The cost of paediatric abdominal tuberculosis treatment in India

Kachapila, Mwayi; Sindhu, Shreya ; Dhiman, Jyoti ; Ghosh, Dhruva; John, Susan; Monahan, Mark; Morton, Dion; Roberts, Tracy; Suroy, Atul ; Oppong, Raymond

DOI:
10.1017/exp.2023.16

Document Version
Publisher's PDF, also known as Version of record

Citation for published version (Harvard):
Kachapila, M, Sindhu, S, Dhiman, J, Ghosh, D, John, S, Monahan, M, Morton, D, Roberts, T, Suroy, A & Oppong, R 2023, 'The cost of paediatric abdominal tuberculosis treatment in India: evidence from a teaching hospital', *Experimental Results*, vol. 4, e18. https://doi.org/10.1017/exp.2023.16

Experimental Results (2023), 4, e18, 1–12
doi:10.1017/exp.2023.16

LIFE SCIENCE AND BIOMEDICINE

NOVEL-RESULT

The cost of pediatric abdominal tuberculosis treatment in India: Evidence from a teaching hospital

Mwayi Kachapila[1,2], Shreya Sindhu[2], Jyoti Dhiman[3,4], Dhruva N. Ghosh[3,4], Susan John[3], Mark Monahan[2], Dion G. Morton[2,5], Tracy E. Roberts[2], Atul Suroy[3] and Raymond Oppong[2]

[1]NIHR Global Health Research Unit on Global Surgery, University of Birmingham, Birmingham, United Kingdom, [2]Health Economics Unit, University of Birmingham, Birmingham, United Kingdom, [3]Christian Medical College & Hospital, Ludhiana, India, [4]India Hub, NIHR Global Health Research Unit on Global Surgery, Ludhiana, India, and [5]Birmingham Surgical Trials Consortium, University of Birmingham, Birmingham, United Kingdom
Corresponding author: Mwayi Kachapila; Email: M.Kachapila@bham.ac.uk

(Received 09 May 2023; Revised 06 August 2023; Accepted 16 August 2023)

Abstract

This study estimated the treatment cost of pediatric abdominal tuberculosis that potentially needs surgical treatment in India. Data were collected from 38 in-patient children at Christian Medical Hospital, Ludhiana as part of a clinical study conducted to establish the patterns of presentation and outcomes of abdominal tuberculosis in an Indian setting. A bottom-up approach was used to estimate the costs from a healthcare provider perspective, and a generalized linear model (GLM) was run to find variables that had an impact on the costs. Costs were reported in international dollars ($) and India Rupees (INR). The results show that the average direct cost was $3095.00 (standard deviation [SD]: 3480.82) or 68,065.13 INR (SD: 76,539.69). The GLM results established that duration of treatment and surgical treatment were significantly associated with higher costs. Efforts of eliminating the condition should be strengthened.

Keywords: abdominal tuberculosis; cost-of-illness; India; pediatric

Introduction

India has the highest number of tuberculosis cases worldwide (World Health Organization, 2021) and 16% of the cases are among children and adolescents aged 19 years or younger (Global Burden of Disease Collaborative Network, 2021). World Health Organization (WHO) defines abdominal tuberculosis as the presence of an abdominal tuberculosis specimen confirmed by clinical suspicion, laboratory, or radiological evidence (World Health Organization, 2010). Abdominal tuberculosis is difficult to diagnose because patients present with symptoms of other abdominal conditions and is associated with high resource utilization rates (Lal et al., 2020). Abdominal tuberculosis is a common condition in India; however, a search of evidence on the burden of the condition shows that there are no data on the estimates of the disease incidence. If diagnosed early, abdominal tuberculosis can be treated by medical interventions; otherwise, surgical interventions are needed (Debi et al., 2014).

The Indian Government aims to provide free tuberculosis services to all people in need, but treatment for complications arising out of tuberculosis is not free, and there are no cost estimates for abdominal tuberculosis interventions (India Ministry of Health with Family Welfare, 2017). The aim of this study was to inform the planning and budgeting of abdominal tuberculosis interventions that potentially need surgery among children up to 18 years old in India by quantifying the costs associated with these patients.

