Cost-effectiveness analysis of household contact tracing with 3 months of weekly rifapentine and isoniazid (3HP) preventive therapy for tuberculosis prevention in Nepal

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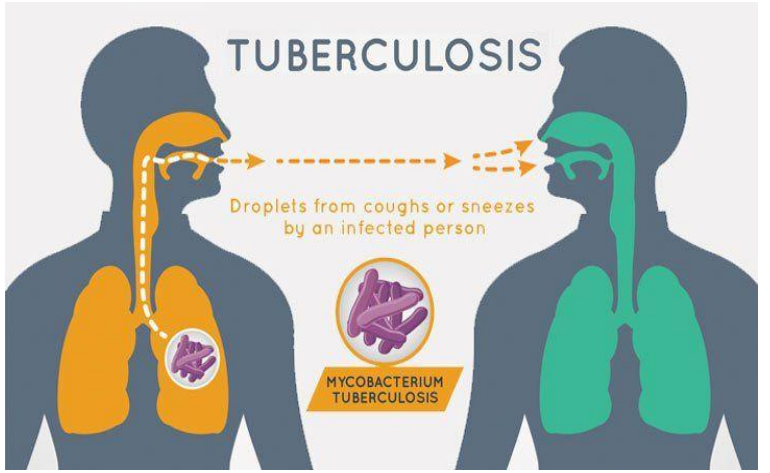
Background

