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RESEARCH ARTICLE

ECONOMIC IMPACT OF TUBERCULOSIS ON SURVIVORS OF DRUG SENSITIVE TB

[1]Dr. Suvrojyoti Dhenki, [2]Dr. Arup Kumar Chakrabartty and [3]Dr. Sahanaz Begum

[1,3]BHMS, MPH(WBUHS), Institute of Public Health, Kalyani
[2]PhD, MPH, MBA, MBBS (Cal), Faculty, School of Public Health, Texila American University

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Corresponding author:
Rajesh Kumar Upadhyay

ABSTRACT

Tuberculosis (TB) imposes a substantial economic burden on survivors of drug-sensitive TB, as evidenced by the data and supported by comparative studies. The findings reveal that direct costs, including diagnostics, medicine, and transportation, significantly impact patients, despite widespread use of government healthcare facilities. These expenses, coupled with income loss and wage disruption highlight the financial instability faced by TB survivors. Prolonged recovery periods further exacerbate this burden, reducing earning potential and straining household finances.

- 74% of survivors reported a loss of income, and 42% experienced job loss due to the disease. The wage loss data shows variability, with 26% reporting no loss, while 23% lost wages equivalent to 7 days, and others reported longer periods (up to 270 days). This demonstrates the severe disruption in earning capacity caused by TB, particularly for daily laborers who constitute a significant share of the employed population (52%).
- Survivors incurred significant additional monthly expenses, with 52% spending ₹1000 or more on necessities related to TB management. Diagnostic and travel costs added to this burden, with 64% spending ₹100 on travel and others incurring costs as high as ₹700 for diagnostics. These recurrent expenditures, though individually modest, compound over time, leading to financial strain.
- 87% of survivors reported a reduction in savings, reflecting how TB depletes financial reserves, leaving families vulnerable to economic shocks. Such financial erosion can have long-term consequences, particularly for low-income households.
- Although 82% of survivors relied on government hospitals for treatment, suggesting some alleviation of direct medical costs, additional expenses for medicine (e.g., 29% incurring ₹2000) and domestic losses (e.g., 23% facing ₹100 in expenses) highlight the hidden costs of managing TB.
- 79% of households experienced mild food insecurity, while 8% faced severe impacts, underlining how TB indirectly affects nutritional well-being. This reflects the trade-offs households must make between healthcare spending and essential needs.

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INTRODUCTION

- TB is an infectious disease caused by a germ called 'Mycobacterium Tuberculosis'.
- TB mostly affects the lungs (causing pulmonary TB) but can also affect other organs, including bones and joints, kidneys, brain, genitals, urinary tract, spine, lymphatic system, intestines, etc. In other words, it could affect all organs except hair and nails[1].
- TB spreads through air. When someone with pulmonary TB coughs, spits or sneezes, droplets of mucous carrying TB germs may be expelled into the air. Anyone who inhales these droplets could develop an active TB infection[2].
- When someone inhales the TB bacteria, it could settle in the lungs and cause pulmonary TB. However, it could also spread to other organs via the blood stream and lymph system and cause an infection in whichever part of the body it settles in.
- When TB affects any organ other than the lungs, it is called extra-pulmonary TB.
- All those who inhale the TB bacteria do not become ill with the disease. When someone harbours the bacteria but does not manifest any symptoms of TB, they are said to have Latent TB infection (LTBI). In people who have LTBI, the normal immune system of the body is able to keep the bacteria well under control. An estimated 30 to 40 % of the Indian population has LTBI[3]

- Malnutrition, diabetes and HIV are some of the risk factors for TB, as they all lower a person's immunity. Smoking, Alcohol is also risk factors[3].

Treating TB

- TB is a curable disease[2].
- The average course of the treatment for drug-sensitive TB is six months. For those with a drug resistant form of TB, the duration of treatment is often longer, up to two years.
- Drug-sensitive TB is treated with a combination of drugs (Isoniazid, Rifampicin, Ethambutol and Pyrazinamide)[2].
- In 2017, India shifted from a thrice-weekly regimen to daily fixed dose combinations (FDC) of first – line anti-tuberculosis drugs in appropriate weight bands[3].
- TB treatment is available free of cost at all government centres. However, costs in the private sector vary tremendously – a full course of TB treatment, if bought from a pharmacy, can cost between Rs. 6,000 to Rs. 12,000 for the six months, depending on the drugs prescribed[3].

India has the highest tuberculosis (TB) burden in the world[1] with more than 24 lakh cases reported in 2022[2]. As part of its commitment to the World Health Organisation's "End TB Strategy", the Government of India has set a target of achieving zero catastrophic cost (defined as total TB treatment cost ≥20% pre-TB annual household income) for TB-affected households by 2025. TB has a serious impact on the participants' employment status and resulted in massive income loss.[1] This necessitates a deeper understanding of the current extent of catastrophic costs faced by TB patients in the country.

The economic and social burden of tuberculosis:

The impact of tuberculosis is most often measured as the direct costs of treatment to the health service, that is, the costs of medicines, personnel, and facilities used. However, the economic impacts are considerably more far-reaching. Often patients seek costly treatment from traditional healers or the private sector before an accurate diagnosis is made. Only then, they may shift to the public sector. The costs to patients and their families that can be quantified are principally in the form of lost earnings from loss of work due to illness or death. Additional costs come from food required while in hospital and the costs of travel to hospital or clinic for care. In addition to these direct treatment and non-treatment costs, tuberculosis imposes intangible costs in the form of pain, suffering, grief and discrimination[2]. In order to fully appreciate the impacts of a disease such as tuberculosis on the well-being of a nation, the costs borne by individuals, households and communities, and not just the costs to the public health services must be examined. Similarly, to fully evaluate the costs and benefits of alternative strategies to combat and treat disease, one must look at the costs and benefits of each alternative approach to individuals, households, and communities, and not just the costs to the public health service. A goal of public policy is to maximize social well-being, subject to budget constraints. This is sometimes forgotten in favour of minimizing the expenditures of public agencies such as departments of health.

- Treatment costs borne by patients and their family
- Non-treatment costs borne by patients and their families
- Psychological and social costs

Objectives of the research

- To quantify the direct medical and non-medical costs incurred by TB survivors.
- To assess the indirect costs in terms of lost productivity and income.
- To find out the socio-economic consequences of TB on survivors and their households.

Review of literature: Tuberculosis (TB) is a significant public health issue with profound economic consequences for those affected. While drug-sensitive TB (DSTB) is treatable and curable, the economic burden on survivors can be substantial. This review synthesizes current literature on the economic impact of DSTB on survivors.

