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TITLE PAGE

Cost of care in patients with psychiatric illness in rural South India

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Ethics statement: This study involved human participants and ethical approval was obtained from the Institutional Ethics Committee, St. John's Medical College, Bangalore, Karnataka, India (IEC study ref. no: 274/2017). Participants gave informed consent before taking part in the study.

Contributors: Dr. Madonne Rufina Dishani is the first author.

MRD, BRG and RR designed the study and obtained ethics approval. Data collection, analysis and manuscript writing done by MRD. MRD, RR and BRG revised the manuscript. All the three authors read and approved the final manuscript.

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ABSTRACT:

Objectives: To assess the mental healthcare costs by persons with mental illness (PwMI) and to identify the factors contributing to the costs. **Design:** This prospective cohort study included 130 PwMI aged ≥18years registered at a private, not-for-profit, rural mental health service in India. A micro costing approach was used. Quality of life (QOL) of participants was also assessed. **Primary outcome measures:** The outcome assessed was Cost Of Illness (COI). Analysis comprised descriptives and logistic regression. Overall, there were 130 person years of follow-up. **Results:** Of the participants, 98 (75%) were women, and 61 (47%) were unable to work due to mental illness. The median COI/person-year was INR 5043.50(IQR:2544.50-15848.50). Overall, 94(74%) participants were adherent to medication, while 43(33%) incurred Catastrophic Health Expenditures (CHE). Those who used tobacco had higher COI compared to their counterparts [AOR: 4.241(CI: 1.709-10.529)]. The mean QOL score was 58.39±22.45. Participants with low QOL had higher COI [AOR: 2.627(CI: 1.217-5.670] compared to their counterparts. COI was not associated with adherence, workplace conflicts or delays in initiating treatment due to financial constraints. **Conclusion:** Community-based management of mental illness in rural contexts could reduce COI and CHE. additionally increasing awareness regarding social protection can enable claims for social protection thereby reducing COI. Adding a tobacco cessation program to the existing system might further lower COI.

Key words: Health Expenditures, Cost of illness, Community Health Services, Mental Disorders, Prospective Studies, Quality of Life

Strengths and limitations:

- This study provides valuable information on the COI among PwMI in the rural context and the factors that contribute to the costs.
- This study can inform resource allocation within national mental health programmes globally in low-middle income contexts.
- This study assessed costs from the patients' perspective, which may not reflect the total overall COI, which requires cost assessments from a societal perspective.

BACKGROUND:

Globally, 1 billion people live with a mental disorder, while every 40 seconds there is a death by suicide (1). Depression, anxiety, and self- harm are the top 25 causes of Disability Adjusted Life Years (DALY) (2). Further, depressive disorders are the largest contributor of morbidity, accounting for 7.5% of the total Years Lived with Disability (YLD)(3).

According to the Indian National Mental Health Survey (NMHS) 2015-16, the lifetime prevalence of mental morbidity in India is 14%. Mental and behavioral problems arising from psychoactive substance abuse contributed to significant morbidity with the prevalence of 22.4%. The prevalence of mental morbidity was higher in males (14%), when compared with females (7.5%)(4).

Long-term treatment of persons with mental illness (PwMI), along with lost productivity, leads to poverty(5). In low- and middle-income countries where universal health care, financial and social support systems are lacking, mentally ill individuals spend much of their savings or borrow money to buy medicines and to access health care facilities(6). Further, the expenditure related to mental illness is attributed to long- term treatment, high cost of medicines and economic losses due to lost wages(7)(8).

Despite this scenario, the global public health expenditure on mental health is low i.e., 2% of the global government health expenditure. Of the World Health Organization (WHO) member states, 13% have reported that PwMIs pay mostly (or entirely) out of pocket (OOP) for mental health services. Another 15% pay mostly or entirely out-of-pocket for psychotropic medications (9).

In India, majority of PwMI, pay for services and medicines while the public mental health expenditure is only 1% of the total (10). Out of the total health expenditure by health care providers in India, 0.2% is spent on mental health hospitals which are primarily providing treatment and diagnostic services to inpatients/ outpatients with mental illnesses.

Further, mentally ill individuals face unemployment and loss of wages due to workplace discrimination. These in turn, increase the financial burden on the family leading to poverty. In other cases, patients incur OOP expenditure due to inappropriate and ineffective mental healthcare(11). Additionally, loss of income and possible loss of employment, resulting from caregiving, is unaccounted for in most studies(7).

OBJECTIVES:

Optimizing the cost of care for mental health is therefore essential to ensure that PwMI receive quality care. However, studies that estimate of the costs of care to individuals and families with mental illness in low- and middle- income countries such as India are limited. Additionally, studies from India that have assessed the cost of care in persons with mental illness in the community, especially in rural areas, are few(5)(7). We, therefore, studied the costs of care, in PwMI in a rural area in South India.

The aims of this paper were 1) to assess the costs incurred towards mental illnesses among PwMI enrolled in a Community Mental Health Programme and; 2) to identify the factors contributing to the COI in the PwMI. The results of the study are expected to enable optimizing mental health services in rural and remote communities both from the patient's perspective and inform mental health policy.

METHODS:

Selection and description of the participants:

This is a prospective study in adults with mental illness, enrolled in the community mental health programme (*Maanasi*) at the Community Health and Training Center (CHTC), Mugalur, Sarjapur Primary Health Center (PHC) area, Bengaluru Urban district, Karnataka, South India. The CHTC, Mugalur, is a unit of the Department of Community Health, St. John's Medical College, Bengaluru, Karnataka, India. *Maanasi*, is a community mental health programme, which provides comprehensive mental health care services including addressing co-morbidities to people from surrounding villages. The services of the programme include, weekly consultations with a psychiatrist, primary care physician, counselling, referrals, subsidized medications, health education, community mental health services as well as rehabilitation.

