Cost-effectiveness and budget impact analysis of the COPD screening and control program in Kerala (SWAAS)

Regional Technical Resource Centre for Health Technology Assessment, SCTIMST, Kerala
&
Health Technology Assessment in India (HTAIn)

Policy Brief

Executive Summary

Background: Existing targeted respiratory programs show short-term benefits, but their long-term value is unclear.
Objectives: Determine the cost-effectiveness of SWAAS and analyse the program's budget impact.
Methods: A model-based economic evaluation was conducted using data from Kerala's health system and published literature. The model assessed the cost-effectiveness, expressed as the Incremental Cost-Effectiveness Ratio (ICER) (incremental cost per quality-adjusted life-year (QALY) gained).
Results:
Cost-Effectiveness: Compared to routine practice, SWAAS was found to be a **'cost-saving option' (ICER: -24882)**. Treatment costs for exacerbations were the most significant factor influencing the ICER.
Budget Impact: The annual treatment cost of diagnosed COPD patients ranges from **INR 97.3 crores to INR 163.5 crores**. The state currently spends significantly less due to the program's early stage and limited enrolment. Costs are projected to increase substantially as enrolment approaches 50% of the eligible population.
Conclusion: While SWAAS appears cost-effective initially, long-term sustainability requires strategic planning and resource mobilization. This includes:

- Inter-departmental collaboration
- Innovative financing mechanisms

Implications: This study provides evidence for SWAAS's potential cost-effectiveness and highlights the need for proactive measures to ensure its financial sustainability for broader implementation and addressing the growing burden of COPD in India.

SWAAS – The COPD control program - What does it aim for?

The aims of SWAAS were the following:

- ***Early-stage COPD identification***
  - Implement preventive strategies to mitigate COPD progression and reduce the number of patients presenting at advanced stages with significantly limited respiratory function.
- ***Structured COPD Program: Primary to Tertiary Care***
  - Multifaceted approach towards the management of COPD patients, including provision of oxygen when indicated, medical intensive care during exacerbations and proper management of stable COPD.
- ***Optimize patient's participation in pulmonary rehabilitation by leveraging available resources.***
  - Pulmonary rehabilitation (PR) is a therapeutic strategy for managing COPD[3].
  - However, access to PR for COPD patients remains restricted. Furthermore, the availability of structured PR programs is even more limited.

Why this economic evaluation study?

- While targeted case-finding programs for curable respiratory illnesses, such as pulmonary tuberculosis, have demonstrably yielded cost-effective outcomes[1], the long-term value of routine screening programs for chronic conditions like Chronic Obstructive Pulmonary Disease (COPD) remains uncertain.
- In the absence of definitive clinical evidence from extended trials, economic models informed by real-world data and existing literature can serve as valuable decision-making tools. These models assess the program's anticipated long-term benefits against the initial investment, considering the region-specific cost-effectiveness threshold, exemplified by the one GDP-per-capita/QALY (Quality-Adjusted Life Year) threshold in India[2].

Objectives of the study

Primary objective

- To determine the cost-effectiveness of the COPD Control Program in Kerala (SWAAS)

Secondary objective

- To determine the budget impact of implementing the COPD Control Program in Kerala (SWAAS).

PICO	Description of the components of PICO
Population	• All patients >40 years with relevant chronic respiratory symptoms or a risk factor (smoking) and without a prior diagnosis of COPD
Intervention	**COPD control program – SWAAS** • Screening and early detection through active case finding, staging of disease, and providing adequate treatment
Comparator	**No COPD control program** • Routine practice where patients are diagnosed during episodes of exacerbation or during visits to hospital for other illnesses.
Outcome	• Implementation cost of the SWAAS program. • QALY gain from the SWAAS program. • Incremental cost effectiveness ratio. • Budget Impact analysis.

Classification of airflow limitation severity in COPD (based on post-bronchodilator FEV1)[4]

GOLD 1	Mild	FEV1 >=80% predicted
GOLD 2	Moderate	50% <= FEV1 < 80% predicted
GOLD 3	Severe	30% <= FEV1 < 50% predicted
GOLD 4	Very Severe	FEV1 < 30% predicted

Methods and Approach

Type of economic evaluation	Cost-utility analysis
Key Health States	• Healthy • Undiagnosed • Diagnosed (GOLD 1 – 4) • Dead
Type of Model	• Decision-analytic model (Markov model)
Perspective	• Health system • (Disaggregated) societal perspective
Time Horizon	• Forty years (assuming an average life expectancy of 75-80 years)
Discounting	• Three percent for costs and consequences
Sensitivity Analysis	• One way sensitivity analysis (OWSA) • Probabilistic sensitivity analysis (PSA)
Software Used	• TreeAge Pro Healthcare 2022 • Microsoft Excel

Quality Adjusted Life-years:

- QALY is a generic measure of health and is used to compare the health gains across different diseases and hence provide a uniform platform to compare effectiveness across all the different areas of healthcare.
- **EQ5D** is the most utilised tool worldwide to measure QoL.

