



The cost-effectiveness of hepatitis C virus screening and treatment strategies among recently arrived migrants from non-Western countries for the Netherlands

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Background

- Globally, an estimated 71 million people have chronic hepatitis C virus infection [1]
- Among chronically infected individuals, 15% to 30% will develop liver-related diseases over decades [1]
- In general, liver cirrhosis and HCC are primarily attributed to chronic HCV or hepatitis B virus (HBV) infection [2]
- HCV prevalence in the Netherlands is between 0.1% and 0.4% in the general population [3]
- HCV prevalence of 0.7-2.3% was estimated among first-generation migrants in the Netherlands [4]
- HCV prevalence is region-specific, with e.g. relatively high rates in the Middle-East. The Arabic spring eventually led to a wave of violence and war, resulting in a high influx of migrants from the Middle-East into Europe
- Treatment modalities for HCV have improved significantly since the introduction of new direct-acting antivirals (DAAs)

Objectives

- We aimed to assess the cost-effectiveness and budget impact of HCV-screening, monitoring and treatment strategies among recently arrived migrants from Middle-Eastern countries in the Netherlands.

Methods

Model

- The health effects and costs of HCV screening, monitoring and treatment were estimated from the healthcare perspective using a Markov model
- Two cohorts of migrants were defined: migrants from countries Middle-East (50,000) and migrants from HCV-endemic regions (25,000).
- Three HCV screening and treatment strategies were evaluated:
 - (i) no screening strategy
 - (ii) monitoring strategy: in which migrants are screened for HCV and HCV-positive individuals without liver fibrosis (F0) are subsequently monitored and patients with liver fibrosis or cirrhosis (F1-F4) are treated
 - (iii) Early treatment strategy in which, after screening, all HCV-positive individuals (F0-F4) are treated