Methods

Study setting, population, and data collected

This study was part of an observational clinical study conducted at Christian Medical Hospital, Ludhiana to establish the patterns of presentation and treatment outcomes for abdominal tuberculosis in an Indian setting. Abdominal tuberculosis was defined using the WHO definition in the introduction above. Data were collected from in-patient children, diagnosed with abdominal tuberculosis, who were initiated on anti-tubercular treatment and completed the treatment.

Retrospective data were collected from medical records of children treated between 1st July 2007 and 31st December 2019, and prospective data were collected from children treated between 1st January 2020 and 30th June 2021. The year 2007 was chosen as the starting point for data collection because this is the year from which abdominal tuberculosis records were available at the hospital. Where necessary, treatment completion, further resource use, and cost data for the retrospective study patients were collected from the patients' family through phone interviews (Supplementary Material S2). Prospective study patients were followed up to 30 days from the day of treatment completion. Patients whose family could not be contacted through the phone were considered lost to follow-up.

Resource use and unit costs

Direct healthcare resource use, direct non-healthcare resource use, unit costs, and indirect costs data were collected (Costa et al., 2012). Direct healthcare resource was the direct healthcare resources used for the treatments such as surgical services, medical diagnostics, medicines, hospital stay, and post-discharge evaluations incurred at Christian Medical Hospital, Ludhiana and other healthcare providers for the same episode of abdominal tuberculosis. Direct non-healthcare resources were the resources used to access the healthcare services, which included transport, accommodation, and food, while the indirect costs were the productivity losses of missed work due to the child's illness. The data were collected using case report forms (CRFs) presented in Table S1 and all the supplementary material are available on the Cambridge Core website (https://www.cambridge.org/core/journals/experimental-results).

Unit costs were collected using the CRFs together with the resources utilized. A bottom-up estimation approach was used to value the direct resources where the quantities of the resources were multiplied by the corresponding unit costs to get the value of the resources. A top-down estimation approach was used to estimate the indirect costs by asking the respondents to estimate the overall income lost to the patient's family because of their child's sickness (Table S1, Question 186–188) (Ghazy et al., 2023).

Ethical considerations

The clinical study was conducted in accordance with national and institutional committees on human experimentation ethical standards and with the Helsinki Declaration of 1975, as revised in 2008 (JAMA, 2013). Ethical clearance for the study was granted by the Indian Health Ministry Screening Committee (2020-4130) and Institutional Ethics Committee (IECCMCL/01-0162020). For the prospective data, the patient's parent or guardian provided written consent indicating that they agreed to participate in the study.

Statistical analysis

Statistical analysis was conducted in STATA Statistical Software, version 17.0 (StataCorp LLC; College Station, TX, USA). Data were presented in terms of mean and standard deviation (SD). Cost analysis was performed from a healthcare perspective by including only the direct costs, and a secondary analysis considered the societal perspective by including the indirect costs (Costa et al., 2012). Sub-group analyses were conducted to establish the difference in costs between groups (Supplementary Material S2).

https://doi.org/10.1017/exp.2023.16 Published online by Cambridge University Press

A sensitivity analysis was conducted to assess the impact of productivity cost underreporting. The productivity costs were assumed to be 93% of all costs in line with the findings from a systematic review of tuberculosis costs in India (Sinha et al., 2020).

Costs from 2009 to 2019 were inflated to 2020 using World Bank inflation rates taking the year of starting treatment as the year for the costs for each patient (World Bank Group, 2022). The costs were inflated to 2020 because it was the year the last patient in this study started the treatment. Costs were reported in 2020 in international dollars ($) and Indian Rupees (INR). Costs collected in INR were converted to international dollars using purchasing power parity conversion factors (Organisation for Economic Co-operation and Development, 2021). All costs were discounted at 3% because it is the recommended rate in developing countries (Bill and Melinda Gates Foundation, 2014).

Assumptions

The following assumptions were made when conducting the analysis:

- Converting the costs to a single year made the retrospective and prospective costs comparable.
- As this was an observational study, resource use between the retrospective and prospective patients was assumed to be similar as they received the same treatment.

Regression analysis

Regression analysis was conducted to find variables that had a significant impact on the direct cost of abdominal tuberculosis (Supplementary Material S2). A generalized linear model (GLM) with log link function and Gamma family was chosen as the appropriate model for the data (Manning & Mullahy, 2001).