The sample size for this study was estimated as 130 persons with mental illness (PwMI). This was calculated using StataCorp. 2011, where the hypothesized average cost (SD) per month was INR 364.33 (±294.08) (12). Further, the sample size was inflated by 10% for non-response and rounded off to the nearest tens.

The PwMI included were residents of Sarjapur PHC area, Bengaluru Urban District aged ≥18 years of age. The participants not at home on 2 consecutive visits made by the researcher were excluded from the study.

Assumptions:

The costs were studied from the patients' perspective. We used an incidence- based approach for estimating costs over the period of a year. Since the duration required for estimating costs was only 1 year, discounting was not applied to the costs. Further, a micro-costing approach was used to assess the costs incurred by the participants. Also, some PwMI visiting the clinic were provided medications at subsidized costs based on their socio-economic status. Hence the COI for the patients was calculated based on the amount paid after the subsidy, while 5 PwMI obtained medications at no cost via government health services.

The Tuberculosis Patient Cost Survey Instrument (13) was modified for assessing costs of mental illness, while additional costs were captured using a patient cost diary. Research assistants trained to capture costs of care administered the survey instrument to the participants.

Patient involvement:
Patients and their caregivers were involved in a focus group discussion (FGD) to identify the additional context-specific types of costs, not included in the survey instrument, which were incurred due to the illness. These additional costs identified in the FGD were then added to the survey instrument and captured during the study.

Costs considered:
One- time costs:
One- time costs were the costs incurred at the first visit for registration of the PwMI as well as the cost incurred for their disability certificate.

Recurrent costs:
Recurrent costs were costs incurred at hospital visits during the year. These costs were incurred at out-patient visits, pill refill visits or in-patient visits as applicable. Recurrent costs at these visits were costs of consultation, medications, investigations, counselling, and non-medical costs such as travel, accommodation, or food.

From the prescription of the patients, the list of medications and investigations was obtained and then the amount paid for medications and investigations during the visit were obtained from the register maintained by the health centre.

The costs assessed were further categorized into direct, indirect, and coping costs (see Table 1). Direct costs were further classified as direct medical and non- medical costs. Indirect costs in this study were calculated as loss of wages in the patient or the caregiver for the hospital visit. If the patient was unemployed or a home maker, the wages were considered as zero. Based on the number of visits made by the patient per year, the costs incurred in the year was calculated.

Catastrophic health expenditure:
Further, health expenditure be viewed as catastrophic, whenever it is greater than or equal to 40% of a household's non-subsistence income, i.e., income available after basic needs have been met.

Additional assessments included, treatment adherence using the Medication Adherence Rating Scale (MARS) (14) and the health-related quality of life (HRQOL) using the EQ-5D-5L (15), as these factors could affect costs of care in PwMI (16–19).

Method of data collection:

The PwMI were approached at their homes, introduced to the study by trained research assistant and administered written informed consent. Subsequently, the study questionnaire was administered to consenting PwMIs. To ensure all costs incurred during the year were captured, three study visits were made- 1st at baseline, 2nd at 6 months and the 3rd at 1 year (endline) after enrollment in the study. Participants were also provided a diary to document costs incurred in

between our visits to ensure that no costs were missed and to facilitate recall. The total cost of the illness in one year was then calculated by summing costs obtained at the three study visits. Additionally, medication adherence and HRQOL were assessed at endline. (See Fig.1: Flowchart showing participant enrollment process and follow-up)

Statistical analysis:

The data collected was entered in Microsoft excel and analyzed using IBM SPSS statistics version 20. The outcome variable is the ***total cost of care in mental illness per person per year***. The direct and indirect costs were computed per person per year. In addition, coping costs per person per year and catastrophic costs were also calculated.

Costs were measured as continuous variables using micro-costing approach. Total direct and indirect costs were calculated by adding individual costs. Data was described using proportions, mean, standard deviation, median and inter-quartile range.

A step-wise logistic regression analysis was done to assess the factors significantly associated with cost of psychiatric illness. In the first step, a bivariate logistic regression analysis was done with the cost of psychiatric illness per person per year as the dependent variable and socio- demographic factors, substance use, financial dependence, problems at workplace, delay in initiating treatment, presence of co-morbidities, adherence to medications, HRQOL as the independent variables. Those variables with a p value less than 0.20 were incorporated into multivariate logistic regression analysis. The variables significantly associated with COI were depicted in the form of odds ratio and confidence interval.

RESULTS:

Socio-demographic characteristics:

Overall, there were 130 person-years of follow-up in our study. The mean age of the study participants was 50.4±14.97 years. Most [98(75.4%)], participants were women, most 125 (96.2%), were Hindu by religion and lived in nuclear families 75(57.7%). Among the study participants, 69(53%) were literate and 79(60.7%) were unemployed. The mean monthly income was INR 1363.08±2492.59. Of the 130 participants, 74(57%) were financially dependent on their family. Financial constraints delayed healthcare seeking in 18.5% of the participants, early in the illness.

The most common psychiatric illness among the 130 participants was depressive disorder (63, 48%) followed by persistent mood disorder (30, 23%), psychosis (14, 11%) and anxiety disorder (13, 10%).

Health related quality of life (HRQOL):

The mean visual analogue scale (VAS) score on the day of the survey was 58.39±22.45. Among the EQ-5D-5L dimensions, pain or discomfort was identified as a problem by most participants, 98 (77.2%), followed by anxiety or depression, 91(71%).

Medication adherence:

The participants' mean treatment adherence score assessed using MARS was 7.65±2.81. Majority, 94(74%) of the participants were found to be adherent to medications. The most common reason for suboptimal adherence in the participants was medication side-effects 49(38.6%), such as tiredness and lethargy after taking medications.