Direct Medical Costs: Direct medical costs for DSTB include expenses related to diagnosis, treatment, and hospitalization. Studies such as those by Tanimura *et al.* (2014)[6] have highlighted that despite free treatment in many countries, patients still incur significant out-of-pocket expenses for diagnostics, additional medications, and hospitalization during severe cases.

Indirect Costs and Income Loss: One of the major economic impacts of DSTB is the loss of income due to inability to work. A study by Lonnrot *et al.* (2009)[7] found that TB patients often face prolonged periods of unemployment, resulting in substantial income loss. This is exacerbated in low-income settings where social safety nets are weak. Research by Foster *et al.* (2017)[8] shows that TB-affected households may face catastrophic costs, pushing them further into poverty.

Long-Term Economic Impact: Long-term health complications from TB can continue to impact survivors economically. Marais *et al.* (2013)[9] noted that survivors might suffer from chronic lung disease and other long-term health issues, reducing their ability to work and earn a livelihood. Studies also indicate that TB survivors often experience reduced quality of life and productivity, as noted by Chatterjee *et al.* (2020)[10].

Social and Psychological Costs: Social stigma associated with TB can lead to social isolation and discrimination in the workplace, further impacting economic stability. A qualitative study by Courtwright and Turner (2010)[11] highlighted that stigma can deter individuals from seeking employment or can lead to job loss, thereby reducing household income.

Healthcare Access and Financial Burden: Access to healthcare facilities and the financial burden of transportation and nutritional support are significant concerns. Research by Ukwaja *et al.* (2013)[12] demonstrated that transportation costs to healthcare facilities can be prohibitively expensive for many TB patients, especially in rural areas. Additionally, ensuring adequate nutrition during treatment can strain already limited household resources.

Policy Implications: Effective policy interventions are necessary to mitigate the economic impact of TB on survivors. Providing comprehensive social protection measures, including income support, nutritional assistance, and transportation subsidies, can alleviate some of the financial burdens. Studies

such as those by Boccia *et al*. (2011)[13] suggest integrating TB care with broader social protection programs to enhance economic resilience among survivors. The economic impact of drug-sensitive TB on survivors is multifaceted, encompassing direct medical costs, income loss, long-term health complications, and social stigma. Addressing these issues requires a holistic approach that includes not only medical treatment but also social and economic support systems. Future research should focus on evaluating the effectiveness of integrated support programs and exploring innovative solutions to reduce the economic burden on TB survivors.

Gap in the existing literature: Economic studies on tuberculosis estimated out-of-pocket expenses related to tuberculosis treatment and catastrophic cost, however, no study has yet been conducted to understand the post-treatment economic conditions of the tuberculosis patients in India especially in Hooghly district. There is need for detailed community based research to understand the context and necessity of the TB survivors.

METHODOLOGY

- **Study Design:** A cross-sectional descriptive study.
- **Study Population:** Survivors of drug-sensitive TB in Hooghly District who have started their treatment within 1st October 2023 to 31st December 2023.

Study setting: According to Census 2011,Hooghly had population of 5,519,145 of which male and female were 2,814,653 and 2,704,492 respectively. Hooghly District population constituted 6.05 percent of total Maharashtra population. Average literacy rate of Hooghly in 2011 were 81.80 compared to 81.80 of 2001.With regards to Sex Ratio in Hooghly, it stood at 961 per 1000 male compared to 2001 census figure of 947.In 2011, total 1,086 families live on footpath or without any roof cover in Hooghly district of West Bengal. Total Population of all who lived without roof at the time of Census 2011 numbers to 3,969. This approx 0.071913312659841% of total population of Hooghly district. The initial provisional data released by census India 2011, shows that density of Hooghly district for 2011 is 1,753 people per sq. km. In 2001, Hooghly district density was at 1,601 people per sq. km. Hooghly district administers 3,149 square kilometers of areas. Out of the total Hooghly population for 2011 census, 38.57 percent lives in urban regions of district. In total 2,128,499 people lives in urban areas.61.43 % population of Hooghly districts lives in rural areas of villages. The total Hooghly district population living in rural areas is 3,390,646. There are 18 blocks in Hooghly District. Randomly two blocks was selected from the list of blocks.one is Dhaniakhali Block and another is Tarakeswer Municipality.

Sampling

Sampling population:Survivors of drug-sensitive TB in Hooghly District who have started their treatment within 1st October 2023 to 31st December 2023.

Sample Size with Calculation: The sample size was calculated based on the prevalence rate of Economic Impact of TB survivors 50%(as there is no confirmed study), with a confidence level of 95% and a margin of error of 10%.

Estimated Number: $n = \frac{z^2 pq}{d^2}$

n = Sample size
z = level of confidence (1.96)
p = Prevalence rate of Economic Impact of TB survivors (Asestimated by a study conducted in Puducherry district in 2018 by Prasanna T, *et al* [14]).
q = 1- p
d =Sampling error (10% = 0.1)

Sample size calculation= $\frac{1.96^2 \times 0.5 \times 0.5}{0.1^2} = \frac{0.9604}{0.01} = 96.04$

So Sample size is = 97

Initially, the study considered 97 participants as the required sample size. And finally, I have been taken the sample size as round off 100.

So Final Sample size is = 100

Sampling Technique: Number of patients to be interviewed per block decided based on the population proportion of the blocks out of the total sample size being 100. Dhaniakhali is the bigger block so from there 60% patients was taken and the rest 40% was taken from Tarakeswar block.

Selection of respondents: From the selected block, list of patients is collected from the block. As they are cured patients the list of patients is collected from the Nikshay Portal by the STS(Senior Treatment Supervisor). First patient on the list was approached first. This way, from the serial number of the patients from the list will be approached for conducting interview. They were visited for conducting interview. On refusal or non-availability of the patient, the next patient was approached for the interview. This way, the interview was conducted till the desired sample size is reached.

Inclusion Criteria

- Individuals who have been diagnosed with drug-sensitive TB and have completed treatment within April 2024 to June 2024.
- Residents of Hooghly District.
- Individuals willing to provide informed consent.

Exclusion Criteria

- Survivors of multi-drug-resistant TB (MDR-TB) or extensively drug-resistant TB (XDR-TB)
- Those patients who have to prescribed extended regime for their treatment (treatment more than six month).

Data Collection Tools

Questionnaire: A structured questionnaire developed, covering sections on demographics, direct and indirect costs, and socio-economic impact.

Data Collection Procedure

Interviews: Face-to-face interviews conducted using the questionnaire.