Missing data

Missing data were accounted for using multiple imputation, which estimated 20 imputed values of the missing variable, and then Rubin's rules were used to combine the outputs for the imputed values (Rubin, 2018).

Results

Patients included in the study

Seventy-five children were treated as in-patients for abdominal tuberculosis that potentially needed surgical intervention. Fifty-seven children completed the treatment, cost data were available from 38 of the 57 patients, and cost analysis was conducted for the 38 patients. Only 10% of the children's fathers and 4% of the children's mothers were in formal employment (Table 1). More characteristics of the patients in the study are presented in Supplementary Material S3.

Costs

The average direct healthcare cost was $3080.80 (SD: 3481.83) or 67,727.97 INR (76,561.84) highly driven by hospital admission cost, which was $2038.77 (SD: 2467.96) or 44,830.58 INR (SD: 54,267.98) representing 66% of the direct costs (Table 2). The average cost of surgery including re-operation was $426.46 (SD: 778.17) or 9377.45 INR (SD: 17,111.19), and the average cost for medical diagnostics was $451.11 (SD: 365.33) or 9,919.45 INR (SD: 8,033.15). These costs were against an average monthly income of $327.32 (SD: 338.13) or 7197.37 INR (SD: 7,435.80) for the households of the patients in the study (Table 1). Patients had multiple diagnostic tests, especially blood tests (Supplementary Material S3).

https://doi.org/10.1017/exp.2023.16 Published online by Cambridge University Press

Table 1. Patient characteristics

Patient characteristics	Units	Mean (SD)
Age at the time of starting treatment	Years	10 (4.9)
Duration of treatment	Days	231 (89)
Duration of admission	Days	9 (11)
Household monthly income	(International dollar, $)	327.32 (338.13)
	Indian Rupee (INR)	7,197.37 (7,435.80)
Patient characteristics	**Category**	**Frequency (percent)**
Year of starting treatment[a]	2009	1 (2.6)
	2011	3 (7.9)
	2012	4 (10.5)
	2013	6 (15.8)
	2014	2 (5.3)
	2015	1 (2.6)
	2016	3 (7.9)
	2017	6 (15.8)
	2018	2 (5.3)
	2019	2 (5.3)
	2020	8 (21.1)
Fathers' occupation	Formally employed	10 (26.3)
	Part-time employment	7 (18.4)
	Self-employed	19 (50)
	Unemployed	1 (2.6)
	Deceased	1 (2.6)
Mothers' occupation	Formally employed	4 (10.5)
	Part-time employment	1 (2.6)
	Self-employed	1 (2.6)
	Unemployed	32 (84.2)
Newly diagnosed	No	2 (5.3)
	Yes	36 (94.7)
Had surgery	No	25 (65.8)
	Yes	13 (34.2)
Gender	Male	18 (47.4)
	Female	20 (52.6)
Father's literacy	Literate	28 (73.7)
	Not literate	10 (26.3)
Mother's literacy	Literate	30 (79.0)
	Not literate	8 (21.1)
Had BCG vaccination	No	4 (10.5)
	Yes	34 (89.5)

https://doi.org/10.1017/exp.2023.16 Published online by Cambridge University Press

Table 1. *Continued*

Patient characteristics	Units	Mean (SD)
Recurrence[b]	Missing	2 (5.3)
	No	34 (89.5)
	Yes	2 (5.3)
Anti-tuberculous therapy	DOTS	22 (57.9)
	No DOTS	16 (42.1)

Abbreviations: BCG, Bacillus Calmette-Guérin; DOTS, directly observed treatment short course; SD, standard deviation.
[a]There were no patients that started treatment in 2010.
[b]The patient had recurrence of the abdominal tuberculosis.