Cost of illness:

The median total cost of care for mental illness incurred per person year was **INR 5043.50 (2544.50- 15848.50).** The median direct costs per person per year was INR 2184.50 (1237.50-3811.25) when the total costs were calculated with the subsidized costs on medications. The amount spent on medications was the largest contributor to direct medical costs [(INR 945.00 (458.25-2043.75)] while the amount spent on travel to the health centre was the largest contributor to direct non-medical costs [INR 250 (120-500)]. Most of the persons visiting the health centre were from nearby villages, hence there was no cost encountered by the patients for accommodation. The median indirect costs per person per year was INR 775.00 (0-2025.00). The costs incurred by the participants are summarized in Table 2.

The median direct cost per month for out- patient visits was INR 232.50 (123-452), whereas the median indirect cost per month was INR 100 (0-200). The median total cost of out- patient visit per patient per year was INR 2817 (1498.50- 4662.50).

In our study only one of the participants had an in-patient visit during the study period, incurring a mean direct cost of INR 118.88±1355.40 and a mean indirect cost of INR 75.31±858.64.

The total mean cost of pill refill visits per person per year was found to be INR 534.92±2998.17 among the participants.

The total mean coping cost per person per year among the participants was found to be INR 4940.00± 9962.85. The commonest source of coping costs was, by borrowing money from family, neighbors (INR1553.00±9132), money lenders and self-help groups (INR1253.00 ±4423.88).

The total cost of mental illness breakup is represented in the sunburst diagram. Fig 2. indicates that the direct costs were approximately half the total cost of care among the study participants.

Catastrophic health expenditure:

Approximately 43 (33%) participants had CHE when total health expenditure ≥40% of non-subsistence income. Among the total 43 participants who encountered CHE, majority of them had depressive disorder 24 (55.8%), followed by psychosis 10 (23.3%).

Logistic regression analysis between socio-demographic characteristics and cost of mental illness:

The median COI (INR 5043.50)/ year was the dependent variable and the socio-demographic factors (gender, income, occupation etc.), financial dependence, personal habits (tobacco consumption), delay in treatment, presence of co-morbidities (e.g.Diabetes mellitus, Hypertension), type of treating facility (govt/private), median EQVAS score 60, adherence of 80% were considered as independent variables for the regression analysis (see Table 3).

Consumption of chewable tobacco, presence of problems at workplace, seeking healthcare at a government facility and low HRQOL, were found to be associated with higher cost of mental illness in the bivariate analysis. However, in the multi-variate analysis, consumption of chewable form of tobacco and low HRQOL were found to be significantly associated with COI with a p value <0.05.

Participants who chewed tobacco had four times the odds of incurring a higher COI when compared with those who did not chew tobacco to incur a COI ≥INR 5043.50 (AOR 4.242, CI: 1.709-10.529). Of the 68 participants with an EQ VAS score ≥ 60, 41(60%) incurred cost <INR 5043.50, while 36 (61%) of those with an EQ VAS score of <60, incurred costs ≥INR 5043.50. Participants who had a lower HRQOL (EQ VAS <60) had approximately twice the odds of (AOR: 2.627, CI: 1.217-5.670) of incurring a higher a COI when compared with their counterparts.

DISCUSSION:

Our study identified that the total median cost of care per person-year was INR 5043.50 (IQR: 2544.50-15848.50). The median direct cost per month for out- patient visits was INR 232.50 (IQR:123-452) per person, whereas the median indirect cost per month per person was INR 100 (0-200). The median total cost of out- patient visit per person-year was INR 2817 (1498.5- 4662.5).

Costs for Schizophrenia and Bipolar Affective Disorder (BAD) at a tertiary care general hospital in New Delhi, India, were nil as the hospital did not charge a consultation fee (20). In contrast, the cost of consultation was INR 36.58±123.35 per month in our study and can be attributed to the minimal outpatient charges which was INR 20 at the CHTC, given that this is a private not-for profit healthcare facility.

Annual healthcare costs for Major Depressive Disorder (MDD) in a cohort study in Canada, were $3,364, 95% for psychological distress and $3,210.00 for MDD. These higher costs may be due to the higher cost of care in High-income countries (HICs), unlike our study where all costs were subsidized along with minimal hospitalization (21).

Higher costs of hospitalization requiring psychiatric care in Nigeria were contributed to hospitalization and the first follow-up visit (22). Higher costs of care including costs for hospitalization and outpatient care were incurred by Schizophrenia patients in Brazil ($US1811.92 ± 284.39) and can be similarly attributed to higher hospitalization rates in the study (23). We

studied multiple illnesses such as Schizophrenia, anxiety disorder, bipolar mood disorder, recurrent depressive disorder to name a few. The spectrum of illnesses of some of which required only minimal healthcare support, probably offset the higher costs incurred by some participants in our study.

Of all our study participants, 33% incurred CHE due to OOP payments. On the contrary, only 12% of the participants incurred CHE in the Nigerian study(22). The differences in catastrophic expenses between the two studies was probably because, the costs that we included, incorporated the costs for out-patient care, in-patient care, and pill refill visits, unlike the study from Nigeria that included only cost of hospitalization and costs related to the first follow-up visit. Also 67% of the participants in the Nigerian study were employed, while in our study only 39.2% were employed. The reason for high unemployment rate in our study could be attributed to the old age >60 years (34.6%), low literacy rate (53%), majority of the study participants being women (75.4%) and being homemakers (49.2%).

Unemployment is a known factor contributing to CHE (24). Since our study had more unemployed participants (60.7%) and also, low per capita income among 3/4th of the employed participants (<INR 2100), lack of social security [only 13(10%) participants received disability pension while 5(4%) had medical insurance] could be the factors which contributed to CHE among 33% of the participants due to OOP payments.