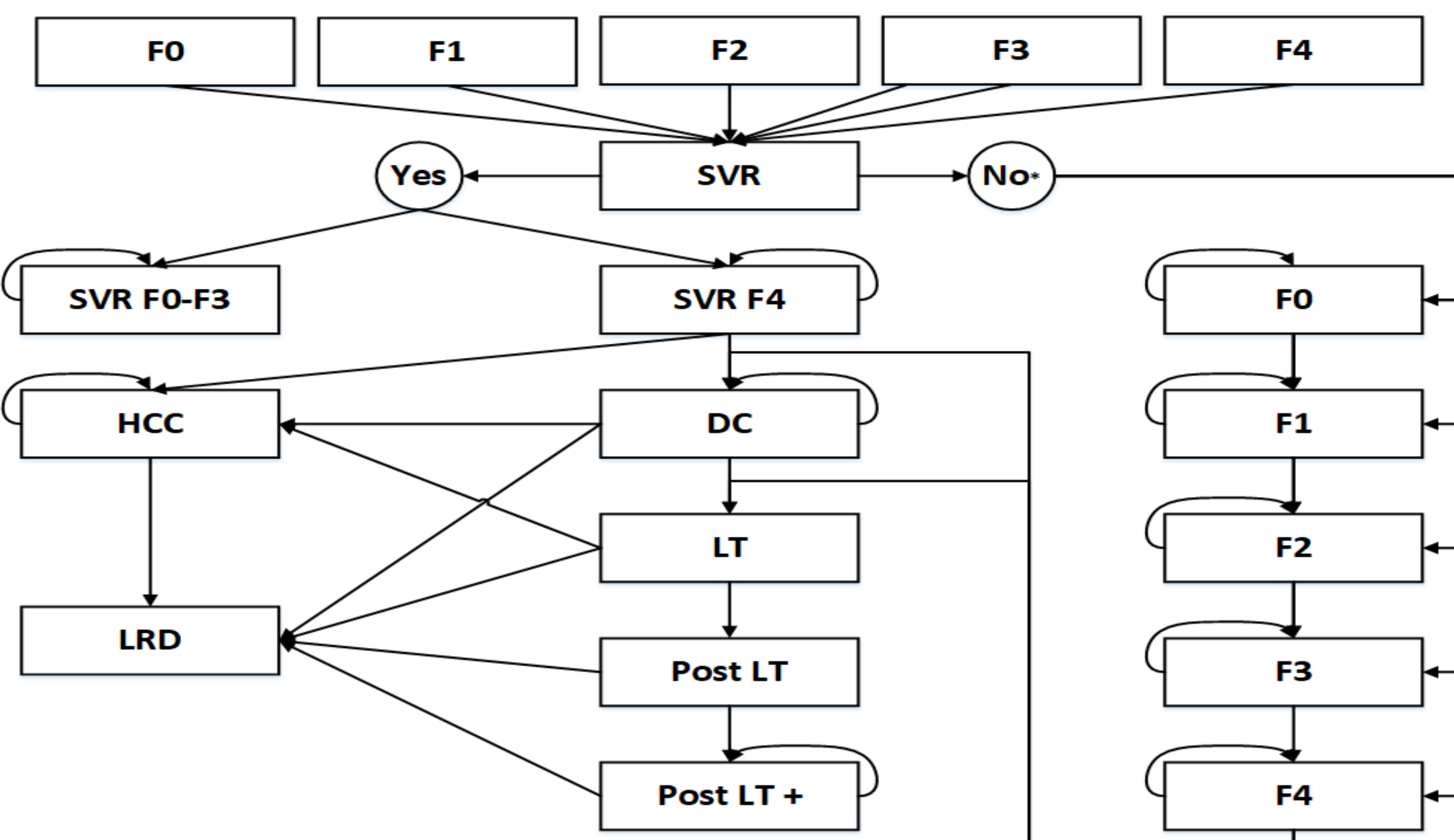


Figure 1: Markov model for hepatitis C virus

METAVIR score: F0,F1,F2,F3,F4; SVR: Sustained Virologic Response; HCC: hepatocellular carcinoma; DC: decompensated cirrhosis; LT: liver transplantation; LRD: liver-related death. *In case of treatment failure, patients will be in the same METAVIR state after the treatment.

Epidemiology of HCV among Middle Eastern migrants in the Netherlands

- The HCV prevalence among migrants from Middle East countries used in this study is estimated to be 1.5% based on the average HCV prevalence among these migrants.
- HCV-endemic countries in the Middle East are defined as countries with prevalence $\geq 2\%$

Table 1: Country of origin with corresponding percentage of total recently arrived migrants in the Netherlands in 2017 and HCV prevalence

Country	Percentage of recently arrived migrants in the Netherlands	HCV prevalence
Syria	51%	1%
Eritrea	13%	1.9%
Iraq	4.3%	3.2%
Morocco	2.6%	7.7%
Algeria	2.4%	1.8%

Screening programme

- HCV serological test, which determines the presence of antibodies against HCV
- PCR test, which determines the presence of viral RNA
- fibrosan test to determine the METAVIR score (F0-F4)

Discussion & conclusions

Strength

- One of the first studies evaluating monitoring and early treatment strategies
- Evaluating an unique monitoring strategy whereby overtreatment of F0 patients would be avoided
- Monitoring strategy gives time for drug prices to further drop after the expiring patents.

Conclusions

- HCV screening in combination with monitoring of F0 patients among migrants from Middle Eastern countries and HCV-endemic countries represents a cost-effective intervention in the Netherlands.
- Combination of HCV screening with an early treatment strategy could be considered among patients with anxiety symptoms due to monitoring instead of treatment.