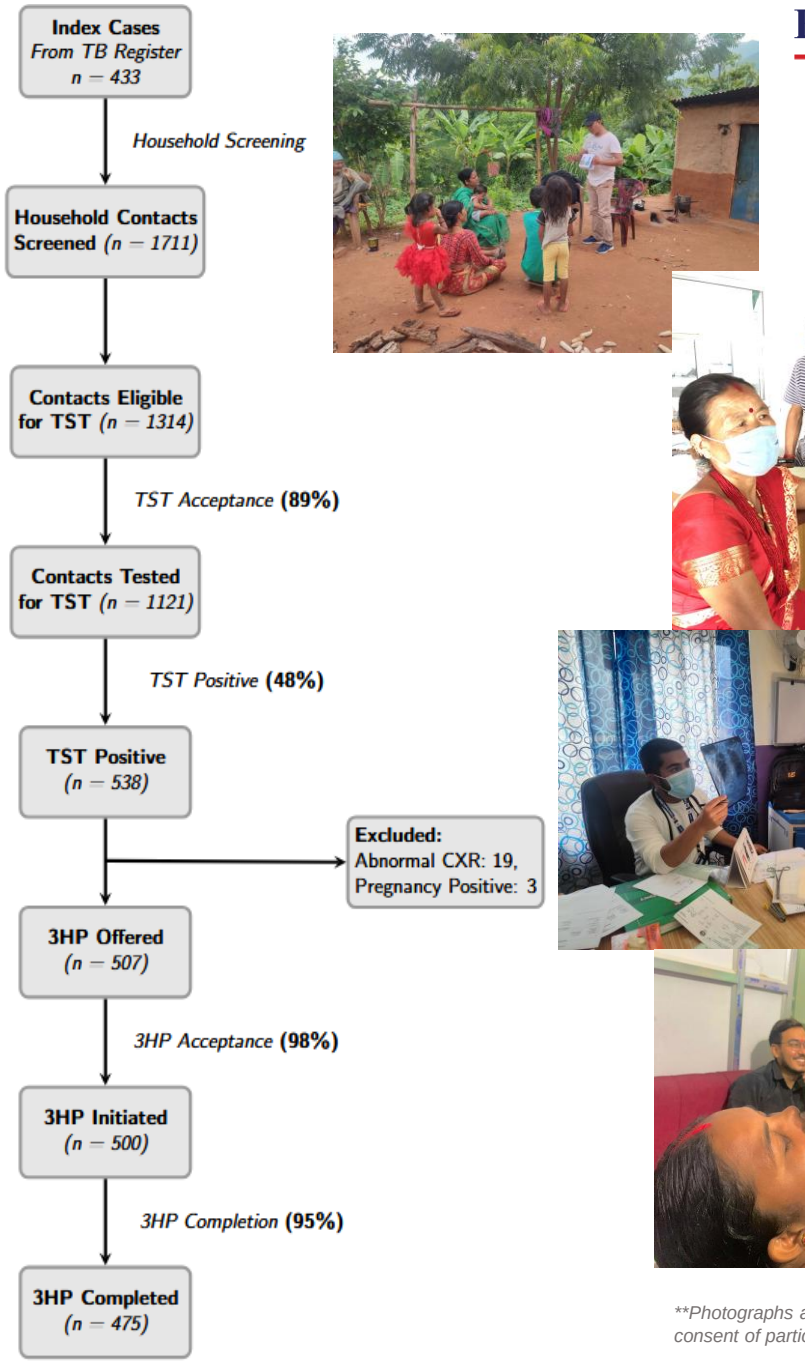


- Tuberculosis (TB) remains the leading cause of death, with 1.25 million deaths in 2023
- Household contact persons of people living with TB face high infection risk
- Up to one-third of the world's population is estimated to have latent TB infection (LTBI)
- Preventive therapy is essential, but coverage remains <25% in high-burden countries

Objective → To estimate the costs and cost-effectiveness of household contact tracing with 3HP regimen in Pyuthan and Chitwan districts of Nepal.

Background – Pilot implementation

- Birat Nepal Medical Trust (BNMT), had piloted the implementation of the WHO recommended 3 months of weekly rifapentine and isoniazid (3HP) therapy in two districts (Pyuthan and Chitwan).
- 1,711 household contact persons were screened for active TB and TB infection.
- Demonstrated feasibility and high acceptance and completion in both rural and urban settings.



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***Photographs are included with the informed consent of participants.*

Methodology I

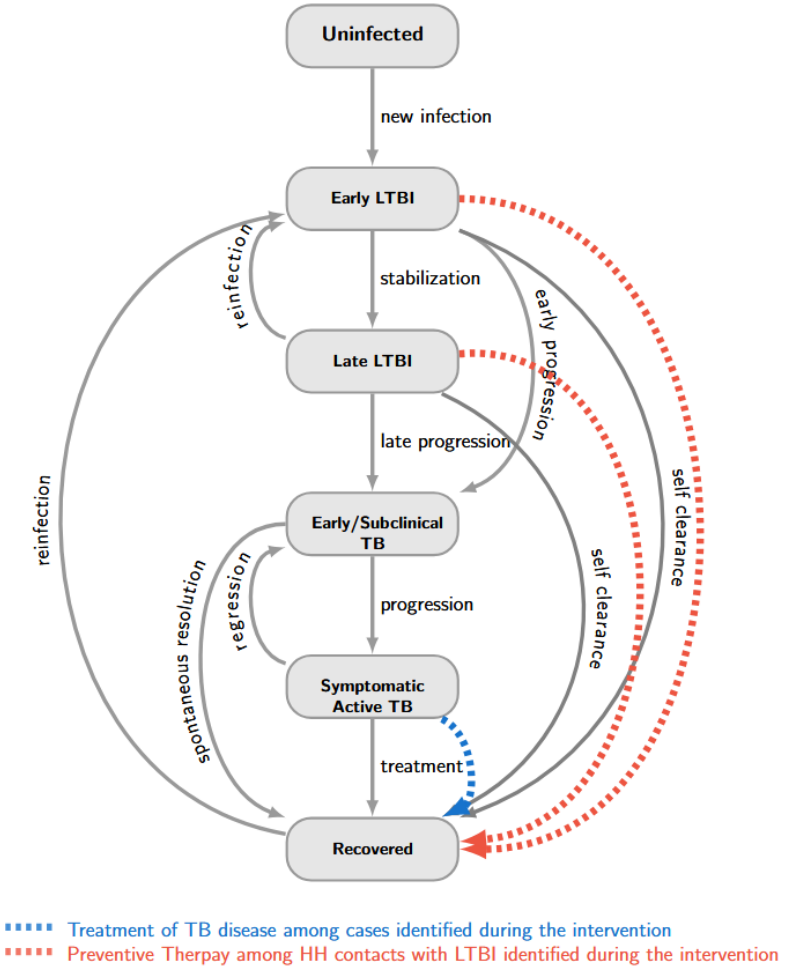
The cost of implementation was calculated using an ingredient-based approach and reported separately for two districts.