In our study the coping cost incurred per participant per year was INR 4940.00± 9962.85. The commonest contributor to coping costs was borrowing money- from family, neighbors (INR1553.00± 9132), money lenders and self-help groups (INR1253.00± 4423.88). In a study from Kerala, South India, 22% families of the PwMI studied had availed a loan, to cope up with the hospitalization, compared to only 3% of our study participants (25). Majority of the participants in our study received financial support from family and friends which probably reduced coping costs. The other reason was the low rate of hospital admission. Also, unlike our study participants who lived in rural areas, in the Kerala study participants had greater access to banks and other loans which they availed, thereby increasing coping costs.

In the multi-variate analysis, consumption of chewable tobacco and low HRQOL were found to be significantly associated with COI. Consumption of tobacco could contribute to the adverse effects of medications and drug interactions, which can lead to non-adherence to medications. Non-adherence is an important factor affecting the COI, as it worsens psychiatric symptoms and increases hospital admissions. Moreover, smokeless tobacco use is associated with phobia, panic disorder, anxiety disorder, alcohol abuse and dependence requiring medical management and adding to costs (26)(27).

Tobacco could also impact the course of mental illness affecting the symptoms of the illness. These in turn could lead to possible changes in the treatment with the addition of some drugs leading to polypharmacy thereby increasing the costs of care in mental illness. Also, polypharmacy can lead

to non-adherence among patients (28), and secondary side effects further worsening non-adherence (29). In our study, participants who used tobacco were 4 times more likely to incur higher costs than those who did not use tobacco.

Higher COI was also associated with the low HRQOL in our study. Participants with a lower QOL were 2.6 times more likely to incur higher costs of care compared to those with a better QOL. HRQOL is affected by mobility, self- care, usual activities, pain or discomfort, anxiety, and depression. In our study >70% participants experienced pain, discomfort, or anxiety probably due to somatization of their illness, symptoms of which were relieved with medications. While these symptoms contribute to a lower HRQOL, medical management necessary to address these symptoms increases COI (24).

Investing in mental health is considered to increase QOL and reduce disability associated with mental illness. Caregivers of PwMI are also benefitted from a lower burden of care, fewer work days lost, and fewer wages lost, thereby lowering costs of care (24).

Unlike our study, an inpatient record review from Italy, from the psychiatry unit, that assessed the factors associated with cost of hospitalization in mental illness, found unemployment, and age ≥ 40 years were associated with higher cost of care (30). The different socio-demographic profile in the Italian study also probably contributed to higher reported costs.

Since COI was self-reported and based largely on participant recall or an expenditure diary, it is likely that costs are underreported. Similarly, the income of the family was also self-reported, and influenced by social desirability or personal information bias. Also, as the study was based in a rural setting, not all income was measurable. As the costs were assessed from the patients' perspective, it does not reflect the total overall COI, which requires cost assessments from a societal perspective.

Conclusion:

Our study provides a valuable information on the COI in PwMI and the factors that contribute to the costs. This can inform resource allocation within national mental health programmes globally in low-middle income contexts.

We found that community-based management of mental illness in rural contexts, can lower COI for PwMI. Community based follow-up of PwMI through community health workers both within the public health system or through public private partnerships (PPP) along with an uninterrupted supply of low-cost medications are essential to lower costs.

Adding a tobacco cessation program to the existing system might further lower COI. Increasing awareness as well as encouraging PwMI to avail social protection such as disability pension could further lower costs and increase the expendable income available for nutrition and basic necessities essential for mental wellbeing.

REFERENCES:

1. World Health Organization. World Mental Health Day: an opportunity to kick-start a massive scale-up in investment in mental health [Internet]. World Health Organization; 2020 Aug 27[cited 2022 Feb 23]. Available from: https://www.who.int/news/item/27-08-2020-world-mental-health-day-an-opportunity-to-kick-start-a-massive-scale-up-in-investment-in-mental-health

2. Abbafati C, Abbas KM, Abbasi-Kangevari M, Abd-Allah F, Abdelalim A, Abdollahi M, et al. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. The Lancet. 2020 Oct 17;396(10258):1204–22.

3. World Health Organization. Depression and Other Common Mental Disorders Global Health Estimates [Internet]. World Health Organization; 2017[Cited 2019 Sep 22]. Available from: https://www.who.int/publications/i/item/depression-global-health-estimates

4. Gururaj G, Varghese M, Benegal V, Rao GN, Pathak K, Singh LK, et al. National Mental Health Survey of India, 2015-16: Summary. Bengaluru, National Institute of Mental Health and Neuro Sciences, NIMHANS Publication No. 128, 2016.

5. Rejani PP, Sumesh TP, Shaji KS. Cost of care: A study of patients hospitalized for treatment of psychotic illness. Indian J Psychol Med 2015;37:71-4.

6. Jenkins R, Baingana F, Ahmad R, McDaid D, Atun R. Social, economic, human rights and political challenges to global mental health. Ment Health Fam Med. 2011;(8):87–96.

7. Sharma P, Das SK, Deshpande SN. An estimate of the monthly cost of two major mental disorders in an Indian metropolis. Indian J Psychiatry. 2006 Jul;48(3):143–8.

8. Srinivasa Murthy R, Kishore Kumar K V, Chisholm D, Thomas T, Sekar K, Chandrashekari CR. Community outreach for untreated schizophrenia in rural India: a follow-up study of symptoms, disability, family burden and costs. Psychol Med. 2005 Mar;35(3):341–51.

9. World Health Organization. Mental health atlas 2020 [Internet]. Geneva: World Health Organization; 2021 [cited 2019 Sep 22]. Available from: https://www.who.int/publications/i/item/9789240036703

10. World Health Organization. Accelerating Country Action on Mental Health [Internet]. World Health Organization; mhGAP FORUM2018 [cited 2019 Sep 22]. Available from: https://cdn.who.int/media/docs/default-source/mental-health/mental-health-forum-reports/who_mental_health_forum_report_2018.pdf?sfvrsn=3dfc9876_3

11. World Health Organization. The WHO MIND Project: Mental improvement for nations development [Internet]. Geneva: World Health Organization; [cited 2019 Sep 22]. Available from: https://www.who.int/mental_health/policy/development/1_Breakingviciouscycle_Infosheet.pdf?ua=1

12. P S, Sk D, N DS. An estimate of the monthly cost of two major mental disorders in an Indian metropolis. Indian J Psychiatry. 2006;48(3):143–8.

