast. Youths like frequenting crowded social places where they can easily infect others with TB or get infected. For those living in congested and small houses without ventilation, they have the fear of infecting family members. According to respondent 7, *"Most of these houses lack proper ventilations and mostly, many people live in the same house making the spread of TB to be more rampant."* Respondent 30 further noted that, *"Congestion and overcrowding in plots or working stations make the disease to spread"*

HIV and AIDs Burden

Studies have shown HIV reduces body immunity and can expose one to TB which is an infectious air borne disease. However, in this study, 90% of the respondents were HIV negative. Those infected reported that it was very painful and stressful to suffer from both diseases at the same time because the body immunity is total compromised and they have to take medication for the rest of their lives.

4.1.4 Approaches Towards Effective Management of Tuberculosis to Attain Youth Productivity in Promoting National Development

Technologies in Diagnosis and Treatment of TB

The study sought to understand the approaches that Kenya has adopted towards effective management of Tuberculosis to attain youth productivity and promote national development. The study revealed that Kenya is very highly committed (75.5%) in preventing and treatment of TB. The respondents gave the following reasons as to why they were of the opinion that the government is committed:

> Respondent 7*, "Once a patient has been diagnosed and found positive, there are vigorous treatments and follow-ups from hospitals; also, provision of free medication."*
>
> Respondent 10, *"the government provides free medication and does follow-ups."*
>
> Respondent 56, *"the nurses do follow-up, reporting on medication intake."*
>
> Respondent 12," *Adoption of prevention innovations like testing close family members as a precaution."*
>
> Respondent 27, *"Follow-up in treatment, screening those close to you just in case, carrying out sensitization."*

The table below shows the rate of adoption of innovative technologies in diagnosis and treatment of TB by the government of Kenya.

Table 4.11: Do you think that Kenya has effectively adopted innovative technologies in diagnosis and treatment of TB?

	Frequency	**Percent**
No	5	10.2
Yes	44	89.8
Total	**49**	**100**

The reported technologies and innovation in TB diagnosis and treatment were: using Gene expert, chest x-ray, TLAM, IGRA test, CT-Scan, Radiology, pleural effusion, timeliness in getting the results. However, there are some incidences where there has been misdiagnosis of the disease. After the diagnosis, TB patients are given free medication, there is a report back program, good record keeping and good monitoring to ensure that patients do not skip medication.

The reported reasons of Kenya's good rating in management of TB was shown in adoption of preventing initiatives such as diagnosing close family members, adoption of modern technologies for diagnosing, health facilities staff following up with TB patients, education and awareness creation of TB, contact tracing and screening, early diagnosis, free treatment, rules to wear a face mask, more upcoming well equipped health facilities, screening of those in contact with the patient and TB teaching for patients. Majority of the respondents acknowledged that Kenya has adopted innovative technologies in the diagnosing and treatment of TB. The respondents gave their following reasons:

Respondent 17, *"Xray is very good unlike spitting in the bottle."*

Respondent 27, *"Chest x-rays and radiology are very efficient in testing TB"*

According to the health workers interviewed the technological advancements in TB diagnosis and treatment had made their work easy compared to past years.

> Respondent 2 applauded that, "having *the patient to produce sputum for analysis was a lot of work. Today we do chest x-ray and we are able to diagnose the problem.*"
>
> Respondent 3 agreed that the government had done well, "*the Government has brought to us technologies such as AFP, Gene expert, Chest x-rays, CT-scan, Igra testing, TB Lam, Culture and Sensitivity."*

4.1.5 Approaches in effective management of TB in Kenya

To effectively manage TB in Kenya, the healthcare workers recommended intensive sensitization campaigns and creation of more adherence treatment platforms for patients. They also recommended capacity buildings; train the youth; and include TB in the curriculums, strengthening of community health groups; creating opportunities for the youth to be engaged in and to express their opinions. Respondent 6 mentioned that, "*there is need for a paradigm shift from using media to using community health groups to reach out more youth through sensitization and capacity building."*

4.2 Discussion

Gender disparity has been noted with HIV and TB cases where women tend to seek for medical attention as opposed to men.[125]The findings in this study show that 49% of those interviewed were females while men were 51%. The chosen sample size cannot be used to conclude that more men

[125] Enos, M., Sitienei, J., Ong'ang'o, J., Mungai, B., Kamene, M., Wambugu, J., Kipruto, H., Manduku, V., Mburu, J., Nyaboke, D., Ngari, F., Omesa, E., Omale, N., Mwirigi, N., Okallo, G., Njoroge, J., Githiomi, M., Mwangi, M., Kirathe, D., … Weyenga, H. (2018a). Kenya tuberculosis prevalence survey 2016: Challenges and opportunities of ending TB in Kenya. *PLOS ONE*, *13*(12), e0209098. https://doi.org/10.1371/journal.pone.0209098

with TB infection seek medical care than women. The Kenya Tuberculosis prevalence survey that was conducted in 2016 suggested that more women with TB infection seek medical care, as compared to their male counterparts.[126]

Studies have shown that children at the age below two years are more vulnerable to Tuberculosis. This risk declines at the age of 1-4 years but rises again at the age of 15-25 years, which are the youth.[127] This study showed that those TB patients at the age of 18 -35 years were 63.3% as compared to 36.7% that were over 35 years of age. The youth and adolescents are very highly vulnerable to Tuberculosis.