We categorized the costs into following categories:

a) Drug and test procurement costs
b) Field implementation costs including screening of household contacts, administering tuberculin skin test (TST), participant reimbursement and healthcare worker salaries
c) Estimated cost of TB diagnosis and treatment

Methodology II

- District-specific deterministic models of TB transmission and epidemiology
- Calibrated to district-specific TB incidence, prevalence, mortality and annual decline in TB incidence
- Estimated total number of TB episodes and deaths averted by the intervention during 2023-2042
- Primary outcome: Incremental cost-effectiveness of intervention (compared to no-intervention) from a health systems' perspective
- Cost per disability-adjusted life-years (DALY) averted, expressed in 2022 US$
- Both deterministic and probabilistic sensitivity analysis was performed



Results I

a) Estimated costs of household contact 3HP intervention

- Based on the analysis, the total test and drug procurement cost was estimated to be $7,522 in Chitwan and $4,116 in Pyuthan district.

- Cost associated with field implementation was $61,637 and $45,308 in Chitwan and Pyuthan district, respectively.

Results II

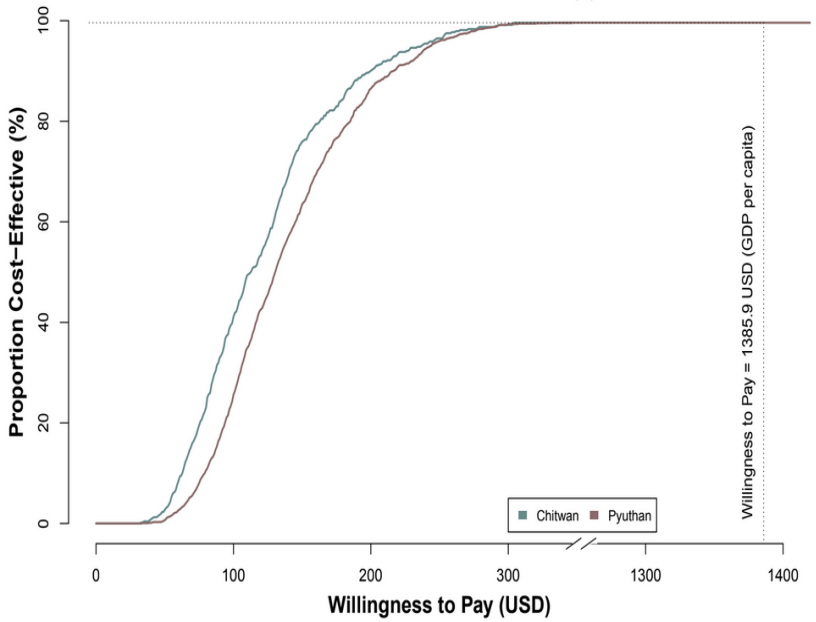
b) Cost-effectiveness of 3HP intervention