13. World Health Organization. Nationwide generic TB patient cost survey [Internet]. World Health Organization;[cited 2023 Mar 6]. Available from: https://enketo.ona.io/x/gt1jrltS

14. K Thompson, J Kulkarni, A.A Sergejew, Reliability and validity of a new Medication Adherence Rating Scale (MARS) for the psychoses, Schizophrenia Research, 2000; 42(3):241-7.

15. Euro QoL. EQ-5D user guides [Internet]. Euro QoL; [cited 2019 Sep 22]. Available from: https://euroqol.org/docs/EQ-5D-5L-User-Guide.pdf

16. Chaudhari B, Saldanha D, Kadiani A, Shahani R. Evaluation of treatment adherence in outpatients with schizophrenia. Ind Psychiatry J.2017;26(2):215–22.

17. Banerjee S, Varma RP. Factors Affecting Non-Adherence among Patients Diagnosed with Unipolar Depression in a Psychiatric Department of a Tertiary Hospital in Kolkata, India. Depress Res Treat. 2013;2013:809542. doi: 10.1155/2013/809542. Epub 2013 Dec 4. PMID: 24381752; PMCID: PMC3868196.

18. Eticha T, Teklu A, Ali D, Solomon G, Alemayehu A. Factors associated with medication adherence among patients with schizophrenia in Mekelle, Northern Ethiopia. PLoS One. 2015 Mar 27;10(3):e0120560. doi: 10.1371/journal.pone.0120560. PMID: 25816353; PMCID: PMC4376899.

19. Ng P, Pan JY, Lam P, Leung A. Quality of life in people with mental illness in non-residential community mental health services in Hong Kong. East Asian Arch Psychiatry. 2014 Jun;24(2):43-50. PMID: 24986198.

20. Sarkar S, Mathan K, Sakey S, Shaik S, Subramanian K, Kattimani S. Cost-of-treatment of clinically stable severe mental illnesses in India. Indian J Soc Psychiatry. 2017;33(3):262.

21. Chiu M, Lebenbaum M, Cheng J, de Oliveira C, Kurdyak P. The direct healthcare costs associated with psychological distress and major depression: A population-based cohort study in Ontario, Canada. PLoS One. 2017 Sep 5;12(9):e0184268. doi: 10.1371/journal.pone.0184268. PMID: 28873469; PMCID: PMC5584795.

22. Agboola AA, Esan OT, Afolabi OT, Soyinka TA, Oluwaranti AO, Adetayo A. Economic burden of the therapeutic management of mental illnesses and its effect on household purchasing power. PLoS One. 2018 Sep 10;13(9):e0202396. doi: 10.1371/journal.pone.0202396. PMID: 30199534; PMCID: PMC6130881.

23. Barbosa WB, Costa JO, de Lemos LLP, Gomes RM, de Oliveira HN, Ruas CM, Acurcio FA, Barbui C, Bennie M, Godman B, Guerra AA Jr. Costs in the Treatment of Schizophrenia in Adults Receiving Atypical Antipsychotics: An 11-Year Cohort in Brazil. Appl Health Econ Health Policy. 2018 Oct;16(5):697-709. doi: 10.1007/s40258-018-0408-4. PMID: 30051254; PMCID: PMC6132453.

24. World Health Organization. Mental Health [Internet]. World Health Organization; [cited 2019 Oct 23]. Available from: https://www.who.int/health-topics/mental-health#tab=tab_1

25. Rejani PP, Sumesh TP, Shaji KS. Cost of care: a study of patients hospitalized for treatment of psychotic illness. Indian J Psychol Med. 2015 Jan-Mar;37(1):71-4. doi: 10.4103/0253-7176.150823. PMID: 25722516; PMCID: PMC4341315.

26. Fu Q, Vaughn MG, Wu LT, Heath AC. Psychiatric correlates of snuff and chewing tobacco use. PLoS One. 2014 Dec 23;9(12).

27. Goodwin RD, Zvolensky MJ, Keyes KM. Nicotine dependence and mental disorders among adults in the USA: evaluating the role of the mode of administration. Psychol Med. 2008 Sep;38(9):1277–86.

28. Kukreja S, Kalra G, Shah N, Shrivastava A. Polypharmacy in psychiatry: a review. Mens Sana Monogr. 2013 Jan;11(1):82-99. doi: 10.4103/0973-1229.104497. PMID: 23678240; PMCID: PMC3653237.

29. Carmona-Huerta J, Castiello-de Obeso S, Ramírez-Palomino J, Duran-Gutiérrez R, Cardona-Muller D, Grover-Paez F, Fernández-Dorantes P, Medina-Dávalos R. Polypharmacy in a hospitalized psychiatric population: risk estimation and damage quantification. BMC Psychiatry. 2019 Feb 21;19(1):78. doi: 10.1186/s12888-019-2056-0. PMID: 30791883; PMCID: PMC6383213.

30. Curto M, Masters GA, Girardi P, Baldessarini RJ, Centorrino F. Factors Associated with Costs of Hospitalization of Severely Mentally Ill Patients. Bipolar Disord. 2016;2(1):103.

