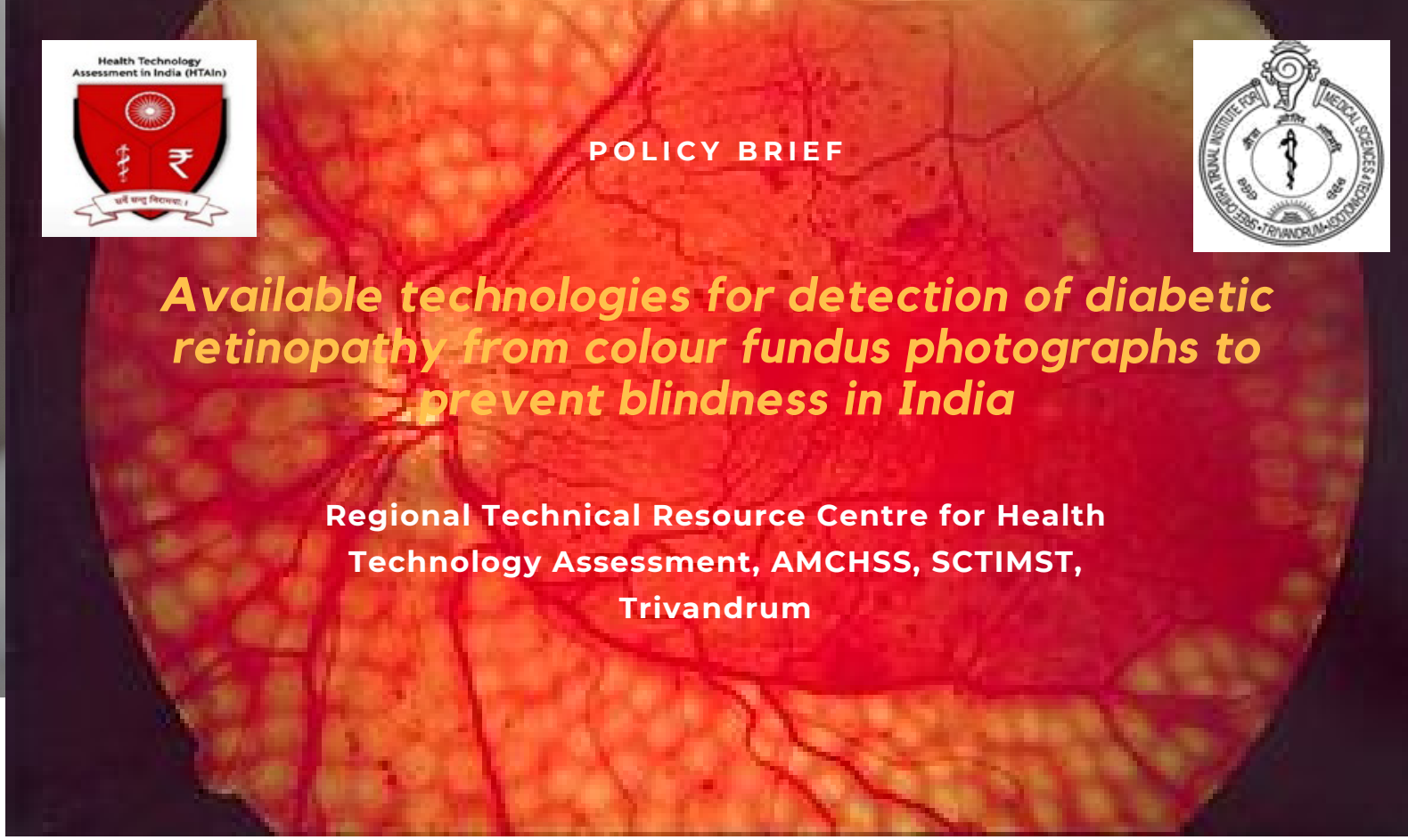

POLICY BRIEF

Available technologies for detection of diabetic retinopathy from colour fundus photographs to prevent blindness in India

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Summary

A Health Technology Assessment was conducted to establish the cost-effectiveness of diabetic retinopathy screening of people with diabetes using tele-screening (retinal images/ colour fundus photographs) compared to non-screening strategies. A budget impact analysis was also conducted to evaluate the overall costs of implementing systematic teleophthalmology-based screening for diabetic retinopathy to the whole state.

Tele-screening for diabetic retinopathy using fundus photography was found to be cost-saving from the health system perspective and cost-effective from the societal perspective. However, considerable out-of-pocket expenditure and loss of labour associated with screening were pointed out by the study.