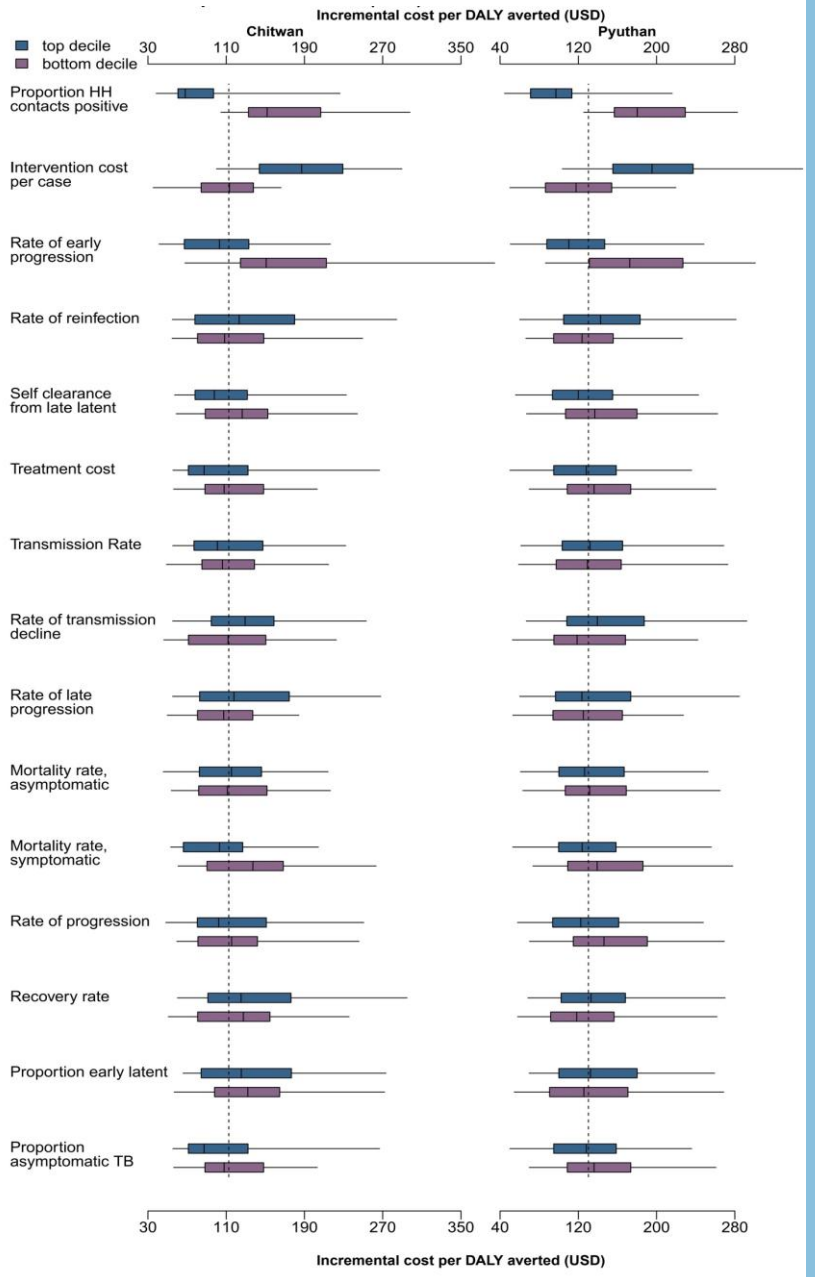
	Costs in 2022 figures (95% UI)			Impact (95% UI)			Cost-effectiveness (95% UI)
	Total cost of intervention	Estimated future cost savings (associated with TB treatment)	Net cost	TB cases prevented	TB deaths averted	Discounted estimated DALYs averted	Cost per DALYs averted
Chitwan	$69,159 (52,718 – 112,480)	$22,158 (14,597 – 29,432)	$47,001 (38,121 – 83,048)	96 (63 – 130)	15 (9 – 24)	397 (249 - 587)	$115 (56 – 242)
Pyuthan	$46,336 (39,830 – 75,321)	$13,652 (8959 – 18,839)	$35,772 (30,869 – 56,480)	59 (38 – 84)	9 (5 – 14)	233 (143 - 354)	$149 (81 – 288)
Combined	$118,583 (92,546 – 187,799)	$35,810 (23,557 – 48,271)	$82,773 (68,989 – 139,528)	155 (101 – 214)	24 (13 – 38)	631 (393 - 942)	$132 (69 – 265)

Sensitivity analysis

- **Most influential parameter:** Proportion of active TB among household contact person and overall unit cost of the intervention per person treated.

- 100% of the simulations were cost-effectiveness at threshold of 1,385 USD (per capita GDP of Nepal in 2022)





Conclusion

- 3HP-based preventive therapy among household contact persons of people living with TB can be implemented with high acceptance and completion rates in urban and rural settings in Nepal.
- Implementing 3HP with the existing healthcare structure is cost-effective, though differences in district-level costs imply the need for context-specific planning.
- Implementation costs are the major drivers of total expenditure suggesting decentralised, locally adapted, cost-efficient delivery strategies.

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TRAC Tuberculosis Research Advancement Center JHU

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