Study variables

Dependent variable

- Economic impact in terms of direct and indirect medical and non-medical costs incurred.
- Socio economic condition of TB survivors.

Independent variable

- Age
- Gender
- Socio-economic status
- Living conditions
- Education
- Occupation
- Lifestyle factors (e.g.- smoking, alcohol use)
- Marital status
- Diet habit
- Access to private and government services

Ethical Considerations: We took

- Permission from Institutions Ethics committee of Institute of Health & Family Welfare.
- Administrative permission in writing was taken from Department of Health and Family Welfare at State , District and Block level authorities
- We used Informed Consent Form which explain clearly on the introduction of researcher, purpose of the study, risk and benefits, confidentiality, liberty to participate / withdraw.

RESULTS

Table 1. Age Distribution among TB Survivors

AGE GROUP	FREQUENCY	PERCENTAGE (%)
18-30	26	26
31-45	36	36
46-60	34	34
61-75	4	4
TOTAL	**100%**	

Age Group Analysis in the Context of TB Survivors Economic Impact:

- **18–30 years (26%)**: This age group, often characterized by early career stages or higher education pursuits, represents a significant portion of TB survivors. Economic impact on this group could include interruptions in education or career progression, resulting in delayed earnings and productivity losses.
- **31–45 years (36%)**: The largest proportion of survivors falls within this working-age group. This demographic likely experiences the highest economic consequences, as it encompasses individuals in their prime earning years, shouldering household responsibilities. Loss of income or employment during TB treatment can have cascading effects on their families.
- **46–60 years (34%)**: This group, constituting a considerable percentage, may face challenges such as premature retirement, prolonged health-related expenses, or financial strain if they support dependents.
- **61–75 years (4%)**: A smaller proportion of survivors in this age group may rely on pensions or family support, with limited productivity losses but potentially higher medical costs due to age-related comorbidities.

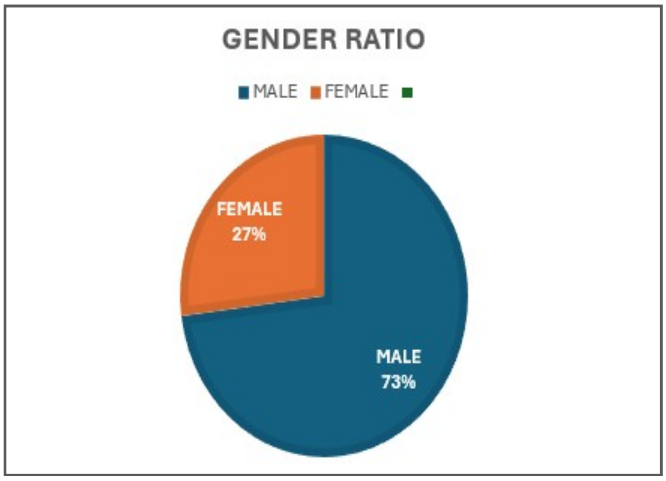

Figure.2. Pie Chart Showing Gender Distribution among TB Survivors

Gender-Based Distribution in the Context of Economic Impact of TB

- **Male (73%)**: The majority of the TB survivors in the study are male. This demographic might face significant economic consequences, particularly as men are often primary income earners in many households. The disruption caused by TB treatment and recovery can lead to lost wages, job insecurity, and financial strain on their families.
- **Female (27%)**: While females constitute a smaller portion of the sample, their economic challenges may differ significantly. Women are often involved in unpaid caregiving or informal sector work, which may not be adequately accounted for in economic productivity loss. Additionally, social stigma associated with TB could disproportionately affect women, leading to long-term socio-economic consequences.

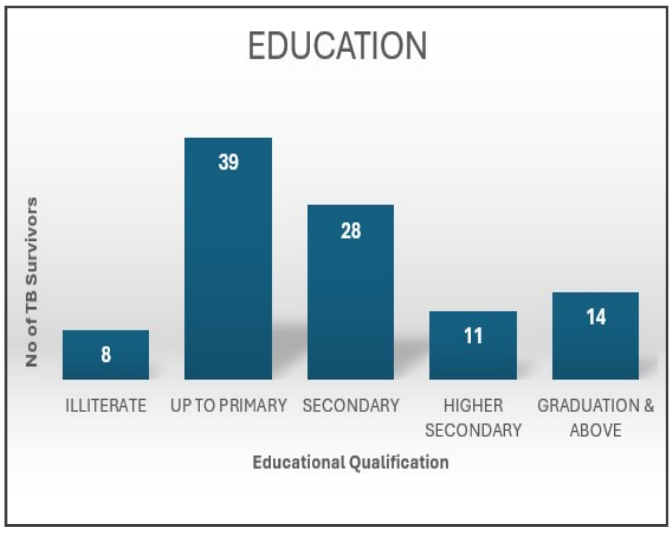

Figure 3. Bar Diagram showing Distribution of educational qualification among TB Survivors

Education Qualification and the Economic Impact of TB:

- **Illiterate (8%):**A small proportion of survivors are illiterate. This group is likely to be engaged in low-paying, informal jobs, making them more vulnerable to income loss during TB treatment and recovery. Limited education may also restrict access to information about TB management and support systems.
- **Up to Primary (39%):**The largest group has only completed primary education, indicating a significant portion of survivors might be involved in low-skilled or semi-skilled labor. This could lead to severe economic consequences, as these jobs often lack job security or social benefits.
- **Secondary (28%):**A sizable percentage of survivors have secondary education, potentially allowing for slightly better employment opportunities. However, disruptions due to TB may still result in considerable financial stress for this group.
- **Higher Secondary (11%):**Survivors with higher secondary education are more likely to be employed in formal or semi-formal jobs. This group might experience indirect costs, such as reduced productivity, but may have better access to healthcare and recovery resources.
- **Graduation & Above (14%):**Those with higher education levels may face fewer economic challenges due to better job opportunities, savings, and access to healthcare. However, the cost of prolonged treatment and recovery might still impact their financial stability.