Tuberculosis vulnerability is influenced by various factors such as age, social behaviors, living conditions, health of an individual, occupation and source of income. The study revealed that 49% did not have a source of income, while 51% were either in casual jobs or small-scale businesses that were not performing well. Those challenged with poverty were 59.2%. People with low and unstable incomes and living in poverty were at a higher risk of Tuberculosis. A study conducted in Malawi, Rwanda, Tanzania, the Philippines and Myanmar revealed that household socioeconomic levels such as poverty and lack of income contributed to severity of Tuberculosis. lack or inadequate income means that a Tuberculosis patient may not afford the recommended

[126] Enos, M., Sitienei, J., Ong'ang'o, J., Mungai, B., Kamene, M., Wambugu, J., Kipruto, H., Manduku, V., Mburu, J., Nyaboke, D., Ngari, F., Omesa, E., Omale, N., Mwirigi, N., Okallo, G., Njoroge, J., Githiomi, M., Mwangi, M., Kirathe, D., … Weyenga, H. (2018b). Kenya tuberculosis prevalence survey 2016: Challenges and opportunities of ending TB in Kenya. *PLOS ONE*, *13*(12), e0209098. https://doi.org/10.1371/journal.pone.0209098

[127] Narasimhan, P., Wood, J., MacIntyre, C. R., & Mathai, D. (2013). Risk Factors for Tuberculosis. *Pulmonary Medicine*, *2013*, 1–11. https://doi.org/10.1155/2013/828939

nutrition and may have limited access to healthcare and proper housing, which in turn may increase the risk of transmitting the disease.[128]

The government of Kenya recognizes the significance of youth involvement in decision making processes on all sectors, including health. Youths have been involved in developing effective policies in TB management and designing initiatives for the youth to engage in TB-related activities such as policy formulation, planning and implementation of TB programs. The youth are also encouraged to come up with innovative approaches in raising awareness. From the study, 83.7% of the interviewed TB patients acknowledge that the government of Kenya is very highly committed to TB diagnosis and treatment. Additionally, the study revealed that 67.3% of the respondents believed that the government of Kenya has not engaged the youth fully in development and creation of opportunities. However, the youth that are already infected with TB have not had the opportunity to be involved in these opportunities. There is lack of inclusivity amongst the youth on how they are involved. Secondly, there education and awareness creation campaigns are not as vigorous as they used to be. This is in line with the response of the Key Informants that were mainly doctors, care givers and nurses, who reported that the government of Kenya does not involve the youth in decision making, designing policies, programs and services for the youth that are already infected with TB, since they better understand the challenges they face.

According to the study, only 18.4% of the interviewed patients had challenges with accessing healthcare facilities. Access to healthcare facilities can be influenced by factors such as

[128] Siroka, A., Law, I., Macinko, J., Floyd, K., Banda, R. P., Hoa, N. B., Tsolmon, B., Chanda-Kapata, P., Gasana, M., Lwinn, T., Senkoro, M., Tupasi, T., & Ponce, N. A. (2016). The effect of household poverty on tuberculosis. *The International Journal of Tuberculosis and Lung Disease*, *20*(12), 1603–1608. https://doi.org/10.5588/ijtld.16.0386

geographical location of the facility, transport and infrastructure, finances, stigmatization and the quality of the healthcare services provided. The youth may shy away from seeking medical care, while others fall victim of stigmatization. The health care services in TB centres in Kenya are deliberately sensitive to the needs of the youth. Firstly, the healthcare facilities are many, they operate in convenient hours for the youth, the patient's information is treated with confidentiality and the youth are empowered and taken through education and training session. Additionally, like other TB patients, the youth are assigned healthcare workers who are friendly, to follow whether the youths are adhering to the TB medication and general care of the patients as provided in the National Tuberculosis, Leprosy and Lung Disease strategy.[129] This was also reported by the interviewed respondents who were TB patients visiting various TB centers for their clinics. The TB medicines and related services were freely provided to the patients.

While improved access to primary healthcare contributes significantly to reducing disease burden and mortality, the low- and middle-income countries are yet to fulfil the Alma Ata Declaration.[130] In the context of Kenya, which is a middle-income country, access to healthcare is not as difficult as in the urban areas. However, it is challenging in the rural areas with poor road infrastructure. Accessing healthcare facilities for TB treatment can be constrained by lack of money for transport, even when the medical care is free at the health facility. A study conducted in the rural parts of Makueni county found out that access to healthcare was limited due to lack of infrastructural

[129] MoH. (2019b). *National Strategic Plan for Tuberculosis, Leprosy and Lung Health 2019-2023*.

