EPH158

Using Population Data to Develop Precision-Based Approaches to Hepatitis C Prevention

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INTRODUCTION

Hepatitis C is an inflammation of the liver caused by the hepatitis C virus (HCV). This is a bloodborne virus, meaning that most infections occur through exposure to blood. This can happen through sharing needles or syringes, or from unsafe medical procedures such as blood transfusions with unscreened blood products [1].

HCV can cause both acute and chronic illnesses. Chronic HCV can result in serious, life-threatening health problems such as cirrhosis and liver cancer. People with chronic HCV are often asymptomatic. When symptoms appear, they are often a sign of advanced liver disease [2]. Therefore, it is extremely important that HCV is diagnosed and treated as early as possible. However, of the 2,000,000 to 3,500,000 people living with HCV in the US, approximately 75% do not know they have the disease and will be asymptomatic in their first decade of carrying HCV. Additionally, the economic burden of chronic HCV is estimated to be around $10 billion annually in the US [3]. Hence, this research aimed to estimate the costs and savings of using data to better identify and screen at-risk populations for HCV in the US.

METHODS

The Centers for Disease Control and Prevention (CDC) reported 70,000 new cases of HCV in 2021 meaning there is an implied crude secondary infection rate of 0.02 to 0.04 secondary infections per person per year in the US. We used published sources and clinical advice to inform a population infection risk of 0.01 for the general population, 0.2 for a targeted population using granular datasets and 0.6 for people who inject drugs (PWID). The cost of screening is $140.

The Socially Determined dataset and visualization was used to examine community-level social risk across seven domains (economic climate, food landscape, housing environment, transportation network, health literacy, digital landscape and social connectedness) in specific locales of higher risk of undiagnosed HCV (see Figures 1 and 2) to understand the environment around these individuals. The social risk scores are calculated at a geospatial unit represented by a hexagon, where each hexagon is 200 to 400 meters in diameter depending on population density. We focused this analysis on Louisiana and Florida, which have similar rates of reported acute infection (6.7 and 7.1 per 100,000), but different rates of reported deaths associated with HCV (5.34 and 2.89).

Table 1: Model inputs

Parameter	Input	Source
Population prevalence	0.01	Tater et al (2020)
PWID prevalence	0.6	
Targeted approach prevalence	0.2	Clinical advice (2%)
Screening cost	$140	

Figure 1: Rates of HCV in the US, per 100,000 [4]

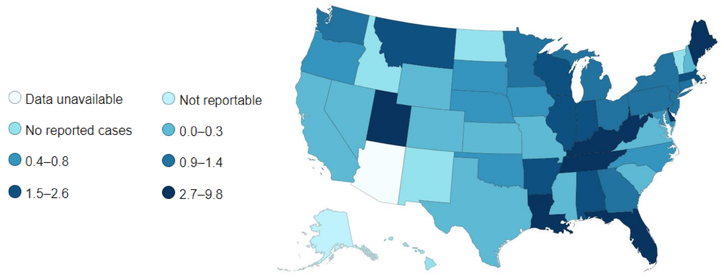
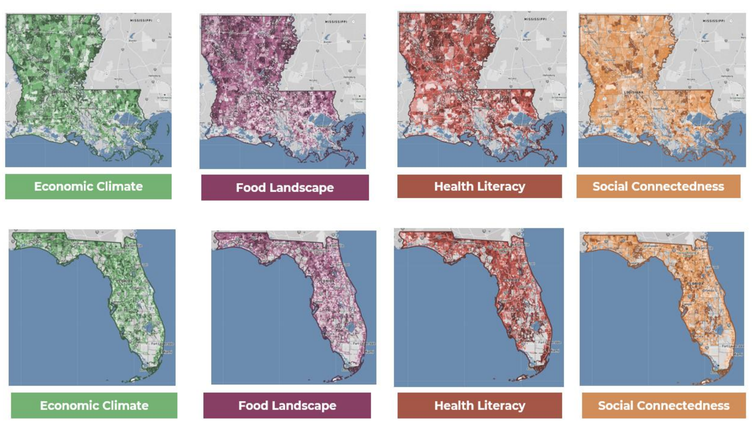


Figure 2: Hexagon-level risk visualization for the states of Louisiana and Florida



RESULTS

We used CDC data to estimate the number of people with HCV in both Florida and Louisiana. There are 21,469 expected cases of chronic HCV in Florida and 4,280 in Louisiana. As shown in Table 2, using a universal screening programme to identify these cases would cost $300m and $60m, respectively. Alternatively, using targeted data, a screening programme would cost $15m and $3m, respectively.

This would prevent 519 and 188 deaths associated with HCV in the first year, respectively. This would be at a cost of $29,000 per death avoided in Florida or $16,000 per death avoided in Louisiana. The costs per death avoided only include screening costs and do not include treatment costs.

Table 2: Model results

Population requiring screening	Florida	Louisiana
Universal screening	2,146,944	427,999
PWID screening	35,782	7,133
Targeted screening	107,347	21,400
Screening cost		
Universal screening	$300,572,168	$59,919,889
PWID screening	$5,009,536	$998,665
Targeted screening	$15,028,608	$2,995,994

DISCUSSION

The results demonstrate that targeted screening has the potential to be an effective method for screening for HCV in the US. PWID screening is the most cost-effective approach. However, PWID screening could fail to identify other at-risk populations that may be identified through more comprehensive analyses that include granular population level datasets, such as Socially Determined.

This analysis uses a clinically plausible estimate for the prevalence of HCV infection risk of 0.2 for the targeted population. Further research is required to evaluate the real-world effectiveness of precision-based approaches to public health initiatives.

CONCLUSION

Targeted screening programmes have previously been very challenging to implement. The use of granular social risk datasets can enable a more informed approach to better address HCV screening, education, and prevention.

REFERENCES

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