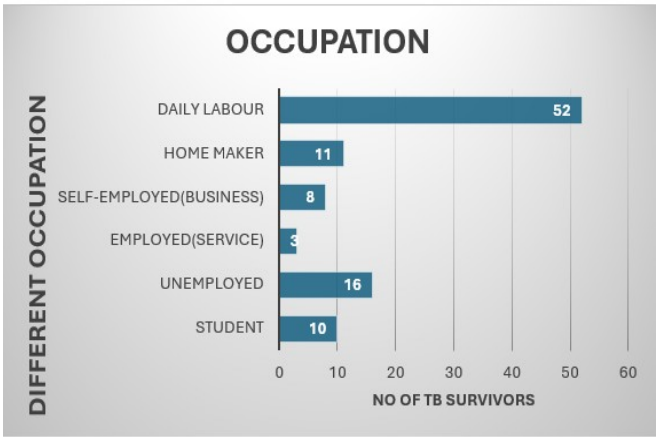

Figure 4. Distribution of different types of occupation among TB Survivors

- **Direct Costs:** Daily labourers and unemployed survivors are likely to struggle with medical and non-medical expenses, given their limited financial resources.
- **Indirect Costs:** Daily labourers and self-employed individuals would face significant indirect costs, including loss of wages and productivity. Students and homemakers may experience indirect costs in the form of delayed education or household disruptions.
- **Socio-Economic Consequences:** The occupational distribution highlights the disproportionate socio-economic impact of TB on vulnerable groups like daily labourers, who may face prolonged poverty, and self-employed individuals, whose businesses could collapse during illness.

Observations

- **Daily Laborers** (52%) dominate the sample, indicating that TB disproportionately affects individuals in low-income, unstable occupations. This aligns with global findings that TB is often linked to poverty and poor living conditions.
- **Students and Homemakers**, while not directly earning, represent groups whose futures and household functioning may be significantly impacted, respectively.
- Survivors in **service or self-employment** roles may require targeted support to regain economic stability.

Table 5. Distribution of TB Survivors according to Monthly Income

MONTHLY INCOME	FREQUENCY	PERCENTAGE (%)
7001-11000	31	31
11001-15000	28	28
15001-19000	8	8
19001-23000	12	12
23001-27000	11	11
27001-31000	2	2
31001-35000	8	8
TOTAL	**100%**	

Monthly Income and the Economic Impact of TB

- **7001–11000 (31%)** and **11001–15000 (28%)**: These two income groups constitute the majority (59%) of the survivors, indicating that a significant proportion of the sample comes from lower-middle-income households. These households are likely to feel a substantial economic burden from TB treatment and associated costs, as they may lack adequate savings or financial buffers.
- **15001–19000 (8%)** and **19001–23000 (12%)**: These survivors, while in relatively higher income brackets, may still experience economic strain due to the indirect costs of TB, such as loss of income during recovery.
- **23001–27000 (11%)**: Survivors in this income range may have better financial resilience, but the long-term socio-economic impact of TB, such as depletion of savings or debt, could still affect their stability.
- **27001–31000 (2%)** and **31001–35000 (8%)**: The higher-income groups form a smaller portion of the sample, suggesting that TB disproportionately affects lower-income populations. While these individuals may manage direct costs more effectively, indirect costs such as productivity loss or prolonged absence from work can still have significant implications.

Observations

- The largest proportion of survivors comes from low-to-lower-middle-income groups (7001–15000). This highlights the link between TB and poverty, as individuals in these income brackets often face higher exposure to risk factors such as poor living conditions, inadequate nutrition, and limited access to healthcare.
- Higher-income groups are less represented, suggesting that wealthier populations may have better access to preventative measures and healthcare, reducing their TB burden.

Table 6. SES of TB Survivors according to BG Prasad's Economic Scale 2024

SOCIO ECONOMIC STATUS	FREQUENCY	PERCENTAGE (%)
Upper Class (9098 & above)	5	5
Upper middle class (4549-9097)	9	9
Middle class (2729-4548)	25	25
Lower middle class (1364-2728)	23	23
Lower class (<1364)	38	38
TOTAL	**100%**	

Figure.7. Distribution of TB Survivors according to Job Loss

Job Loss and the Economic Impact of TB:

- **YES (42%)**: A significant portion of TB survivors reported losing their jobs due to the illness. This underscores the severe impact of TB on individuals' livelihoods, especially for those in informal employment or jobs without job protection policies. Job loss exacerbates the financial burden by adding indirect costs such as income loss and potential costs for job search or retraining.
- **NO (58%)**: While the majority of survivors retained their jobs, this does not necessarily imply financial stability. These individuals may still have faced reduced income, unpaid leaves, or decreased productivity due to the time required for treatment and recovery.

Observation

- The **42% job loss rate** highlights the significant socio-economic disruption caused by TB, particularly for those in vulnerable occupations, such as daily laborers and self-employed individuals.
- Survivors who retained their jobs may include individuals in formal sectors or those with workplace policies supportive of long-term health conditions.

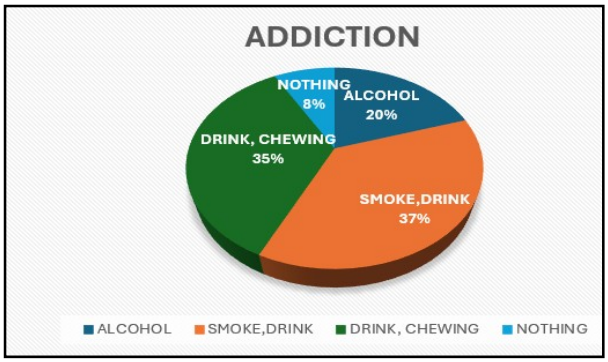

Figure 8. Distribution of TB Survivors among different types of addiction

Addiction Habits and the Economic Impact of TB

- **Alcohol Only (20%)**: A portion of survivors reported alcohol use. Addiction to alcohol could compound the economic impact of TB, as it represents an ongoing expense that diverts funds from essential needs like healthcare and nutrition. Additionally, alcohol consumption may exacerbate health issues, prolong recovery, and increase medical costs.
- **Smoke and Drink (37%)**: The largest group of survivors reported both smoking and drinking. These dual addictions can have severe health and economic implications, including higher direct medical costs due to complications, reduced work productivity, and increased healthcare utilization. Smoking is also a known risk factor for respiratory issues, which could worsen the condition of TB survivors.
- **Drink and Chewing Tobacco (35%)**: Survivors in this group face similar challenges. Chewing tobacco, like smoking, is associated with health risks that could impede recovery and add to medical expenses. This group also likely experiences additional economic strain from the costs associated with these addictions.
- **No Addiction (8%)**: A small proportion of survivors reported no addictions, suggesting that this group might have fewer lifestyle-related health risks. They may recover faster and face lower healthcare costs, which could reduce the overall economic burden of TB.