[130] Jamison, D. T., Alwan, A., Mock, C. N., Nugent, R., Watkins, D., Adeyi, O., Anand, S., Atun, R., Bertozzi, S., Bhutta, Z., Binagwaho, A., Black, R., Blecher, M., Bloom, B. R., Brouwer, E., Bundy, D. A. P., Chisholm, D., Cieza, A., Cullen, M., … Zhao, K. (2018). Universal health coverage and intersectoral action for health: Key messages from Disease Control Priorities, 3rd edition. *The Lancet*, *391*(10125), 1108–1120. https://doi.org/10.1016/S0140-6736(17)32906-9

prerequisites such as poor roads, and neglected health facilities.[131] This applies to North Eastern Parts of Kenya and other areas away from major towns and urban centers.

While all the ten key informants reported that Kenya had adopted the state-of-the-Art technology in TB diagnosis and treatment, a good number of the patients interviewed (65.3%) reported that they had suffered delayed diagnosis due to misdiagnosis. The big number of the respondents that suffered misdiagnosis can be explained by the fact that patients adopt different treatment pathways, e.g. herbalist, private clinics, on counter drugs, public hospitals and traditional healers.[132] Additionally, there are many reasons that can lead to misdiagnosis of Tuberculosis. TB can present with atypical symptoms, it can come along with infection of other diseases such as HIV, similar symptoms to other diseases, limited access to diagnosis tools, poor medical history and drug resistance.[133]

The patients (respondents) that suffered poor housing were 49%. Tuberculosis, like many other respiratory infections is a social disease that is affected by poor housing, poor quality of life, overcrowding, burgeoning population, large families, lack of education, alcoholism amongst other social factors (Khan et al., 2019) . Poor housing comes with poorly ventilated houses, or small houses without adequate space for the household members. In such cases, saliva or body fluid droplets from the infected person can easily get in conduct with the rest of the members sharing

[131] Essendi, H., Johnson, F. A., Madise, N., Matthews, Z., Falkingham, J., Bahaj, A. S., James, P., & Blunden, L. (2015). Infrastructural challenges to better health in maternity facilities in rural Kenya: Community and healthworker perceptions. *Reproductive Health*, *12*(1), 103. https://doi.org/10.1186/s12978-015-0078-8

[132] Mbuthia, G. W., Olungah, C. O., & Ondicho, T. G. (2018). Health-seeking pathway and factors leading to delays in tuberculosis diagnosis in West Pokot County, Kenya: A grounded theory study. *PLOS ONE*, *13*(11), e0207995. https://doi.org/10.1371/journal.pone.0207995

[133] Kunjok, David Majuch and Mwangi, John Gachohi and Mambo, Susan and Wanyoike, Salome. (2021). *Assessment of delayed tuberculosis diagnosis preceding diagnostic confirmation among tuberculosis patients attending Isiolo County level four hospital, Kenya*. *38*(1).

the household and get infected.[134] TB is mainly concentrated on vulnerable members of the community such as homeless people, prisoners, persons living with HIV and the poor. Ancient methods of TB control in Kenya have led to humiliation and discernment for the infected, fear and mistrust for health institutions. These challenges have led to delayed TB diagnosis, continuous transmission, poor treatment outcomes and low treatment completion rates.[135]

HIV and AIDs burden was reported by the interviewed TB patients (28.6%) as one of the challenges they face. Tuberculosis and HIV is a duet noted as a public health challenge in the world. People with HIV develop low immunity and therefore become highly susceptible to TB infection.[136] Improved diagnostics and accessibility of medical care can improve this challenge.

The study revealed that 57.1% of the respondents suffered substance abuse. Misuse of drugs and alcohol as well as cigarettes increase the risk of TB infection and complicates management of the condition. Substance abuse leads to weakened immune system, damage of the lungs, reduced drug adherence and chronic health conditions.[137] Patients with challenges of substance abuse should get integrated care to address both the TB and substance abuse challenges. This can be difficult to the youth that do not have a source of income, are in poverty and rely on casual jobs or their relatives for upkeep and care.

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[134] Mathema, B., Andrews, J. R., Cohen, T., Borgdorff, M. W., Behr, M., Glynn, J. R., Rustomjee, R., Silk, B. J., & Wood, R. (2017). Drivers of Tuberculosis Transmission. *The Journal of Infectious Diseases*, *216*(suppl_6), S644–S653. https://doi.org/10.1093/infdis/jix354

[135] Jetty, R. (2021). Tuberculosis among First Nations, Inuit and Métis children and youth in Canada: Beyond medical management. *Paediatrics & Child Health*, *26*(2), e78–e81. https://doi.org/10.1093/pch/pxz183

[136] Tiberi, S., Carvalho, A. C. C., Sulis, G., Vaghela, D., Rendon, A., Mello, F. C. D. Q., Rahman, A., Matin, N., Zumla, A., & Pontali, E. (2017). The cursed duet today: Tuberculosis and HIV-coinfection. *La Presse Médicale*, *46*(2), e23–e39. https://doi.org/10.1016/j.lpm.2017.01.017