Table 2. Cost-analysis results

	Mean cost in $ (SD)	Mean cost in INR (SD)
Direct healthcare costs	**3080.08 (3481.83)**	**67,727.97 (76,561.84)**
Direct healthcare costs by resource use category		
Hospital admission	2038.77 (2467.96)	44,830.58 (54,267.98)
Surgery including re-operation	426.46 (778.17)	9377.45 (17,111.19)
Medical diagnostics	451.11 (365.33)	9,919.45 (8,033.15)
Medication	34.46 (21.63)	757.79 (475.68)
Re-evaluation	13.88 (24.28)	305.13 (533.78)
Costs incurred at other providers	115.40 (354.27)	2537.58 (7,790.04)
Other costs		
Direct non-healthcare costs[a]	14.92 (39.31)	328.16 (864.46)
Direct costs[b]	**3095.00 (3,480.82)**	**68,056.13 (76,539.69)**
Indirect/productivity costs		
Income lost due to sickness	41.83 (75.33)	919.74 (1,656.42)
Other expenses		
Loans accessed	341.08 (1,111.14)	7500.00 (24,432.75)
Sub-group analysis		
Surgery	9731.20 (11,061.44)	213,979.40 (243,230.00)
Medical	1685.60 (2,262.01)	37,064.64 (49,739.40)
Females	5830.36 (11061.44)	128,203.70 (221,011.60)
Males	2891.03 (2904.47)	63,570.78 (63,866.41)
Out-patient	342.15 (405.51)	7523.44 (8916.74)
In-patient	5709.18 (8335.66)	125,539.20 (183,292.90)
Anti-tuberculosis therapy (DOTS)	2835.16 (2508.90)	62,342.27 (56,394.89)
Anti-tuberculosis therapy (no DOTS)	6642.01 (11,190.07)	146,051.10 (246,058.40)

Abbreviations: DOTS, directly observed treatment short course; INR, Indian Rupee; SD, standard deviation; $, international dollars.
[a]Includes transport, food, and accommodation.
[b]Combines direct healthcare and direct non-healthcare costs. Out-patient is the costs made for out-patient follow-ups. The study included patients who potentially needed surgery but after examinations some patients did not need the surgery.

https://doi.org/10.1017/exp.2023.16 Published online by Cambridge University Press

Table 3. Generalized linear model regression analysis results

Regressors	Coefficients	Standard error	z	$P > \|z\|$	95% Confidence interval	
Age	0.01	0.04	0.3	0.77	−0.06	0.08
Re-operation	0.09	0.65	0.14	0.89	−1.18	1.36
Anti-tuberculous therapy (DOTs)	0.02	0.34	0.07	0.94	−0.64	0.69
Length of hospital stay (days)	0.06	0.03	2.03	0.04	0.00	0.11
Type of treatment (surgery)	1.47	0.44	3.31	0.00	0.60	2.34
Duration of treatment	0.002	0.00	0.99	0.32	0.00	0.01
Patient had BCG vaccine	−0.34	0.53	−0.64	0.52	−1.38	0.70
Constant	4.99	0.94	5.34	0.00	3.16	6.82

Abbreviations: BCG, Bacillus Calmette-Guérin vaccine; DOTS, directly observed treatment short course; Z, Z-score.

Regression results

The GLM regression results show that only length of hospital stay and surgical treatment were significantly associated with higher costs (Table 3).

Productivity costs

The patient's parents lost an average of 4 working days (SD: 5) due to the child's sickness, which was associated with $41.83 (SD: 75.33) or 919.94 INR (SD: 1656.42) loss in income. The average amount of loans accessed to pay for the treatment was $341.08 (SD: 1111.14) or 7500.00 INR (SD: 24,433.75) (Table 2). However, sensitivity analysis shows that the results might have been affected by underreporting on the productivity costs as the results changed substantially when estimates on productivity costs from the literature were factored in (Table 4).

Discussion

In India, the direct cost of pediatric abdominal tuberculosis that potentially needs surgical treatment was estimated to be $3095.00 (68,056.69 INR) and most of the costs were direct healthcare costs. These results were confirmed GLM regression analysis, which showed that the costs were significantly increased by an increase in duration of treatment and surgery cost that aligns with intuition. This could be because all the patients included in the study were admitted, which as expected was associated with high costs. Further, because abdominal tuberculosis is difficult to diagnose, the disease was likely diagnosed at an advanced stage, which increased the duration of treatment, resource use, and costs. These costs can potentially be avoided or reallocated if pediatric abdominal tuberculosis can be eliminated.

Strengths and weaknesses of the study

This study adds to a growing body of evidence on costs of tuberculosis by focusing on pediatric abdominal tuberculosis, which has been overlooked.