Observations

- A combined 72% of survivors reported having addiction habits (smoking, drinking, chewing tobacco, or a combination), which highlights the need to address these lifestyle factors when considering the economic impact of TB.
- 8% of survivors with no addiction serve as a comparative group, potentially demonstrating fewer complications and faster recovery, thus incurring lower economic costs

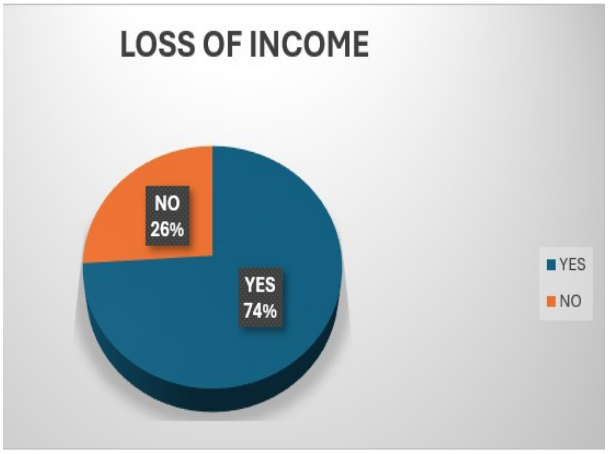

Figure 9. Pie chart showing Distribution of TB Survivors according to Loss of Income

- **Direct Costs**: Loss of income compounds the challenge of managing direct medical and non-medical costs, such as treatment, diagnostics, transportation, and nutritional supplements required during TB recovery. Survivors experiencing income loss may resort to borrowing,

liquidating assets, or cutting back on essential needs to afford treatment.

- **Indirect Costs**: The indirect costs of TB, such as reduced earnings due to missed work or the inability to work during and after treatment, are evident in the high percentage of survivors reporting income loss. These costs extend beyond the individual, impacting entire households that depend on the survivor's earnings.
- **Socio-Economic Consequences**: Survivors who lose income often experience long-term financial instability, increased debt, or poverty. This is especially critical for families where the survivor is the primary breadwinner, as the economic impact could include reduced access to education, health, and other necessities for family members.

Observations

- The **74% income loss rate** underscores the profound impact of TB on survivors' livelihoods, particularly in lower-income and informal employment settings.
- Even among the 26% who did not lose income, other indirect costs such as reduced productivity and out-of-pocket expenses could still contribute to financial strain.

Table 10. Distribution of TB Survivors according to Loss of Income per Day

LOSS/DAY(RS)	FREQUENCY	PERCENTAGE (%)
150	11	11
200	28	28
250	17	17
300	12	12
400	4	4
700	2	2
TOTAL	**74%**	

Daily Income Loss and the Economic Impact of TB:

- **₹150/day (11%)**: A smaller proportion of survivors reported a daily income loss at the lower end of the spectrum. These individuals might belong to occupations with minimal income variability or informal work where daily earnings are modest.
- **₹200/day (28%)**: The largest group of survivors experienced a loss of ₹200/day, reflecting the typical earning range of daily-wage laborers or low-income workers.
- **₹250/day (17%) and ₹300/day (12%)**: These groups faced slightly higher daily income losses, possibly indicative of skilled labor or mid-level informal sector work.
- **₹400/day (4%) and ₹700/day (2%)**: A smaller proportion of survivors reported high daily income losses, which might be associated with higher-paying skilled professions, business losses, or contractual jobs.

Relevance to Research Objectives

- **Direct Costs**: Survivors experiencing higher daily income losses are likely to face greater challenges in managing the direct medical and non-medical costs of TB treatment. For low-income earners, even smaller daily losses can significantly disrupt their ability to afford essential services.
- **Indirect Costs**: The loss of daily income directly impacts survivors' ability to maintain financial stability during treatment and recovery. It exacerbates the indirect costs of TB, such as lost productivity, delayed debt repayment, and reduced household spending capacity.

Socio-Economic Consequences

- For survivors in the higher income loss categories, the financial impact of TB could result in a sharp decline in living standards, particularly if they are primary earners.
- Survivors with lower daily income losses may still face long-term economic repercussions due to the cumulative effect of prolonged treatment and recovery periods.

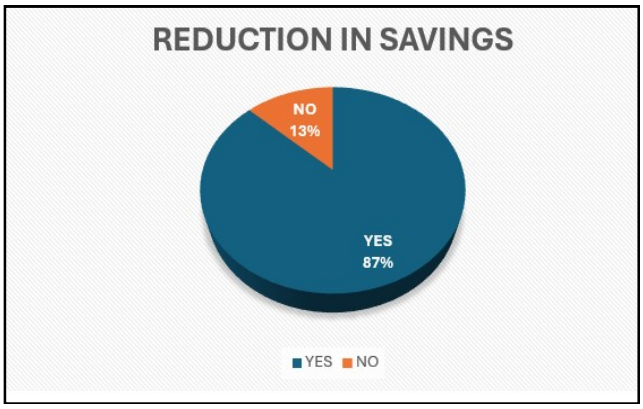

Figure 11. Distribution of TB Survivors according to Reduction in Savings

Relevance to Research Objectives

- **Direct Costs**: The need to pay for direct medical and non-medical expenses (e.g., hospitalization, medications, diagnostics, transportation) often leads survivors to use their savings. This trend is particularly evident among those without access to free healthcare or insurance.
- **Indirect Costs**: Survivors experiencing income loss are more likely to rely on savings to cover basic needs, which further depletes their financial security.

Socio-Economic Consequences

- A reduction in savings weakens the financial resilience of survivors and their households, leaving them vulnerable to future crises or emergencies.
- For low-income families, the depletion of savings can push them into debt, leading to long-term socio-economic challenges such as inability to fund education, healthcare, or housing needs.

Observations

- The 87% savings reduction rate highlights the pervasive financial burden TB places on survivors, irrespective of their income levels.
- The 13% of survivors who did not experience savings depletion may have had access to safety nets, such as family support, government schemes, or employer benefits, helping them avoid financial erosion.

Table 12. Distribution of TB Survivors according to cost per travel

COST/TRAVEL(RS)	FREQUENCY	PERCENTAGE (%)
100	64	64
150	23	23
200	12	12
500	1	1
TOTAL	**100%**	

Travel Costs and the Economic Impact of TB

- **₹100 (64%)**: The majority of survivors reported spending ₹100 per trip on travel. This likely reflects shorter distances or the use of economical modes of transport, such as buses or shared autos, to reach healthcare facilities.
- **₹150 (23%)**: A significant portion of survivors incurred slightly higher travel costs, possibly due to longer distances or higher transport costs in urban or semi-urban settings.
- **₹200 (12%)**: Survivors in this group may have needed to travel longer distances or relied on private transport, increasing their expenses.
- **₹500 (1%)**: A very small proportion reported the highest travel costs, indicating access challenges for those living in remote or poorly connected areas, necessitating the use of costly transportation like taxis or ambulances.