[137] Nordholm, A. C., Andersen, A. B., Wejse, C., Norman, A., Ekstrøm, C. T., Andersen, P. H., Koch, A., & Lillebaek, T. (2023). Mental illness, substance abuse, and tuberculosis risk. *Journal of Infection*, *86*(5), e135–e137. https://doi.org/10.1016/j.jinf.2023.01.035

The study reported that 53.1% of the respondents had challenges with adhering to TB treatment. There are various reasons as to why the youth may fail to adhere to TB treatment. Firstly, TB treatment takes a long duration of time, such as six months and over, while taking the prescribed antibiotics. The patients under treatment may develop side effects such as lack of appetite, gastrointestinal discomforts, nausea, skin rush and fatigue, which may compromise medical prescriptions routine. Additionally, the youth may face stigmatization from the community, making it difficult to seek support or TB treatment. Some patients may also lack TB knowledge, in terms of its cause and duration of treatment, as reported in Asmara, Ethiopia.[138]

[138] Gebreweld, F. H., Kifle, M. M., Gebremicheal, F. E., Simel, L. L., Gezae, M. M., Ghebreyesus, S. S., Mengsteab, Y. T., & Wahd, N. G. (2018). Factors influencing adherence to tuberculosis treatment in Asmara, Eritrea: A qualitative study. *Journal of Health, Population and Nutrition*, *37*(1), 1. https://doi.org/10.1186/s41043-017-0132-y

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

5.1.1 Summary for the Effects of TB on Youth Productivity in Promoting National Development in Kenya

This paper was on the effects of Tuberculosis on Youth productivity and in promoting national development in Kenya. The study acknowledges that the youth population in Kenya has been burgeoning with 60% of the youth not in employment. Additionally, the youth may be constrained from undertaking their duties due to disease burden. Young people have been shying away from going for TB diagnosis and getting the right treatment. Additionally, TB may be diagnosed late and therefore not treated early. People infected with TB are isolated and this hinders the young people from being recruited in the police, military, NYS, work places or participating in nation building activities.

TB is a killer disease, very infectious in nature. The challenges of TB infection compounded with poverty, unemployment and cultural practices have highly affected the youth, especially women. TB deprives the youth of energy, self-esteem and sources of income so they cannot give their full potential in nation building and promotion of national security.

The study sought to answer questions on; 1) How does TB affect youth optimum productivity in promoting national development in Kenya? 2) What are the challenges in managing Tuberculosis in Kenya? and 3) How effective are the approaches towards management of Tuberculosis to attain optimum youth productivity and promote national security in Kenya?

5.1.2 Summary for the Challenges in Managing Tuberculosis in Kenya

The study found out that TB is a grave health challenge in the word. Every year, approximately 140,000 Kenyans get infected with TB with ¾ of the number suffering from HIV and AIDs while ¼ of the number die from the disease. Tuberculosis is ranked as the 4th leading cause of deaths in Kenya with nearly 2 Kenyans dying every hour from the disease, despite the treatments available. Kenya has made progress in the fight against TB, and was among the first countries in Africa to achieve and implement World Health Organization (WHO) guidelines in Africa.[139] Due to these efforts, new infections and deaths have reduced and Kenya has ensured that families with TB patients are not burdened with the TB expenses.[140]

The multidrug-resistant strains type has high prevalence in these countries and have really affected the poor more. Kenya has a high TB burden. As of 2017, it was estimated that in every 100,00 population, there are over 300 cases of tuberculosis while mortality rate was estimated at 50 people from the population.[141] TB endemic regions and affected individuals continue to suffer stigma, poverty, no awareness, low uptake of prevention, crowded and inadequate housing, food insecurity, taboo, underinvestment, poor implementation of government policies and health programs, as well as inequitable health access due to poor primary health infrastructure.[142]

In Kenya, people with TB go through stigma and are looked down up on. In the long run, they develop fear and mistrust for health institutions. These challenges have led to delayed TB diagnosis, continuous transmission, poor treatment outcomes and low treatment completion

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[140] https://www.copenhagenconsensus.com/publication/kenya-perspective-tuberculosis

[141] Zumla A, Petersen E, Nyirenda T, Chakaya J. Tackling the tuberculosis epidemic in sub-Saharan Africa - unique opportunities arising from the second European developing countries clinical trials partnership (EDCTP) programme 2015-2024. Int J Infect Dis. 2015; 32:46–9. Available from: https://www.ijidonline.com/article/S1201-9712(14)01757-3/fulltext. https://doi.org/10.1016/j.ijid.2014.12.039.

[142] Young, Ed, Bianca Masuku, Barbara Torresi, Digby Francis Warner, and Anastasia Sideris Koch. "Eh! woza: intersection of art and science to engage youth on tuberculosis." *Global Health Innovation* 1, no. 1 (2018).

rates.[143] A certain group of marginalized adolescents and young adults may be more vulnerable to TB, which increases their risk of acquiring the diseases coupled with challenges in accessing healthcare. The vulnerable categories are those who are homeless, in substance abuse, detained and the displaced.