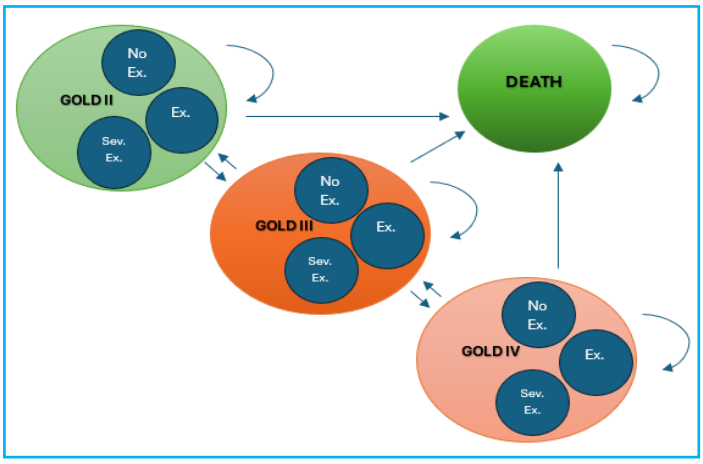

Figure 1: Schematic diagram for the Markov state transition model.

Base-case result cost utility analysis

Strategy	Cost	Incr. Cost	Effect.	Incr. Eff.	ICER
Screening Arm	3955.2		0.6392		
Routine Clinical Practice	4787.9	832.7	0.6057	-0.0335	-24882

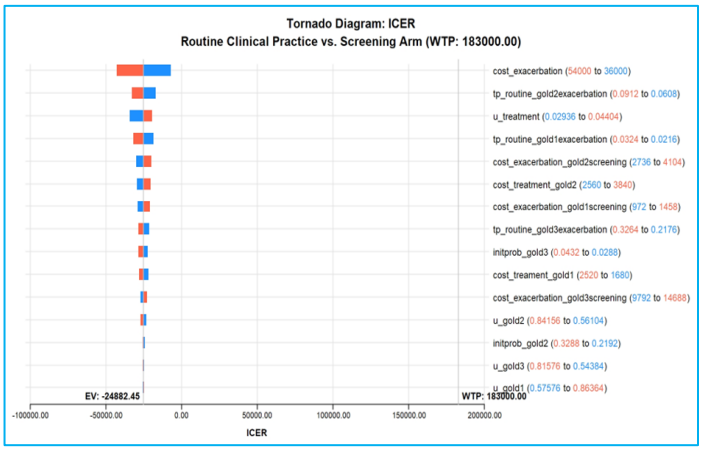

Figure 2: One-way sensitivity analysis

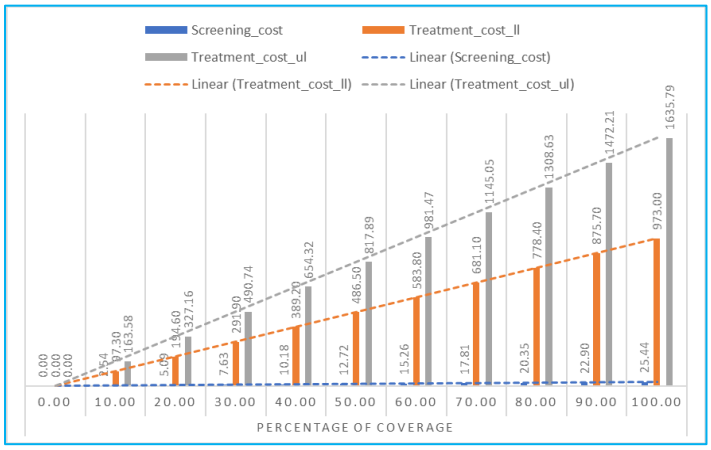

Figure 3: Budget Impact (projected)

Results and recommendations

Results

Cost-utility analysis:

- Compared to the passive routine practice, the active screening strategy for early identification and treatment of COPD patients was a **cost saving** option.
- Incremental cost-effectiveness ratio (ICER) of INR **(-) 24882** (cost saving).
- Acute exacerbations represent the principal drivers of direct costs for COPD care.

Budget impact analysis:

- Current screening coverage (10%) & service penetration (~50%): **INR 8.8 Crores**
- Lower projected prevalence of COPD & total screening coverage and service penetration: **INR 97.3 Crores**
- Highest projected prevalence of COPD & total screening coverage and service penetration: **INR 163.6 Crores**

Recommendations

- The present study demonstrates that active screening for early identification and treatment of COPD (SWAAS program) offers a cost-saving alternative to the current passive approach.
- While the initial financial outlay for the SWAAS program appears manageable, ensuring its long-term sustainability requires strategic planning and resource mobilization.
- Exploring avenues for interdepartmental collaboration, innovative financing mechanisms will be critical for the program's continued success.

Recent developments

- More COPD clinics (SWAAS) will be opened in public sector hospitals in 2024.
- Steps have been taken for opening the second State COPD Centre at the Chest Diseases Hospital in Thrissur this year, which will have a pulmonary rehabilitation centre for patients suffering from respiratory illnesses and a training centre for health-care workers.

References

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4. Mirza S, Clay RD, Koslow MA, Scanlon PD. COPD guidelines: a review of the 2018 GOLD report. InMayo Clinic Proceedings 2018 Oct 1 (Vol. 93, No. 10, pp. 1488-1502).