Observations

- The 64% of survivors incurring ₹100 travel costs suggests that most survivors have relatively easy access to healthcare facilities, but even this cost may be significant for low-income families.
- Survivors reporting higher travel costs (₹150–₹500) highlight the geographical and transportation challenges that contribute to the economic impact of TB, particularly in rural or remote areas.

Table 13. Distribution of TB Survivors according to additional expenses per month

ADDITIONAL/MONTH(RS)	FREQUENCY	PERCENTAGE (%)
500	13	13
1000	52	52
2000	23	23
3000	8	8
4500	4	4
TOTAL	**100%**	

Additional Monthly Costs and the Economic Impact of TB

- **₹500 (13%)**: A smaller proportion of survivors reported incurring relatively low additional expenses, which may reflect limited spending on nutritional supplements, transportation, or out-of-pocket medical costs.
- **₹1000 (52%)**: Over half of the survivors reported additional monthly costs of ₹1000, indicating a significant economic burden, potentially driven by ongoing medical expenses, dietary adjustments, and travel for healthcare access.
- **₹2000 (23%)**: Survivors incurring ₹2000 in monthly expenses likely include those with higher treatment needs, greater transportation costs, or dependency on expensive medications not covered by government schemes.
- **₹3000 (8%)**and**₹4500 (4%)**: These categories represent survivors with the highest additional costs, likely due to more severe cases, comorbidities, or long-term hospitalization. This group might include survivors with limited access to subsidized healthcare services.

Observations

- The **52% of survivors spending ₹1000/month additionally** highlights the common financial challenge faced by the majority of TB survivors, with the costs likely tied to basic TB management needs.
- Survivors incurring higher additional costs (**₹2000–₹4500**) underline the need for targeted support for those with severe disease conditions or inadequate access to subsidized care.

Table 14. Distribution of TB Survivors according to source of treatment initiation

STARTED TREATMENT	FREQUENCY	PERCENTAGE (%)
INFORMAL PROVIDERS	14	14
PRIVATE HOSPITAL	4	4
GOVERNMENT HOSPITAL	82	82
TOTAL	100%	

Treatment Initiation and Its Economic Impact

- **Government Hospitals (82%)**: The majority of survivors began treatment at government facilities. This is likely due to the availability of free or highly subsidized TB diagnostic and treatment services under national TB programs.
- **Informal Providers (14%)**: A significant portion of survivors initially sought care from informal or unregulated healthcare providers, which might reflect limited access to formal healthcare services, lack of awareness, or preference for local providers. However, this choice could lead to delayed treatment initiation, higher initial expenses, or inadequate care, adding to the financial burden.
- **Private Hospitals (4%):** A small number of survivors initiated treatment at private hospitals, where treatment costs are typically higher. Survivors in this category likely faced significant direct medical expenses, including diagnostics, consultations, and medications.

Observations

- The 82% reliance on government hospitals demonstrates the importance of publicly funded healthcare systems in providing accessible and affordable TB treatment.
- The 14% use of informal providers highlights gaps in healthcare accessibility, awareness, or trust in formal systems, which could be addressed through education campaigns and improved outreach services.
- Survivors starting at private hospitals (4%) likely represent a group with higher initial financial capacity or preference for private care, but they may have encountered significant economic strain over time.

Table 15. Distribution of TB Survivors according to additional medicine cost

ADDITIONAL MEDICINE COST(RS)	FREQUENCY	PERCENTAGE (%)
1500	12	12
2000	29	29
3000	12	12
4000	8	8
NO COST	39	39
TOTAL	**100%**	

Additional Medicine Costs and Its Economic Impact

- **No Additional Cost (39%):** A significant proportion of TB survivors (39%) did not incur any additional medicine

costs. This indicate that they received free medication through government program (NTEP).

- **1500 INR (12%) and 3000 INR (12%)**: Moderate costs incurred by smaller subsets of survivors suggest either partial subsidies or the need for supplementary medications not covered under standard treatment protocols.
- **2000 INR (29%)**: This is the most common additional cost incurred by survivors, indicating that a large portion required medicines outside standard prescriptions, possibly due to complications or co-morbidities.
- **4000 INR (8%)**: A smaller percentage faced higher medicine costs, possibly reflecting severe cases, additional treatments, or private healthcare reliance.

Observations

- The **39% incurring no costs** highlights the critical role of free government or NGO-provided medicines in reducing TB-related financial strain.
- The **29% at 2000 INR** cost represents a substantial financial burden, possibly reflecting gaps in free medicine coverage or additional health needs.
- Higher costs (e.g., 4000 INR for 8%) suggest the need for supplementary support for patients with more severe or complicated cases.

Table 16. Distribution of TB Survivors according to additional diagnostic cost

DIAGNOSTIC COST	FREQUENCY	PERCENTAGE (%)
GOVT aided cost zero	39	39
250	8	8
350	17	17
500	9	9
700	12	12
2000	5	5
2500	7	7
3500	3	3
TOTAL	**100%**	

Diagnostic Costs and Its Economic Impact

- **Government-Funded Diagnostics (39%)**: A significant proportion of survivors (39%) accessed diagnostic services free of cost, likely through government programs or public healthcare facilities. This indicates the effectiveness of public health initiatives aimed at reducing diagnostic expenses for TB patients.
- **Low-Cost Diagnostics (250–700 INR)**:
- **8% at 250 INR** and **17% at 350 INR** suggest that some survivors accessed low-cost diagnostic services, possibly subsidized but not entirely free.
- **12% at 700 INR** and **9% at 500 INR** highlight the out-of-pocket expenses incurred by a notable subset of survivors, pointing to partial gaps in free diagnostic availability.
- **High-Cost Diagnostics (2000–3500 INR)**:**5% at 2000 INR**, **7% at 2500 INR**, and **3% at 3500 INR** reflect a smaller but significant proportion of survivors facing substantial diagnostic expenses, potentially due to reliance on private healthcare facilities or advanced diagnostic requirements.