The incremental cost-effectiveness ratio in the health system perspective was highly influenced by treatment uptake and the cost of screening. The budget impact analysis showed that scaling up the program to all Family Health Centres (FHCs) in Kerala will increase the burden by 16 crore rupees on the exchequer although the net impact will be saving around 8 crore rupees by reducing the number of patients requiring expensive management in late stages.

Recommendations

In states like Kerala, which has a robust primary healthcare infrastructure with functioning NCD clinics, the inclusion of the tele-screening model into the diabetic retinopathy care pathway is recommended as it is beneficial to the patient and the health system. However, ensuring that district-level hospitals have the capacity to absorb the patient yield from screening who require specialized ophthalmic care is important.

Background

The state government of Kerala is pressing forward to achieve universal health coverage and address the SDG on health access. The state has a high prevalence of diabetes. A recent report from Kerala suggests that one in five of the Kerala adult population has diabetes. The prevalence of diabetes mellitus in India vary from 18-34%, and Diabetic Retinopathy (DR) is a common microvascular complication of diabetes mellitus. Diagnosis of diabetic retinopathy in the early stages can have a significant effect on its prognosis. Therefore, there is an urgent need to tackle the complications of diabetes.

The state government launched the Aardram Mission in 2017 to transform the public healthcare system to achieve the SDGs in phases with short-term goals on building infrastructure and quality care services. Evidence from across the world has shown that systematic DR screening has been effective in reducing blindness. In Kerala, the transformation of primary care through the Aardram Mission with a focus on NCDs provides the backdrop to implementing a DR care pathway attached to the established NCD clinics. (Fig.1) A Markov and decision tree model was used to simulate and analyze the screening process. (Fig. 2a)