Tables:

Table 1: Types of costs assessed among the study participants

Type of cost		Costs assessed
Direct costs	Direct medical costs	Consultation Medications Investigations Procedures or therapies Counselling charges Registration fees Hospital-day charge Specialist consultation Consultation with a traditional or spiritual healer
	Direct non-medical costs	Transport Food Accommodation Visitors' food and accommodation Vehicle parking charge Amount spent for security guard
Indirect costs		Loss of wages in the patient Loss of wages in the caregiver
Coping costs		Sale of property Availing loan from bank Borrowing money from moneylenders, family friends and neighbors Savings amount used Loan from co-operative society Loan from self-help groups Working under money-lender

Table 2: Individual costs assessed per person per year (n=130)

Type of costs			**Mean cost per person per year ±Standard deviation**	**Median cost per person per year (IQR)**
Direct costs	Direct medical costs	Consultation	INR 307.65±1086.92	INR 100.00 (50.00-120.00)
		Medications	INR 1628.28±2302.98	INR 945.00 (458.25-2043.75)
		Investigations	INR 1835.31±6843.29	INR 0 (0-420.00)
		Consultation with a traditional or spiritual healer	INR 259.23±2633.34	0
		First visit cost	INR 53.52±64.25	INR 10 (10-90)
	Direct non-medical costs	Transport	INR 468.19±757.93	INR 250 (120-500)
		Food	INR 90.92±605.22	0
		Cost of application for disability certificate	INR 190.77±524.35	0
Total direct costs per person per year				INR 2184.50 (1237.50-3811.25)
Indirect costs	Loss of wages in the patient		INR 479.23±1012.32	INR 0 (0-600)
	Loss of wages in the caregiver		INR 1502.31±5688.41	INR 0 (0-1200)
Total indirect costs per person per year				INR 775.00 (0-2025.00)
Coping costs	Availing loan from bank		INR 5000.00±1732.05	0
	Borrowing money from moneylenders, family friends and neighbors		INR 1553.84±9132.48	INR 0 (0-200)
	Amount used from savings		INR 95.00±884.35	0
	Loan from co-operative society		INR 9000.00±1414.21	0
	Loan from self-help groups		INR 1253.84±4423.88	0
Total coping costs per person per year			INR 4940±9962.85	INR 0 (0-6000)
Total cost of illness per person per year				**INR 5043.50 (2544.50-14977.75)**

Table 3: Logistic regression analysis between socio-demographic characteristics and cost of mental illness (n=130)

Socio-demographic factors		<Median cost (<INR 5043.50) n (%)	≥Median cost (≥INR 5043.50) n (%)	Unadjusted OR (CI)	Adjusted OR* (CI)
Gender	Male	18 (56.2)	14 (43.8)	Reference	-
	Female	47 (48)	51 (52)	1.395 (0.625-3.114)	-
Age in years	18-45	27 (46.6)	31 (53.4)	Reference	-
	>45	38 (52.8)	34 (47.2)	0.779 (0.390-1.558)	-
Card	No BPL	3 (50)	3 (50)	Reference	-
	BPL	62 (50)	62 (50)	1.000 (0.194-5.148)	-
Type of family	Others	28 (50.9)	27 (49.1)	Reference	-
	Nuclear	37 (49.3)	38 (50.7)	1.065 (0.531-2.136)	-
Living status	Family	62 (50)	62 (50)	Reference	-
	Alone	3 (50)	3 (50)	1.000 (0.194-5.148)	-
Per capita income	≥2102	15 (45.5)	18 (54.5)	Reference	-
	<2102	50 (51.5)	47 (48.5)	0.783 (0.355-1.730)	-
Occupation	Employed	24 (47.1)	27 (52.9)	Reference	-
	Un- employed	41 (51.9)	38 (48.1)	0.824 (0.407-1.667)	-
Education	Literate	31 (44.9)	38 (55.1)	Reference	-
	Illiterate	34 (55.7)	27 (44.3)	0.648 (0.324-1.295)	-
Primary caregiver	Present	12 (48)	13 (52)	Reference	-
	Absent	53 (50.5)	52 (49.5)	0.906 (0.378-2.168)	-
Financial dependence	Independent	10 (55.6)	8 (44.4)	Reference	-
	Dependent	55 (49.1)	57 (50.9)	1.295 (0.476-3.524)	-
Smoking	No	64 (50.8)	62 (49.2)	Reference	-
	Yes	1 (25)	3 (75)	3.097 (0.314-30.579)	-
Alcohol	No	64 (50.4)	63 (49.6)	Reference	-
	Yes	1 (33.3)	2 (66.7)	2.032 (0.180-22.975)	-
Chewable tobacco	No	56 (58.9)	39 (41.1)	Reference	Reference
	Yes	9 (25.7)	26 (74.3)	4.148 (1.753-9.815)	**4.241 (1.709-10.529)**
Problems at workplace	No	28 (58.3)	20 (41.7)	Reference	Reference
	Yes	37 (45.1)	45 (54.9)	1.703 (0.829- 3.498)	1.979 (0.888-4.411)
Treatment delay	No	53 (50)	53 (50)	Reference	-
	Yes	12 (50)	12 (50)	1.000 (0.412- 2.426)	-
Co-morbidity	No	34 (53.1)	30 (46.9)	Reference	-
	Yes	31 (47)	35 (53)	1.280 (0.642-2.549)	-
Treating facility	Government	1 (20)	4 (80)	Reference	Reference
	Private	64 (51.2)	61 (48.8)	0.238 (0.026-2.192)	0.282 (0.028- 2.805)
EQ VAS	≥60	41 (60.3)	27 (39.7)	Reference	Reference
	<60	23 (39)	36 (61)	2.377(1.164- 4.853)	**2.627(1.217-5.670)**
Adherence	≥80%	42 (48.8)	44 (51.2)	Reference	-
	<80%	22 (53.7)	19 (46.3)	0.824 (0.391- 1.737)	-

*- Variables with a p value <0.2 were included for analysis in the adjusted model, and those variables found to be with a p value <0.05 were considered significant.