5.1.3 Summary for the Approaches Towards Effective Management of Tuberculosis in Kenya

The approaches in managing and Treating TB in Kenya are in implementation of the WHO TB Elimination strategy adopted in 2014 as part of the SDGs. The strategy advocates for 90% reduction of deaths associated with TB by 2030. Early treatment, and sticking to medical prescriptions for TB is good for healing. Seeking treatment for those infected with TB is good to prevent the sick from further infecting others.

5.2 Conclusions

This section presents conclusions as per the findings on the three objectives of the study.

5.2.1 Conclusions for the Effects of TB on Youth Productivity in Promoting National Development in Kenya

There are several conclusions drawn from this study. The study establishes that Kenya still faces several challenges in the management of TB. These challenges are more severe to the vulnerable population; the youth being included. This affects their capability to participate in national development initiatives. Health security is key in enhancing the other aspects of security within a population.

[143] Jetty, Radha. "Tuberculosis among First Nations, Inuit and Métis children and youth in Canada: Beyond medical management." *Paediatrics & Child Health* 26, no. 2 (2021): e78-e81.

5.2.2 Conclusions for the Challenges in Managing Tuberculosis in Kenya

Kenya has not fully adopted the technologies in TB diagnosis and treatment due to poor medical systems, lack of finances for implementation and inadequate advocacy on the importance of getting screened for TB. The government should form and strengthen partnerships with development organizations to fight TB as well as encouraging increased advocacy and awareness creation amongst communities on TB disease, how to control it and how to treat once one is infected. These partnerships will also enhance speedy adoption of new innovations in TB diagnosis and treatment.

5.2.3 Conclusions for the Approaches Towards Effective Management of Tuberculosis in Kenya

The government of Kenya is highly committed in prevention and management of TB. The government has adopted and ensured availability and accessibility of state-of-the-art technologies and innovations such as use of Chest x-rays, Radiology and C-T scan in diagnosis of TB. Additionally, the respondents, who were majorly patients reported of good hospitality, respect, care, good treatment and follow ups by the medical personnel handling TB patients.

5.3 Recommendations

This section presents study recommendations based on the researcher's opinion as per the findings of the study.

5.3.1 Recommendations for the Effects of TB on Youth Productivity

The study found out that the youth are very highly vulnerable to the effects of Tuberculosis. In addition, the youth lacked job opportunities and continued to struggle with life.

1. The government should create avenues to involve the youth in decision making processes. The youth know what they need to solve their problems and be able to bear the effects of tuberculosis.

5.3.2 Recommendations for the Challenges in the Management of TB in Kenya

Majority of the youths do not have a source of income, are stricken by poverty and therefore keep on depending on their parents and relatives for upkeep, housing and transport to the TB centres.

1. The government should come up with programs that engage the youth that are infected with TB. For instance, there could be Kazi kwa vijana program, specifically, for the youths.
2. The government can also introduce a program to facilitate the tb patients with fare so that they do not fail to attend the clinics due to lack of transport. Currently this support is only provided to the MDR patients through donor funds and hence should be scaled up. All TB patients also need food and supplements.

5.3.3 Recommendations for the Approaches Towards Effective Management of Tuberculosis in Kenya

This study has examined the effects of Tuberculosis on Youth productivity and in promoting National Development in Kenya. The study therefore recommends the following:

1. Statistics have shown that the youth with TB are lagging behind in accessing TB prevention and care. The same was reported in the TB centres visited because as the youth also shied away from sharing information. There is need for sensitization of youth and the general public on the importance of visiting the public health facilities for free TB testing and treatment since the disease can be expensive to treat if left to persist and can lead to death.

Appendix 1: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **437495**

Date of Issue: **06/December/2022**

RESEARCH LICENSE

This is to Certify that Dr.. CAROLINE ACHIENG ASIN of National Defence College Kenya, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Busia, Kisumu, Machakos, Mombasa, Nairobi, Siaya, Vihiga on the topic: THE EFFECTS OF TUBERCULOSIS ON YOUTH PRODUCTIVITY AND IN PROMOTING NATIONAL DEVELOPMENT IN KENYA for the period ending : 06/December/2023.

License No: **NACOSTI/P/22/22293**

437495

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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See overleaf for conditions

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)
Legal Notice No. 108: The Science, Technology and Innovation (Research Licensing) Regulations, 2014

The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was the established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way;
    i. Endanger national security
    ii. Adversely affect the lives of Kenyans
    iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
    iv. Result in exploitation of intellectual property rights of communities in Kenya
    v. Adversely affect the environment
    vi. Adversely affect the rights of communities
    vii. Endanger public safety and national cohesion
    viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
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9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

Appendix 2: Request to conduct Research

RESTRICTED

Telephone: 254-2-884036
Fax: 254-2-884036
E-mail: ndc@ndc.go.ke

When replying please quote:

Ref: NDC/A/141

National Defence College
Warai North Road
P.O Box 24381
Karen - Nairobi
Kenya

10 November 2022

TO WHOM IT MAY CONCERN

FACILITATION FOR DR CAROLINE ACHIENG ASIN ADMN No. ND601/0044/2022

The above Senior Officer is a course participant at the National Defence College and has been admitted for Masters of Arts in National Security and Strategy, under the National Defence University- Kenya Programme.