Observations

- Government-funded diagnostics play a crucial role in reducing financial barriers, benefiting **39%** of survivors.
- A significant proportion still incurs costs, with 33% spending between 250–700 INR and 15% spending 2000 INR or more, indicating a financial strain for these individuals.
- Survivors incurring high diagnostic costs might have sought care in private facilities or required additional tests not covered under free programs

Table 17. Distribution of TB Survivors according to days of wages loss

DAYS OF WAGES LOSS	FREQUENCY	PERCENTAGE (%)
NO DAY LOSS	26	26
7	23	23
30	17	17
60	9	9
90	14	14
180	8	8
270	3	3
TOTAL	**100%**	

Days of Wages Loss and Its Economic Impact

- **No Wage Loss (26%)**:A significant portion of survivors (26%) reported no wage loss, possibly because:
- They were not part of the labor force (e.g., homemakers, students, or unemployed individuals).
- Their illness and treatment were managed in a way that allowed them to maintain their work schedule.
- They may have had alternative arrangements, such as paid leave or support from employers.

- **Short-Term Wage Loss (7–30 Days: 23% and 17%)**:
- Around **23% lost wages for 7 days**, and **17% for 30 days**. This reflects survivors with minimal treatment interruptions or those in occupations where brief absences were manageable.
- These groups represent individuals whose work and productivity were affected during the early stages of diagnosis and treatment.

- **Moderate Wage Loss (60–90 Days: 9% and 14%)**:
- **9% lost wages for 60 days**, and **14% for 90 days**, indicating survivors with extended treatment schedules or those experiencing complications.
- This suggests a considerable impact on income, particularly for daily laborers and informal workers with limited financial resilience.

- **Prolonged Wage Loss (180–270 Days: 8% and 3%)**:
- **8% reported 180 days of wage loss**, and **3% experienced 270 days**, indicating prolonged absences from work due to severe illness, lengthy treatment protocols, or significant physical weakness post-treatment.
- Survivors in these categories are likely to face severe economic consequences, including loss of job security, savings depletion, and increased financial dependence.

Observations

- The majority (66%) experienced wage loss, with **40% facing short-term losses** and **26% experiencing moderate to long-term losses**.

- Survivors with prolonged wage losses (180–270 days) represent a vulnerable group that likely faces severe socio-economic challenges.
- A notable 26% experienced no wage loss, suggesting protective mechanisms like public assistance or employer support in some cases.

Table 18. Distribution of TB Survivors according to domestic loss

DOMESTIC LOSS(RS)	FREQUENCY	PERCENTAGE (%)
NO COST	52	52
100	23	23
200	8	8
250	5	5
400	12	12
TOTAL	**100%**	

Domestic Loss and Its Economic Impact

- **No Cost (52%)**:A majority of TB survivors (52%) reported no measurable domestic loss, possibly due to financial assistance, community support, or shared responsibilities within the household.
- **Low Domestic Costs (₹100–₹200)**:**23% incurred ₹100**, and **8% incurred ₹200**, indicating minor adjustments to household budgets, likely for caregiving or additional supplies.
- **Moderate Domestic Costs (₹250–₹400)**:**5% incurred ₹250**, while **12% incurred ₹400**, representing more significant expenses, potentially arising from the need for specialized caregiving or extensive domestic adjustments

Relevance to Research Objectives

- **Hidden Economic Burden**: Domestic loss represents an often-overlooked aspect of the financial strain of TB. Even survivors who manage healthcare costs may face challenges from indirect expenses at home.
- **Household Vulnerability**: Households with higher domestic losses may be more financially vulnerable, especially if these costs are coupled with wage loss or other treatment-related expenditures.
- **Support Systems**: Survivors with no domestic costs may have benefited from strong support systems, such as family members, NGOs, or government aid, which helped offset these expenses.

Table 19. Distribution of TB Survivors according to household's food security

HOUSEHOLD'S FOOD SECURITY	FREQUENCY	PERCENTAGE (%)
NO IMPACT	13	13
MILD IMPACT	79	79
SEVERE IMPACT	8	8
TOTAL	**100%**	

Impact of TB on Household Food Security

- **No Impact (13%)**: A minority of households reported no effect on food security. These households may have better financial resources or external support, allowing them to maintain normal food consumption despite TB-related expenses.
- **Mild Impact (79%)**: The majority of households experienced mild disruptions to their food security, possibly due to the reallocation of income towards medical costs, reduced earnings, or increased healthcare-related expenses.
- **Severe Impact (8%)**: A small but significant proportion of households faced severe impacts on food security, likely reflecting extreme financial strain, reduced income, and depleted savings. This group may have been forced to compromise on the quality or quantity of food consumed.

Relevance to Research Objectives

- **Direct Costs:** Direct costs for treatment and transportation could exacerbate the financial burden, leading to food insecurity.
- **Indirect costs:** Indirect costs from lost productivity and income due to TB might force survivors to prioritize healthcare expenses over basic necessities such as food.

Socio-Economic Consequences

- Food insecurity may exacerbate the health outcomes of TB survivors, as proper nutrition is essential for recovery and maintaining immunity.
- Severe impacts on food security could lead to long-term socio-economic repercussions for households, including malnutrition and poorer health for other members.

DISCUSSION

The analysis of the data reveals a significant economic burden associated with tuberculosis (TB) among survivors of drug-sensitive TB. When compared with prior studies, such as those by Tanimura *et al*. (2014), Marais *et al*. (2013), Courtwright & Turner (2010), and Ukwaja *et al*. (2013), several key patterns and differences emerge, underscoring the multifaceted impact of TB on individuals and households.

Direct Costs and Out-of-Pocket Expenditures: The findings from this study highlight that although a majority of individuals access government healthcare services (82%), a significant portion incurs additional diagnostic costs, medicine expenses, and transportation costs. This aligns with Tanimura *et al*. (2014), who reported that TB patients often experience catastrophic healthcare expenditures, with direct costs contributing significantly to financial hardship. The persistent out-of-pocket expenses seen in our study are a testament to the inadequacy of complete cost coverage under existing government healthcare schemes, echoing similar conclusions drawn by Marais *et al*. (2013).

Income Loss and Wage Disruption: A substantial proportion of participants reported income loss and wage disruption due to TB, with nearly 74% experiencing a loss of income and 42% losing jobs altogether. The burden of wage loss is further exacerbated by prolonged recovery periods, as highlighted by 17% reporting a 30-day wage loss and 14% experiencing a 90-day wage loss. Courtwright & Turner (2010) emphasized that TB not only affects health but also compromises economic productivity, particularly among breadwinners in low- and middle-income settings. This study further reinforces their findings, showing that TB survivors face long-term financial instability due to diminished earning capacity.