Fig 1: Flow chart showing the methodology of recruitment of study participants

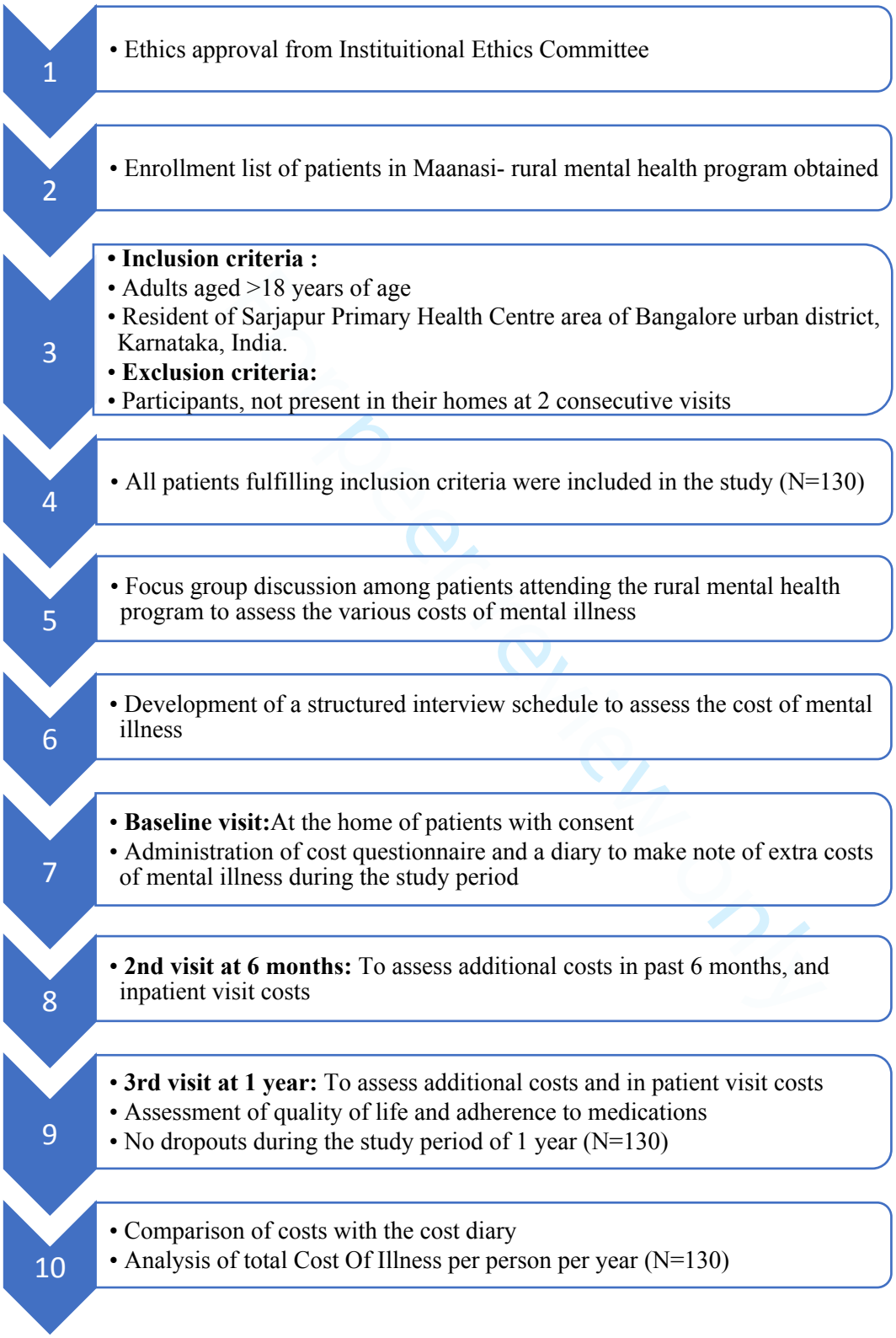
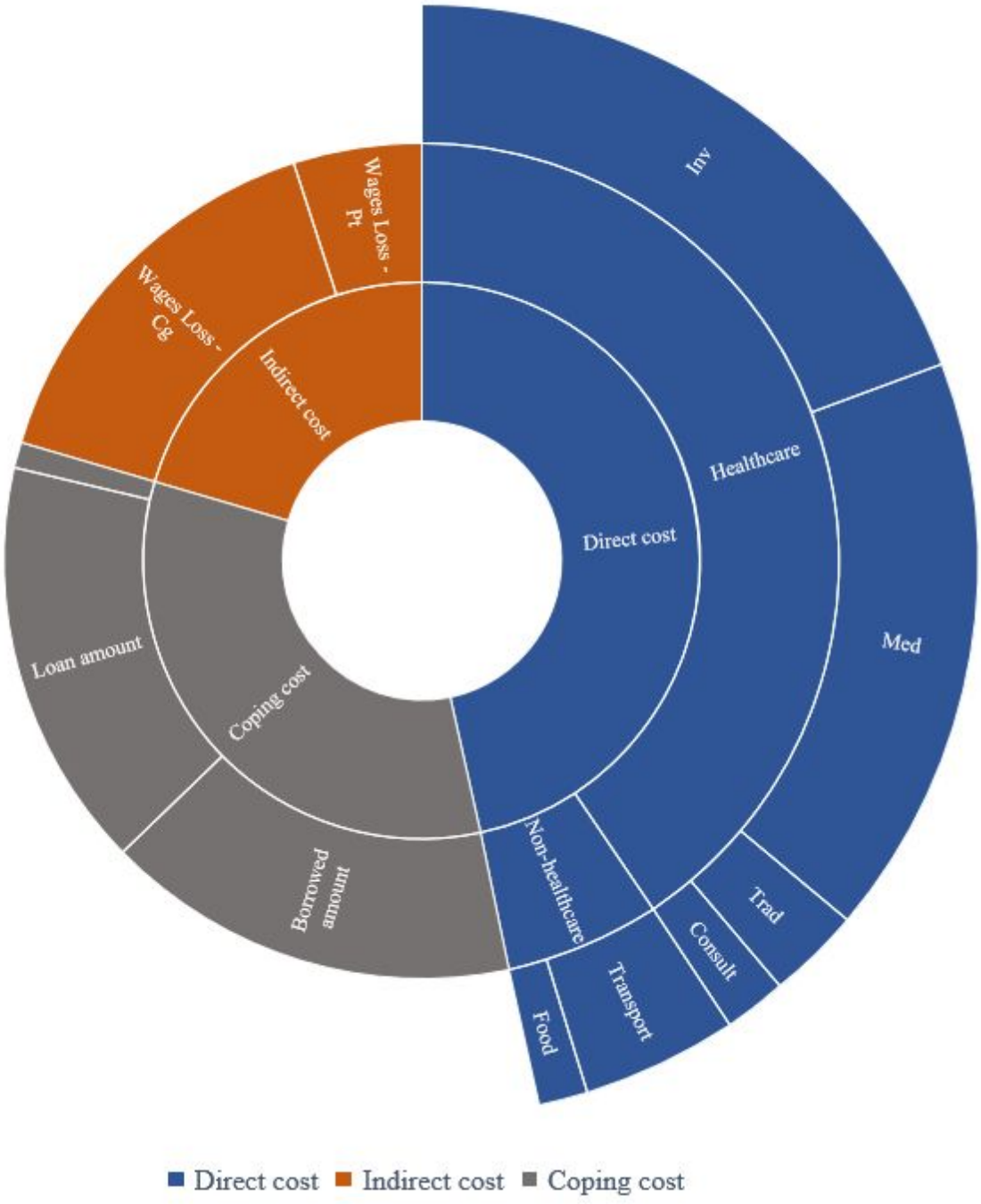