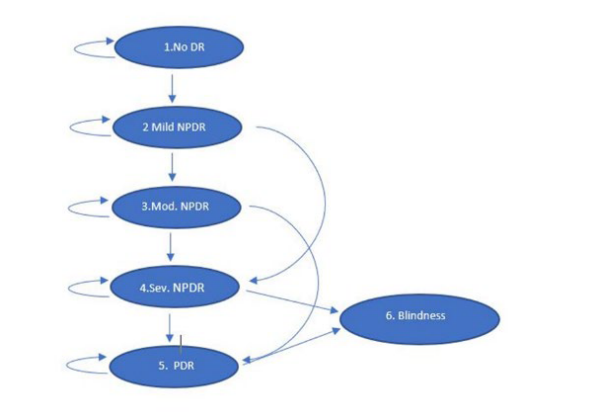

Figure 2a: Transition stages in a Markov Model

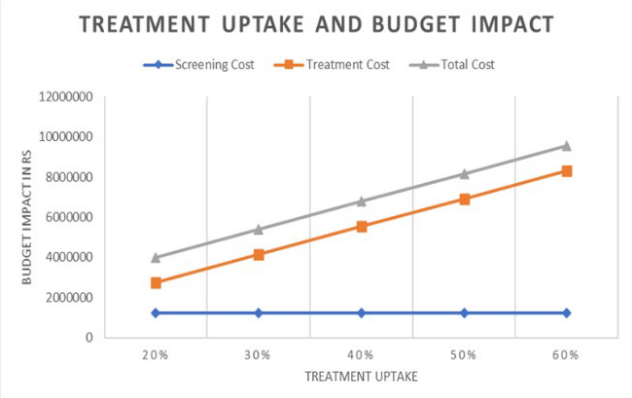

Figure 2b: Treatment uptake and budget impact

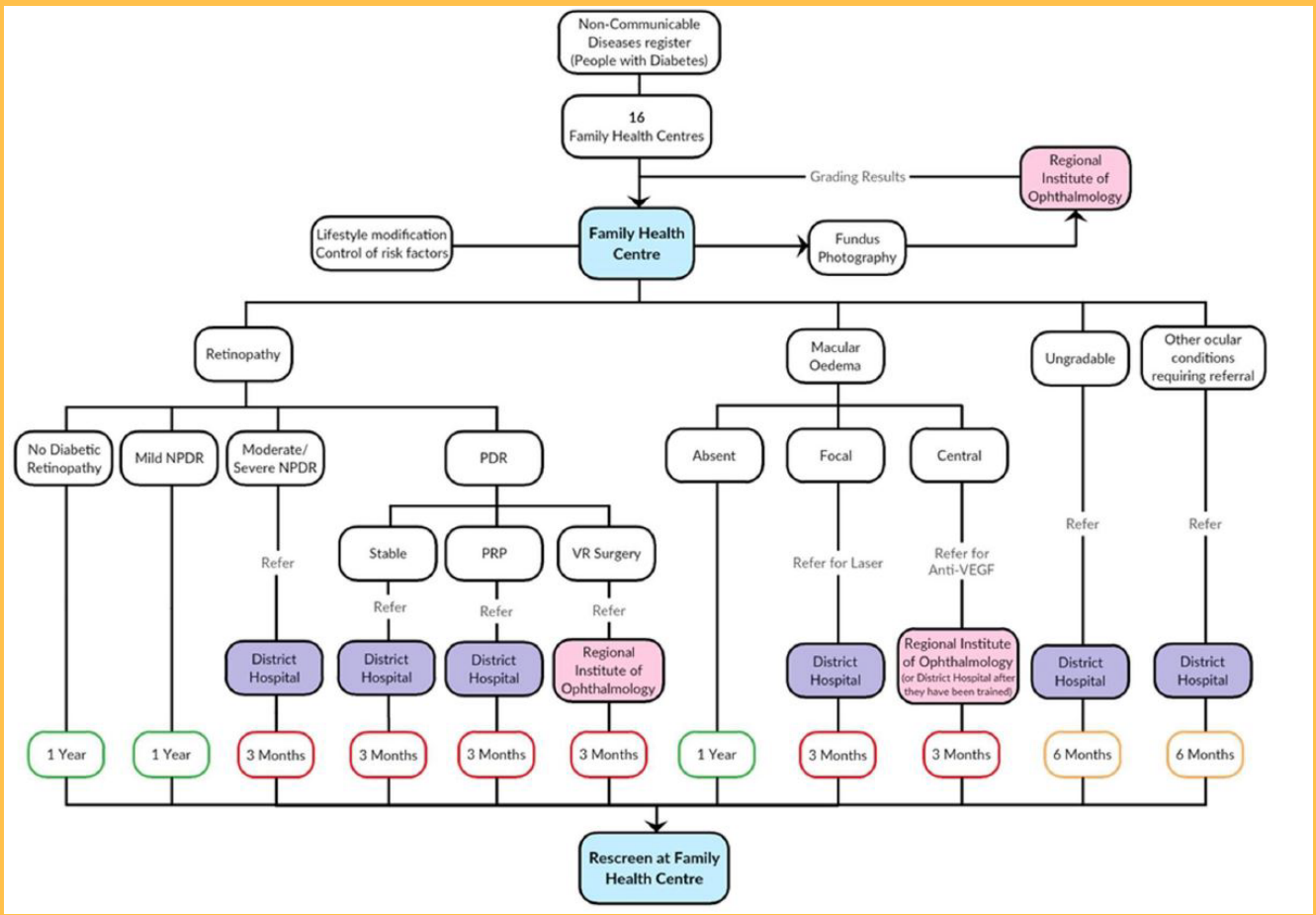

Figure 1: Diabetic retinopathy screening programme in Kerala

Findings

Tele-screening for DR using fundus photography is cost-saving (ICER -717) from a health system perspective and cost-effective from a societal perspective. (Fig.2b) However, the study pointed to considerable amounts of out-of-pocket expenditure and loss of labour associated with screening.

On doing one-way sensitivity analysis, ICER in health system perspective was highly influenced by treatment uptake and cost of screening; and societal perspective ICER by utility values of late stages of DR.

The budget impact analysis showed that scaling up the program to all Family Health Centers (FHCs) in Kerala will increase the burden by 16 crore rupees on the exchequer. (Table 4) However, the net impact will be saving around eight crore rupees by reducing the number of patients requiring expensive management in the late stages.

Table 1: Treatment Uptake and Budget Impact

Treatment Uptake	Screening Cost (Rs)	Treatment Cost (Rs)	Total Cost/FHC(Rs)	Annual Cost/FHC(Rs)	Annual Cost for Kerala(Rs)
20%	12,42,165	27,72,099	40,14,264	8,02,852	13,64,84,976
30%	12,42,165	41,58,149	54,00,314	10,80,062	18,36,10,676
40%	12,42,165	55,44,198	67,86,364	13,57,272	23,07,36,376
50%	12,42,165	69,30,248	81,72,413	16,34,482	27,78,62,042
60%	12,42,165	83,16,298	95,58,463	19,11,692	32,49,87,742

Conclusion

- **The tele-screening model for diabetic retinopathy by fundus photography is a cost-effective and cost-saving tool compared to the current scenario from a health system perspective.**
- **It is cost-effective relative to the threshold of Indian GDP per capita, even from a societal perspective.**
- **The indirect expenses such as travel and wage loss cost more than the expenses of screening, hence streamlining of screening and reimbursement of travel expenses of patients need to be considered.**
- **As per the current model, the effectiveness of screening is dependent on the proportion of patients in the PDR stage receiving PRP/Vitreoretinal surgery. Hence, ensuring that district/subdistrict level referral hospitals can absorb the additional caseload is vital to its success.**