Table 4. Sensitivity analysis results

	Mean cost in $ (SD)	Mean cost in INR (SD)
Revised productivity costs	4,127 (7,081)	90,757 (155,693)
Revised total cost	8,524 (14,669)	187,425 (322,565)

Abbreviations: INR, Indian Rupee; SD, standard deviation; $ international dollars.

https://doi.org/10.1017/exp.2023.16 Published online by Cambridge University Press

This study has limitations. First, the generalizability of the results should be made with caution because the study was conducted at a single hospital and the sample size was small. Second, the retrospective data could be affected by quality of data because of relying on old records and recall bias of the respondents. Third, there was high rate of lost to follow-up (19/57). This might have resulted in bias especially by under-representing the costs of poorer patients who could not be reached for follow-up interviews because their families did not have a phone and patients treated in earlier years of the study as the contact details might have changed (Supplementary Material S4). Fourth, it was not possible to conduct patient matching by comparing the costs of abdominal tuberculosis patients to similar patients without the condition to minimize the impact of confounding variables on the results. However, regression analysis was conducted and found variables that significantly increased the costs of abdominal tuberculosis. Finally, productivity costs in this study were low compared to the direct costs maybe because all patients were children, and majority of their parents were not formally employed, as such they were likely not to report the lost productive days for doing unpaid household work. The sensitivity analysis results showed a substantial difference to the base case results because values from a single study, which only had point estimates but no SD, were used as such we could not estimate a range of values in the sensitivity analysis.

Comparisons with other studies

A systematic review of studies conducted in India found that the indirect costs for tuberculosis were higher compared to direct costs. The review reported that average direct costs range from $27 to $184 compared to $1 to $674 for indirect costs (US dollars) (Sinha et al., 2020). The difference in costs reported in the review and the current study can be because the review included studies with costs from many hospitals including public, private, or non-governmental organization-owned hospitals, which might have different costs compared to Christian Medical Hospital, Ludhiana (Sinha et al., 2020). The direct cost of abdominal tuberculosis in the current study was $3095.00, which is much higher than the average cost of extra-pulmonary tuberculosis, $367 US dollars, from seven health facilities in Yemen using data collected from 2008 to 2009 (Othman et al., 2012). The difference can be attributed to the fact that the current study included only hospitalized patients, while the earlier study did not include the cost of hospitalization. Beyond these, there was no cost evidence from high tuberculosis burden countries especially on abdominal tuberculosis.

Policy implications

The evidence in this study shows that patients do not have access to free tuberculosis services especially surgical services, and they incur huge costs. As such, free tuberculosis services should be extended to all patients in India and efforts of eliminating the condition should be strengthened.

Open peer review. To view the open peer review materials for this article, please visit http://doi.org/10.1017/exp.2023.16.

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1017/exp.2023.16.

Data availability statement. The data available have been presented in the manuscript and Supplementary material available online.

Authorship contribution. M.K. conducted the analysis, wrote, and edited the manuscript. S.S. conceptualized the cost-analysis study, conducted preliminary analysis, and wrote the manuscript. R.O. and M.M. conceptualized the cost analysis study, supervised the analysis and manuscript development, commented, and edited the manuscript. S.J., D.N.G., A.S., and J.D. conceptualized the clinical study, supervised data collection, and commented on the current manuscript. T.E.R. edited and commented on the manuscript. D.G.M. commented on the manuscript.

Funding statement. This research was funded by the National Institute for Health Research (NIHR) (NIHR 16.136.79) using UK aid from the UK Government to support global health research. The views expressed in this publication are those of the author(s) and not necessarily those of the NIHR or the UK Department of Health and Social Care.

Competing interest. We do not have any conflict of interests to declare.

References

Bill and Melinda Gates Foundation. (2014). Methods for Economic Evaluation Project (MEEP). Retrieved from https://www.idsihealth.org/wp-content/uploads/2015/01/MEEP-report.pdf (accessed 28 July 23).