Fig 2: Sunburst diagram representing the cost breakup
n=130



Inv- Investigations, Med- Medications, Trad- Traditional healer consultation fees, Consult- Consultation fees, Pt- Patient, Cg- Caregiver

Reporting checklist for economic evaluation of health interventions.

Based on the CHEERS guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the CHEERSreporting guidelines, and cite them as:

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	Reporting Item	Page Number
Title		
#1	Identify the study as an economic evaluation or use more specific terms such as “cost-effectiveness analysis”, and describe the interventions compared.	This was a cost of illness study on persons with mental illness – mentioned in Page no.1

Abstract			
	#2	Provide a structured summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses), and conclusions	Page no.1
Introduction			
Background and objectives	#3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions	Page no.3,4
Methods			
Target population and subgroups	#4	Describe characteristics of the base case population and subgroups analysed, including why they were chosen.	Page no.4
Setting and location	#5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	Page no.4
Study perspective	#6	Describe the perspective of the study and relate this to the costs being evaluated.	Page no.4
Comparators	#7	Describe the interventions or strategies being compared and state why they were chosen.	n/a We did not compare any interventions, since the

			study was a cost analysis- Partial economic evaluation
Time horizon	#8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	Page no.4
Discount rate	#9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate	n/a Since the costs were evaluated only for a year, discount rates were not applied (page no.4)
Choice of health outcomes	#10	Describe what outcomes were used as the measure(s) of benefit in the evaluation and their relevance for the type of analysis performed	n/a Since it was a cost analysis study, cost benefits were not measured
Measurement of effectiveness	#11a	Single study-based estimates: Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data	n/a Since it was a cost analysis study, cost effectiveness was not studied
Measurement of effectiveness	#11b	Synthesis-based estimates: Describe fully the methods used for identification of	n/a since the study was a

		included studies and synthesis of clinical effectiveness data	cost analysis, effectiveness was not measured
Measurement and valuation of preference- based outcomes	#12	If applicable, describe the population and methods used to elicit preferences for outcomes.	Page no.6 Total costs were considered as outcome in the study
**Estimating resources and costs **	#13a	Single study-based economic evaluation: Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs	Page no.6,7 Micro costing approach was used to assess the individual costs. This was not a comparative study, hence there was no alternative intervention
Methods			
Estimating resources and costs	#13b	Model-based economic evaluation: Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary	Page no.6,7 Micro costing approach was used to assess the

		or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	individual costs. This was not a comparative study, hence there was no alternative intervention
Currency, price date, and conversion	#14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate.	The costs were estimated in INR. The exchange rate during the study period 2018-2019 was, 0.0142 USD per INR
Choice of model	#15	Describe and give reasons for the specific type of decision analytical model used. Providing a figure to show model structure is strongly recommended.	n/a This was not a cost-effectiveness study hence no model was used
Assumptions	#16	Describe all structural or other assumptions underpinning the decision-analytical model.	n/a There was no decision-analytical model used in the study
Analytical methods	#17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or	Page no.6

		censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	
Results			
Study parameters	#18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	Page no. 6-8, 14-17
Incremental costs and outcomes	#19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	n/a since we did not have any intervention in the study
Characterising uncertainty	#20a	Single study-based economic evaluation: Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact of methodological	n/a This study did not assess effectiveness of interventions

		assumptions (such as discount rate, study perspective).	
Characterising uncertainty	#20b	Model-based economic evaluation: Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model and assumptions.	n/a Since the study did not compare any interventions
Characterising heterogeneity	#21	If applicable, report differences in costs, outcomes, or cost effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information.	n/a cost effectiveness analysis was not done in the study
Discussion			
Study findings, limitations, generalisability, and current knowledge	#22	Summarise key study findings and describe how they support the conclusions reached. Discuss limitations and the generalisability of the findings and how the findings fit with current knowledge.	Page no. 8-10
Other			
Source of funding	#23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the	Mentioned in Title page

		analysis. Describe other non-monetary sources of support	
Conflict of interest	#24	Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations	Mentioned in Title page: None declared