Reduction in Savings and Food Security: The study reveals hat 87% of respondents reported a reduction in savings, while

79% experienced mild impacts on food security, and 8% faced severe impacts. This mirrors Ukwaja *et al*. (2013), who found that TB often drives families into poverty due to a combination of treatment-related costs and lost income. The data here underscores how TB survivors, especially from economically vulnerable households, struggle to maintain financial stability and basic sustenance during and after treatment.

Broader Economic Burden: Additional costs, such as transportation, domestic losses, and medicine, contribute to the financial strain on survivors. For instance, 52% of respondents reported monthly additional costs of ₹1000, and 23% incurred costs as high as ₹2000. These findings align with Tanimura *et al*. (2014), who emphasized that non-medical costs, often underestimated, are a significant contributor to the overall financial burden of TB.

Social and Structural Dimensions: The disproportionate impact on daily laborers (52%), low-income households, and individuals with minimal savings indicates that TB disproportionately affects socially and economically marginalized groups. Marais *et al*. (2013) similarly highlighted the structural vulnerabilities of TB-affected populations, where socio-economic inequality exacerbates the disease's impact. While studies like Tanimura *et al*. (2014) and Ukwaja *et al*. (2013) focus on the global picture of TB-related economic burdens, this study provides a localized perspective that corroborates their findings. However, the data also highlights nuances unique to this context, such as the heavy reliance on government healthcare facilities and the specific costs borne by individuals. Furthermore, it underscores the necessity for holistic interventions that address both direct medical costs and indirect socio-economic consequences, resonating with the call for broader social protection measures outlined by Courtwright & Turner (2010).

These findings emphasize the urgency for integrated healthcare and economic support programs. Subsidies for transportation, wage compensation schemes, and financial aid for diagnostics and medicine are crucial to alleviating the economic strain on TB survivors. Moreover, addressing the socio-economic disparities identified in this study requires multi-sectoral approaches that combine healthcare delivery with poverty alleviation and social safety nets, as suggested by Marais *et al*. (2013).

CONCLUSION

The data shows the profound economic burden faced by survivors of drug-sensitive tuberculosis, which extends beyond medical expenses to encompass loss of income, reduction in savings, and disruptions in household stability. Despite the availability of government healthcare services, the out-of-pocket expenditures for diagnostics, medicines, and transportation remain significant for many survivors, particularly those from economically vulnerable groups such as daily laborers and homemakers. Furthermore, wage losses, prolonged absenteeism, and job insecurity exacerbate financial hardships, leading to reduced savings and, in some cases, severe impacts on food security. The economic toll is compounded by additional monthly expenses and domestic costs, which many households struggle to manage. This analysis highlights the pressing need for enhanced financial protection mechanisms, such as comprehensive healthcare subsidies, wage compensation programs, and food security initiatives. Addressing these economic challenges is critical to mitigating the long-term socio-economic consequences of TB and ensuring sustainable recovery for survivors and their families. The data highlights the multifaceted economic burden faced by survivors of drug-sensitive tuberculosis (TB). While TB treatment may be provided at minimal or no cost in some settings, the financial consequences extend far beyond direct medical expenses, affecting individuals and households across multiple dimensions.

Strengthen Access and Coverage of Ni-kshay Poshan Yojana (NPY)

Address Coverage Gaps:

There is 100% coverage of NPY among the TB survivors. That is an outstanding performance for adding supplement and necessities among the survivors. Assign community health workers (ASHAs, TB health visitors) to assist in NPY enrollment and ensure timely disbursement of benefits.

RECOMMENDATIONS

Insights for Policy and Intervention

- For daily labourers, financial support programs (e.g., cash transfers), free treatment, and access to social security are critical to alleviating the economic burden.
- For students, policies to ensure continuity in education during and after treatment (e.g., scholarships, educational support) are essential.
- For homemakers, support mechanisms such as caregiving assistance and financial subsidies can help offset household disruptions.
- Job Loss Prevention: Employers, particularly in sectors employing daily laborers or informal workers, should be encouraged to provide job protection measures, such as paid sick leave or flexible work arrangements.
- Strengthening Public Health Services: Ensuring that government healthcare facilities are accessible, well-equipped, and efficiently managed can help reduce dependency on informal providers.

REFERENCES

1. Global tuberculosis report 2022. https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2022
2. The End TB Strategy.https://www.who.int/publications-detail-redirect/WHO-HTM-TB-2015.19
3. The Global Plan to End TB 2023–2030.https://www.stoptb.org/advocate-to-endtb/global-plan-to-end-tb
4. World Health Organization Geneva, Switzerland: WHO; 2019. Tuberculosis patient cost surveys: a handbook. (Google Scholar)
5. Department of State for Health, The Gambia Banjul, The Gambia: Gambian National Leprosy and Tuberculosis Control Programme; 2012. National guidelines for the management of tuberculosis. (Google Scholar)
6. Tanimura, T., Jaramillo, E., Weil, D., *et al*. (2014). Financial Burden for Tuberculosis Patients in Low- and

Middle-Income Countries: A Systematic Review. European Respiratory Journal.
7. Lönnroth, K., Jaramillo, E., Williams, B. G., *et al*. (2009). Drivers of Tuberculosis Epidemics: The Role of Risk Factors and Social Determinants. Social Science & Medicine.
8. Foster, N., Vassall, A., Cleary, S., *et al*. (2017). The Economic Burden of TB Diagnosis and Treatment in South Africa. Social Science & Medicine.
9. Marais, B. J., Hesseling, A. C., Gie, R. P., *et al*. (2013). The Burden of Childhood Tuberculosis and the Accuracy of Community-Based Surveillance Data.
10. Chatterjee, S., Pujari, B. S., & Bhattacharya, S. (2020). The Economic Burden of Tuberculosis in India: Evidence from a Large Cross-Sectional Survey. Infectious Diseases of Poverty.
11. Courtwright, A., & Turner, A. N. (2010). Tuberculosis and Stigmatization: Pathways and Interventions. Public Health Reports.
12. Ukwaja, K. N., Modebe, O., Igwenyi, C., *et al*. (2013). The Economic Burden of Tuberculosis Care for Patients and Households in Africa: A Systematic Review. International Journal of Tuberculosis and Lung Disease.
13. Boccia, D., Hargreaves, J., De Stavola, B., *et al*. (2011). The Association between Household Socioeconomic Position and Prevalent Tuberculosis in Zambia: A Case-Control Study. PLOS ONE.
14. T. Prasanna, K. Jeyashree, P. Chinnakali, Y. Bahurupi, K. Vasudevan, M. Das Catastrophic costs of tuberculosis care: a mixed methods study from Puducherry, India Glob Health Action, 11 (1) (2018 Jan 1), Article 1477493.

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