Costa, N., Derumeaux, H., Rapp, T., Garnault, V., Ferlicoq, L., Gillette, S., Andrieu, S., Vellas, B., Lamure, M., Grand, A., & Molinier, L. (2012). Methodological considerations in cost of illness studies on Alzheimer disease. *Health Economics Review*, **2**(1), 18. https://doi.org/10.1186/2191-1991-2-18

Debi, U., Ravisankar, V., Prasad, K. K., Sinha, S. K., & Sharma, A. K. (2014). Abdominal tuberculosis of the gastrointestinal tract: Revisited. *World Journal of Gastroenterology*, **20**(40), 14831–14840. https://doi.org/10.3748/wjg.v20.i40.14831

Ghazy, R. M., Sallam, M., Ashmawy, R., Elzorkany, A. M., Reyad, O. A., Hamdy, N. A., Khedr, H., & Mosallam, R. A. (2023). Catastrophic costs among tuberculosis-affected households in Egypt: Magnitude, cost drivers, and coping strategies. *International Journal of Environmental Research and Public Health*, **20**(3), 2640. https://doi.org/10.3390/ijerph20032640

Global Burden of Disease Collaborative Network (Producer). (2021, 20.02.2022). Global Burden of Disease Study 2019 (GBD 2019) Reference Life Table.

India Ministry of Health with Family Welfare. (2017). *National strategic plan for tuberculosis elimination.* New Delhi, India: Government of India. Retrieved from https://tbcindia.gov.in/WriteReadData/NSP%20Draft%2020.02.2017%201.pdf.

JAMA. (2013). World medical association declaration of Helsinki: Ethical principles for medical research involving human subjects. *JAMA*, **310**(20), 2191–2194. https://doi.org/10.1001/jama.2013.281053

Lal, S. B., Bolia, R., Menon, J. V., Venkatesh, V., Bhatia, A., Vaiphei, K., Yadav, R., & Sethi, S. (2020). Abdominal tuberculosis in children: A real-world experience of 218 cases from an endemic region. *JGH Open*, **4**(2), 215–220. https://doi.org/10.1002/jgh3.12245

Manning, W. G., & Mullahy, J. (2001). Estimating log models: To transform or not to transform?. *Journal of Health Economics*, **20**(4), 461–494. https://doi.org/10.1016/s0167-6296(01)00086-8

Organisation for Economic Co-operation and Development. (2021). *Purchasing Power Parity: Exchange rates.* Organisation for Economic Co-operation and Development.

Othman, G. Q., Ibrahim, M. I., & Raja'a, Y. A. (2012). Costs associated with tuberculosis diagnosis and treatment in Yemen for patients and public health services. *Eastern Mediterranean Health Journal*, **18**(4), 393–398. https://doi.org/10.26719/2012.18.4.393

Rubin, D. B. (2018). Multiple imputation. In S.van Buuren (Ed.), *Flexible imputation of missing data* (2nd ed., pp. 29–62): Chapman and Hall/CRC.

Sinha, P., Carwile, M., Bhargava, A., Cintron, C., Acuna-Villaorduna, C., Lakshminarayan, S., Liu, A. F., Kulatilaka, N., Locks, L., & Hochberg, N. S. (2020). How much do Indians pay for tuberculosis treatment? A cost analysis. *Public Health Action*, **10**(3), 110–117. https://doi.org/10.5588/pha.20.0017

World Bank Group. (2022). Inflation, consumer prices (annual %) - India. Retrieved from https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?end=2020&locations=IN&start=2007 (accessed 8 August 2023).

World Health Organization. (2010). *Treatment of tuberculosis Guidelines.* Geneva, Switzerland: World Health Organization.

World Health Organization. (2021). *Global tuberculosis report 2021.* Geneva, Switzerland: World Health Organization.

Cite this article: Kachapila, M., Sindhu, S., Dhiman, J., Ghosh, D. N., John, S., Monahan, M., Morton, D. G., Roberts, T. E., Suroy, A., & Oppong, R. (2023). The cost of pediatric abdominal tuberculosis treatment in India: Evidence from a teaching hospital. *Experimental Results,* 4, e18, 1–12. https://doi.org/10.1017/exp.2023.16

Peer Reviews

Reviewing editor: Dr. Marc Henrion, Ph.D.

Malawi-Liverpool-Wellcome Trust Clinical Research Programme, Statistical Support Unit, Queen Elizabeth Central Hospital, PO Box 30096, Blantyre, Malawi

Minor revisions requested.

doi:10.1017/exp.2023.16.pr1

Review 1: The cost of Paediatric Abdominal Tuberculosis in India: Evidence from a Teaching hospital

Reviewer: Dr. Linda Sande

London School of Hygiene & Tropical Medicine, London, United Kingdom of Great Britain and Northern Ireland, WC1E 7HT

Date of review: 12 June 2023

Conflict of interest statement. Reviewer declares none.