Results

Table 2: Incremental cost-effectiveness of different strategies of HCV screening and treatment among migrants in the Netherlands

Cohort	Strategy	Total cost	Incremental cost	QALYs	QALYs gained	ICER (€/QALY gained)	Budget impact
Migrants from Middle Eastern countries (50,000 migrants, HCV prevalence 1.5%)	No screening	€ 2,476,820		1,934			
	Monitoring*	€ 7,215,229	€ 4,387,849	4,723	2,789	1,699	€ 5,022,095
	Early treatment**	€ 34,584,711	€ 27,369,482	4,723	0	∞	€ 28,338,403
Migrants from HCV-endemic countries (25,000 migrants, HCV prevalence 2%)	No screening	€ 1,651,213		1,289			
	Monitoring*	€ 4,704,403	€ 3,053,189	3,149	1,860	1,642	€ 3,242,313
	Early treatment**	€ 22,950,724	€ 18,246,321	3,149	0	∞	€ 18,892,269

*Monitoring strategy: screening cohort + monitoring F0 patients + treatment F1-F4 patients

** Treatment strategy: screening cohort + treatment F0-F4 patients

- The monitoring strategy of both cohorts is cost-effective.
- Early treatment strategy compared to the monitoring strategy of both cohorts is not cost-effective

Sensitivity analyses

- One-way sensitivity analysis showed that the estimated distribution of METAVIR stages after the screening are the most sensitive parameters in both cohorts by comparing monitoring strategy to no screening.

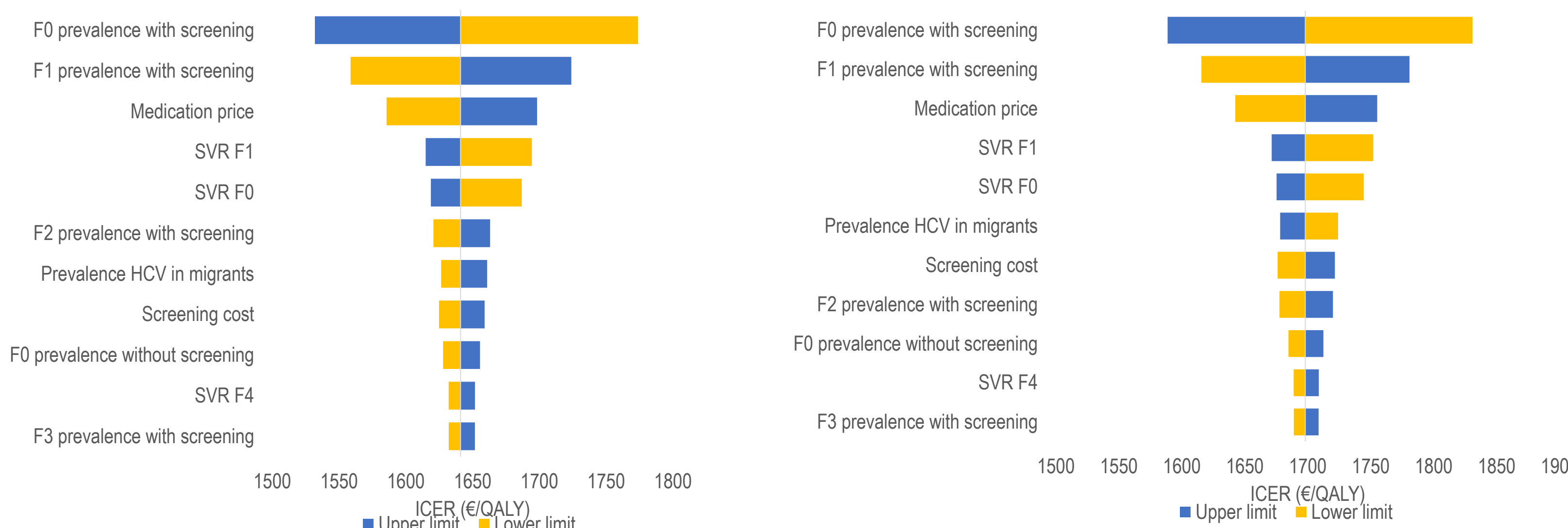


Figure 2: One-way sensitivity analysis for the strategy monitoring in the cohort of 50,000 migrants from Middle Eastern countries

Figure 3: One-way sensitivity analysis for the strategy monitoring in the cohort of 25,000 migrants from endemic countries

- Analysis to estimate the ICER of the early treatment strategy vs. monitoring strategy with an estimated QALY loss of 0.02 because of anxiety due to monitoring
- Threshold analysis to estimate the possible QALY loss with €20,000/QALY and €50,000/QALY