As part of academic requirements, Dr Caroline Achieng ASIN is required to undertake a research project in partial fulfillment of MA degree programme she is enrolled in. Her approved research topic is **"The Effects of Tuberculosis on Youth Productivity and in Promoting National Development in Kenya".**

The purpose of this letter is to kindly request your office to facilitate the Officer as she conducts her research project.

Submitted for your kind consideration and facilitation.

Mr F M MABEYA
Head of Programme
for Commandant

Appendix 3: Approval to Conduct Study in Langata and Dagoretti

NAIROBI CITY COUNTY

Telephone 020 344194

Web: www.nairobi.go.ke

City Hall,
P. O. Box 30075-00100,
Nairobi,
KENYA.

HEALTH WELLNESS & NUTRITION

REF: NCCG/DHS/REC/309 **DATE: 17th February 2023**

Dr. CAROLINE ACHIENG ASIN
NATIONAL DEFENCE COLLEGE, KENYA
NAIROBI

Dear Dr, Caroline,

RE: RESEARCH AUTHORIZATION

This is to inform you that the Nairobi City County – County Health Services Research Ethics Committee (REC) reviewed the documents on the study titled "THE EFFECTS OF TUBERCULOSIS ON YOUTH PRODUCTIVITY AND IN PROMOTING NATIONAL DEVELOPMENT IN KENYA."

I am pleased to inform you that you have been authorized to carry out the study at Dagoretti North, Dagoretti South and Langata Sub counties in Nairobi County. The researcher will be required to adhere to the ethical code of conduct for health research in accordance with the Science Technology and Innovation Act, 2013 and the approval procedure and protocol for research for Nairobi.

On completion of the study, you will submit one hard copy and one copy in PDF of the research findings to the REC. In addition, you will disseminate recommendations of the research at a virtual meeting organized by the REC. By copy of this letter, the Sub County Medical Officers of Health - Dagoretti North, Dagoretti South and Langata are to accord you the necessary assistance to carry out this research study.

Yours sincerely,

DR. ANDREW TORO
CHAIR - RESEARCH ETHICS COMMITTEE

Cc: Chief Officers – Public Health, Medical Services and Health Facilities
Sub County Medical Officers of Health - Dagoretti North, Dagoretti South and Langata sub-counties

Appendix 4: Consent form

The data was collected digitally through open data kit called Kobocollect. The first section was seeking consent. If the respondent did not agree to be interviewed after doing the introduction, the enumerator would click 'No' and the questionnaire would let them submit to the server, as shown in the figure below:

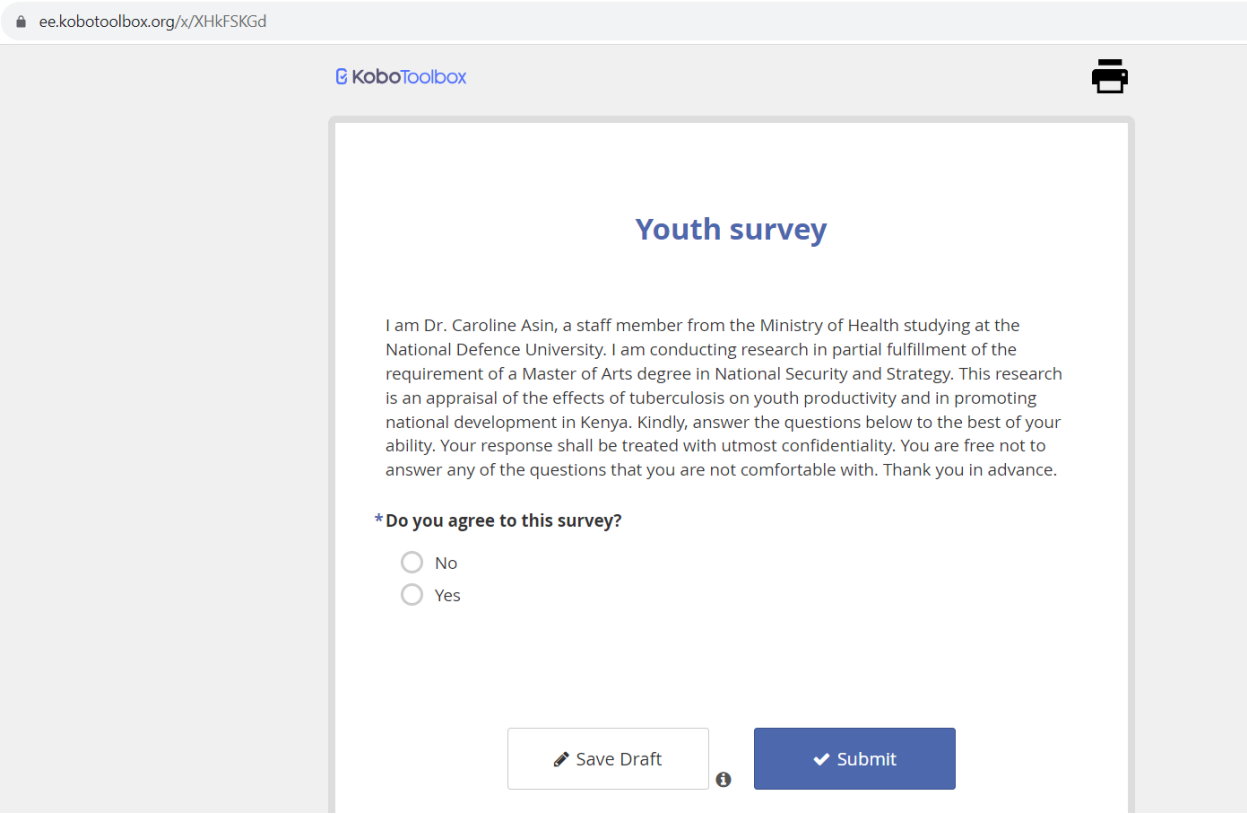

Figure 4: A snip of the Open data kit called Kobo collect for digital data collection - 1

If the respondent agreed, the data collection enumerator would click yes, then the tool would lead them to start filling in the information as shown below:

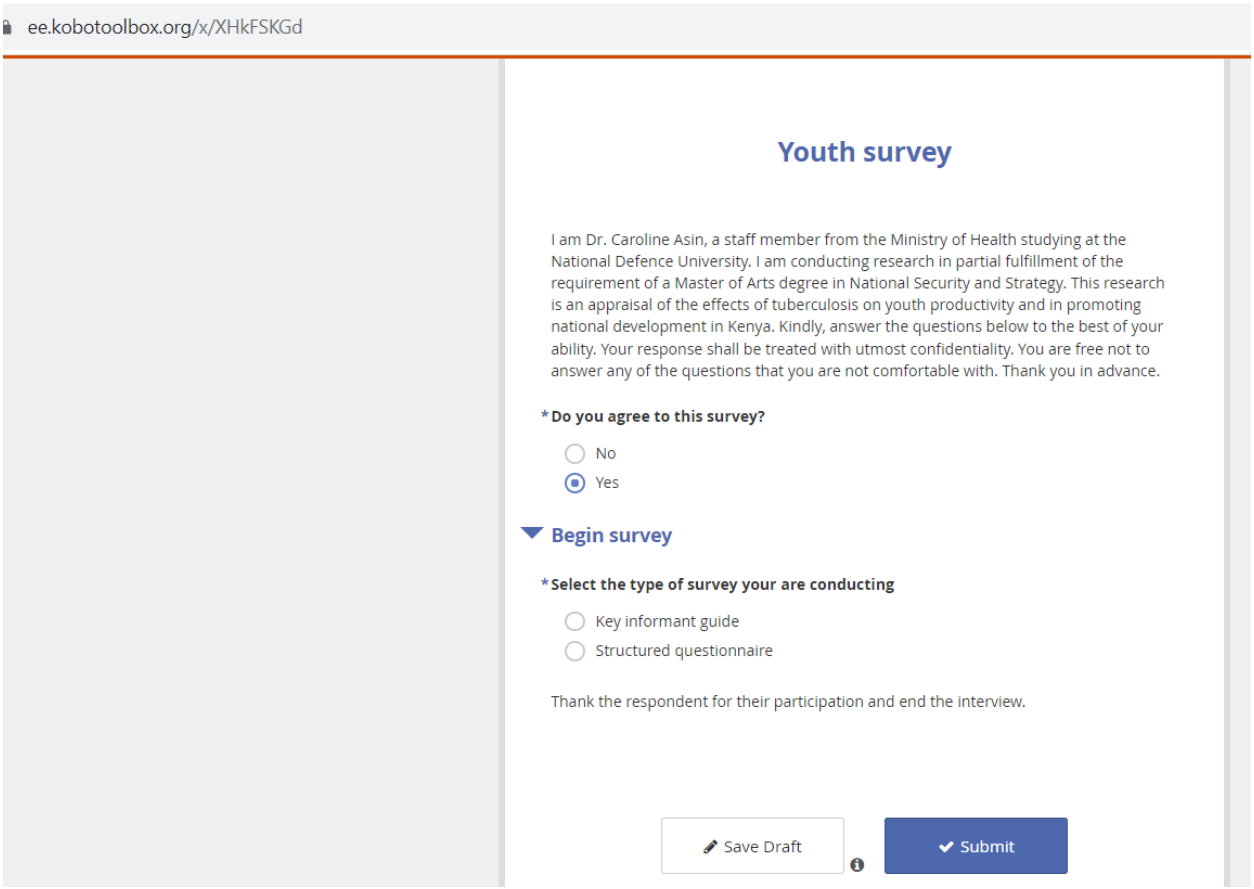

Figure 5: Figure 3: A snip of the Open data kit called Kobo collect for digital data collection - 2