Comment

Thank you for the opportunity to review this manuscript. Please find below a few additional comments for your consideration.

Lines 116-118: It is not very clear how top-down costing has been used here in estimating lost income. The authors refer to Table S1 which is the instrument used to collect the data. They do not direct the reader to which questions were used in calculating lost income or the detailed estimation approach.

Line 137-140: What was the conversion process? Were the costs in INR inflated to 2020 INR equivalent then converted to International dollars?

Line 159-161: Please provide an explanation here regarding the (75-38)/75 who did not have cost data. How many were lost to follow-up, how many were excluded because they were later found to have a different diagnosis etc.

Table 2: The structure is somewhat confusing. Adding subgroup totals would help guide the reader to each of the cost categories. It would also be helpful if the subcategory titles were in bold.

Line 184-186: A sensitivity analysis to inform the potential underreporting associated with self-estimated productivity losses would be useful here.

Overall, it is not coming out clearly how patients paid for the treatment. Was this captured in the CRF?

Score Card

Presentation

3.0 /5

Is the article written in clear and proper English? (30%)	4/5
Is the data presented in the most useful manner? (40%)	3/5
Does the paper cite relevant and related articles appropriately? (30%)	2/5

Context

Does the title suitably represent the article? (25%)	4/5
Does the abstract correctly embody the content of the article? (25%)	4/5
Does the introduction give appropriate context? (25%)	3/5
Is the objective of the experiment clearly defined? (25%)	3/5

Results

Does the discussion adequately interpret the results presented? (40%)	2/5
Is the conclusion consistent with the results and discussion? (40%)	3/5
Are the limitations of the experiment as well as the contributions of the experiment clearly outlined? (20%)	4/5

https://doi.org/10.1017/exp.2023.16 Published online by Cambridge University Press

doi:10.1017/exp.2023.16.pr2

Review 2: The cost of Paediatric Abdominal Tuberculosis in India: Evidence from a Teaching hospital

Reviewer: Dr. Lucky Ngwira

Kamuzu University of Health Sciences, Blantyre, Malawi, 3

Date of review: 10 July 2023

Conflict of interest statement. Reviewer declares none.

Comment

Thank you for the opportunity to review this work. It is well written and concise, but I think it could benefit from the following.

Title:
-Consider rephrasing- sounds like the cost of the disease and not the cost of treatment.
Introduction:
-Add abdominal TB definition and the local context.
-Move introduction to beginning of the page to line 65.
-Page 4, lines 76-77: You may consider referencing.
-Page 4, line 80: Perhaps change objective to 'planning and budgeting'.
Methods:
-Page 5 lines 87-89: Move this definition to the introduction section.
-Page 5 line 116 change top-bottom to top-down.
-Reference the Helsinki Declaration.
-Include the actual consenting process under data collection section
-Explicitly mention period of analysis e.g., 10 years from 2007 to 2017.
Results:
-Tables at the end look a little bit scattered if they can start on a new page.
-There's mention of tables S1- S3 but none of these have been provided.
-Abbreviation such as GLM, and BCG should be made at first use.
-There is no mention of discount rate, as well as sensitivity analysis and underlying assumptions.
Conclusion:
-I think some direct policy influence can come from the results, not just informing future research.
Tables:
1: Move brackets for international dollar inwards.
1: No 2010? If yes, would be nice to put a footnote.
1: Adding occupation gives total of 76 against 75 reported in results section.
2: Direct health care + non-health care costs not really adding to direct cost in the $ column.

Score Card

Presentation

5.0 /5

Is the article written in clear and proper English? (30%)	5/5
Is the data presented in the most useful manner? (40%)	5/5
Does the paper cite relevant and related articles appropriately? (30%)	5/5

Context

Does the title suitably represent the article? (25%)	1/5
Does the abstract correctly embody the content of the article? (25%)	5/5
Does the introduction give appropriate context? (25%)	3/5
Is the objective of the experiment clearly defined? (25%)	5/5

Results

Does the discussion adequately interpret the results presented? (40%)	4/5
Is the conclusion consistent with the results and discussion? (40%)	5/5
Are the limitations of the experiment as well as the contributions of the experiment clearly outlined? (20%)	5/5

https://doi.org/10.1017/exp.2023.16 Published online by Cambridge University Press