Table 3: Incremental cost-effectiveness ratio of different QALY loss possibilities among migrants in the Netherlands

Cohort	Analysis	QALY loss	ICER (€/QALY gained)
Recently arrived migrants from Middle Eastern countries (50,000) (HCV prevalence 1.5%)	Assumed QALY loss	0.02	67,578
	Threshold analysis	0.07	20,000
	Threshold analysis	0.0275	50,000
Recently arrived migrants from HCV-endemic countries (25,000) (HCV prevalence 2%)	Assumed QALY loss	0.02	67,511
	Threshold analysis	0.07	20,000
	Threshold analysis	0.0275	50,000

- The probabilistic analysis (PSA) indicates that in all simulations the ICER of the strategy monitoring compared to no screening was below the informal Dutch WTP-threshold of €20,000 per QALY gained

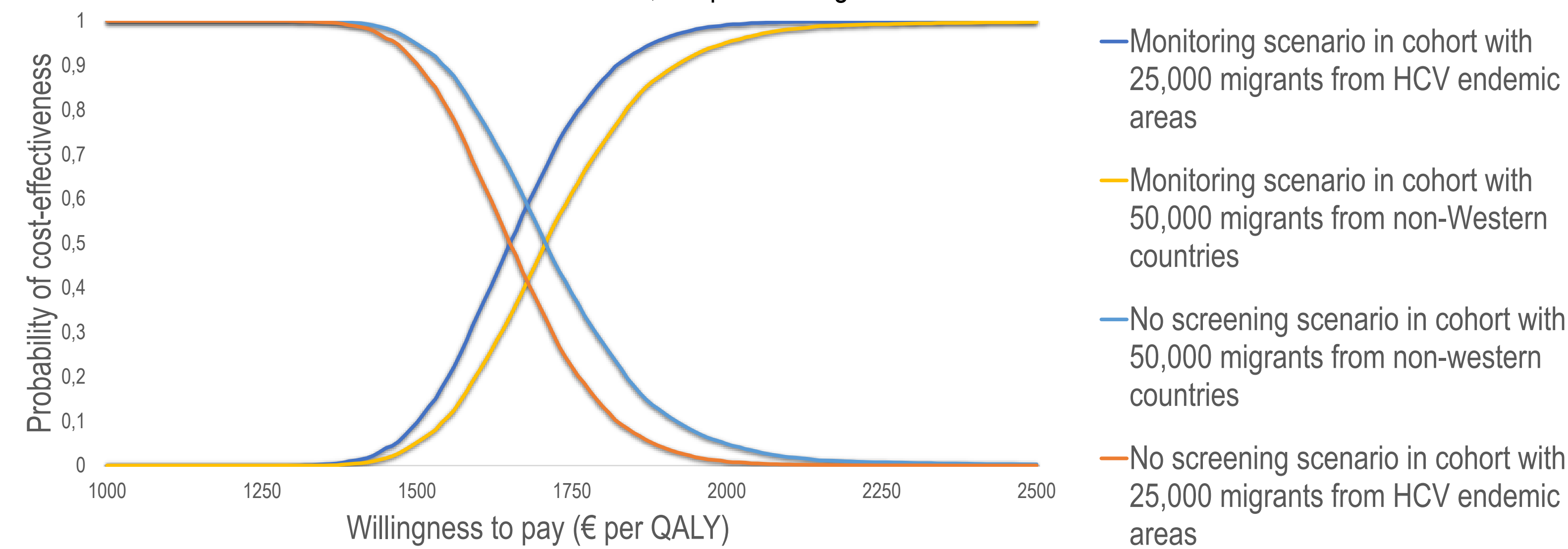


Figure 4: Cost-effectiveness acceptability curve

Limitations

- We did not include retreatment in our analysis and the long-term effects of DAA treatment are unknown. In practice, there will be retreatment after failed treatment.
- The risk of re-infection and transmission is not covered in this study
- The possible overlap between different HCV risk groups is disregarded. Although very limited.
- We did not include lost to follow-up during monitoring strategy.