Appendix 5: Research Questionnaire

I am Dr. Caroline Asin, a staff from the Ministry of Health and studying at the National Defence University. I am conducting research in partial fulfilment of the requirement of Master of Arts degree in National Security and Strategy. This research is an appraisal on "***The effects of Tuberculosis in youth productivity in promoting national development in Kenya"***

Please answer the following questions:

SECTION A: Demographic Information

1. Date of the Interview

……

2. Gender of the Respondent
    a. Male ☐
    b. Female ☐
3. Age of the respondent

……

4. Name of Institutional facility where applicable

……

SECTION B: EFFECTS OF TB ON YOUTH'S PRODUCTIVITY IN NATIONAL DEVELOPMENT

5. How vulnerable are the youth and young adults to TB?

   Very low ☐

   Low ☐

   Normal ☐

   High ☐

   Very high ☐

6. Do you think the government of Kenya has engaged the youth fully in development and creation of opportunities?

   Yes ☐

   No ☐

   Please explain

……

…….....

……

…….....

7. Are the youth involved in the development of policies, services and programs?

   Yes ☐

   No ☐

   Please explain how?

……

…….....

……

…….....

8. What is your source of income?

   Employment ☐

   Business ☐

   None ☐

9. How do you take care of your TB treatment and basic needs?

……

…….....

10. As a young person and a TB patient, do you have an opportunity / a platform to voice your opinions?

    Yes ☐

    No ☐

    Please explain

……

…….....

……

…….....

SECTION C: CHALLENGES IN MANAGING TUBERCULOSIS IN KENYA

11. Please rate the challenges faced by TB patients in Kenya. You can add others as well as you explain further.

11.1 Poor access to healthcare

extremely challenging ☐

Challenging ☐

Neutral ☐

Not challenging ☐

Please explain

……

…….....

11.3 Stress

extremely challenging ☐

Challenging ☐

Neutral ☐

Not challenging ☐

Please explain

……

…….....

11.4 Poverty

extremely challenging ☐

Challenging ☐

Neutral ☐

Not challenging ☐

Please explain

……

…….....

11.5 Delayed diagnosis

extremely challenging ☐

Challenging ☐

Neutral ☐

Not challenging ☐

Please explain

……

…….....

11.6 Lack of income

extremely challenging ☐

Challenging ☐

Neutral ☐

Not challenging ☐

Please explain

……

…….....

11.7 Poor housing

extremely challenging ☐

Challenging ☐

Neutral ☐

Not challenging ☐

Please explain

……

…….....

11.8 HIV and Aids burden

Extremely challenging ☐

Challenging ☐

Neutral ☐

Not challenging ☐

Please explain

……

…….....

11.9 Substance abuse

extremely challenging ☐

Challenging ☐

Neutral ☐

Not challenging ☐

Please explain

……

…….....

11.10 Adherence to TB medication

extremely challenging ☐

Challenging ☐

Neutral ☐

Not challenging ☐

Please explain

……

…….....

SECTION D: APPROACHES TOWARDS EFFECTIVE MANAGEMENT OF TUBERCULOSIS TO ATTAIN YOUTH PRODUCTIVITY AND PROMOTE NATIONAL DEVELOPMENT IN KENYA

12. How do you rate Kenya's commitment to the prevention of TB?

Very low ☐

Low ☐

Normal ☐

High ☐

Very high ☐

13. How do you rate Kenya's commitment to the treatment of TB?

Very low ☐

Low ☐

Normal ☐

High ☐

Very high ☐

14. Do you think Kenya has effectively adopted innovative technologies in diagnosing TB?

    Yes ☐

    No ☐

    Please explain

15. Do you think Kenya has effectively adopted innovative approaches in treating TB?

    Yes ☐

    No ☐

    Please explain

……

…….....

……

Thank you so much

Appendix 6: Key Informant Guide

I am Dr. Caroline Asin, a staff from the Ministry of Health studying at the National Defence University. I am conducting research in partial fulfilment of the requirement of Master of Arts degree in National Security and Strategy. This research is on: **The effects of Tuberculosis on Youth productivity in promoting National Development in Kenya.**

Kindly, answer the questions below to the best of your ability. Your response shall be treated with utmost confidentiality. You are free not to answer any of the questions that you are not comfortable with. Thank you in advance.

1. How vulnerable are the youth and young adults to TB?

……

…….....

……

…….....

2. Do you think the government of Kenya has engaged the youth fully in development and creation of opportunities?

……

…….....

……

…….....

3. Do you think the youth are involved in the development of policies, services and programs?

……

…….....

……

…….....

4. Are TB patients given an opportunity / a platform to voice their opinions and recommendations?

……

…….....

……

…….....

5. In your opinion, how is Kenya's commitment in the prevention of TB?

……

…….....

……

…….....

6. In your opinion, how is Kenya's commitment in the treatment of TB?

……

…….....

……

…….....

7. Do you think that Kenya has effectively adopted innovative technologies in diagnosing TB?

……

…….....

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…….....

8. Do you think that Kenya has effectively adopted innovative technologies in treating TB?

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…….....

9. What do you recommend towards effective management of TB amongst the youth in Kenya?

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…….....

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