

# Food Insecurity Associated with Infection of Hepatitis C and B Viruses in the United States

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## Purpose

- The purpose of this study was to examine the possible correlation between food insecurity and HBV/HCV infection.

## Background

- HCV and HBV are viral liver disease that causes liver inflammation
- Food insecurity is defined as not having access to adequate food that nutritionally satisfies an individual
- HCV and HBV-infected populations are rising with 1 million and 1.2 million new cases per year, respectively
- Food insecurity (FI) is also growing, with an increase in the rates from 10.4% to 13.5% between 2021 and 2022
- Correlation between FI and HCV-HIV (Human immunodeficiency virus)
- Link between HBV/HCV and FI is unclear
- Injection drug use (IDU) is a primary risk factor for HCV and HBV infection.
- FI may prompt IDU
- IDU may serve as a linking factor between FI and HBV/HCV
- This study focuses on studying the correlation between FI, HCV, and provides an incentive to combat effects on the population

## Methods

- The data used for this study was derived from the National Health and Examination Survey (NHANES) 2015-2020
- The eligibility criteria were that respondents had to be adults over 20, have no missing values for HBV or HCV infection status, the primary outcomes, and have not received the HBV vaccine
- The total sample size was 9797.
- Primary predictor was food insecurity
- Several other confounding factors were included
- Primary outcome was HBV/HCV infection
- Statistical Analysis System (SAS) was utilized to code for the data analysis
- Predictors were tested with a chi-square test and also a logistic regression model

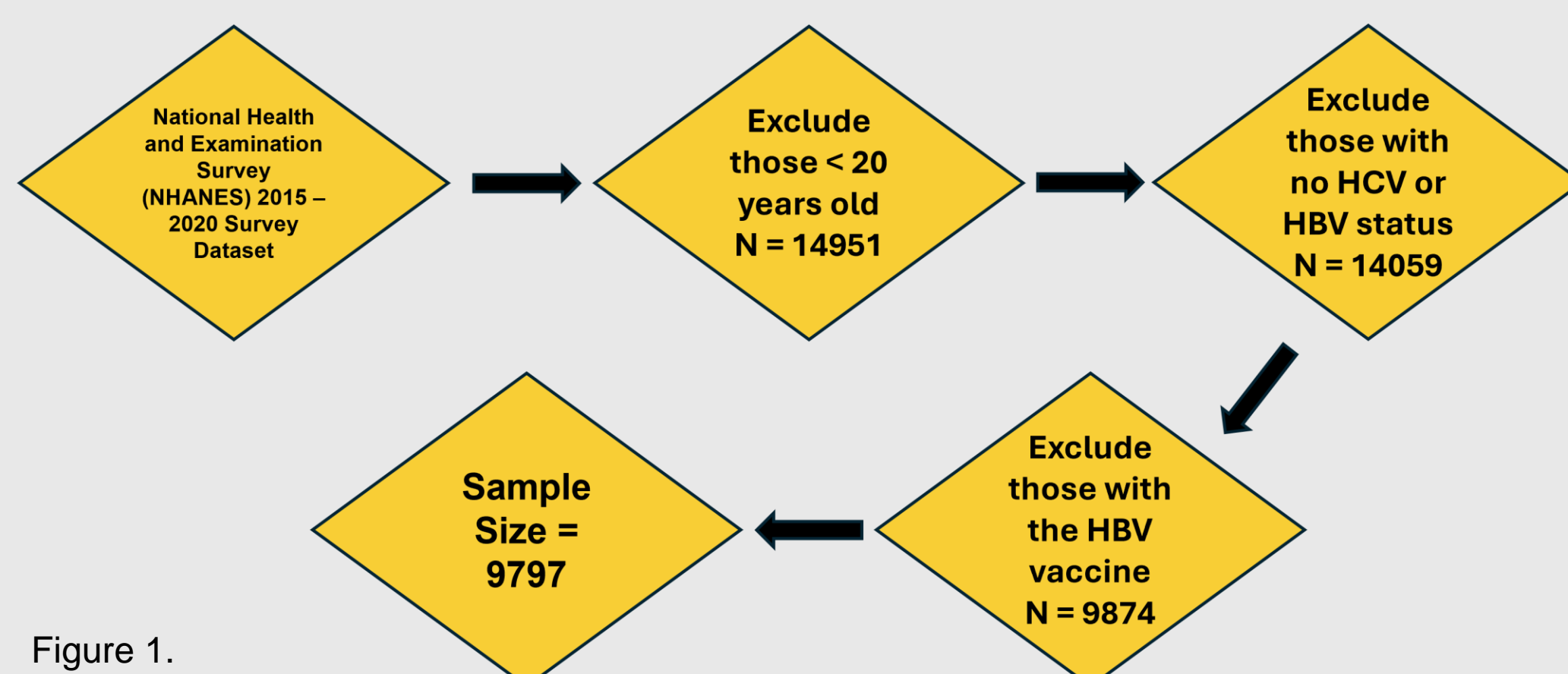


Figure 1.

## Results

Table 1. Multivariable Logistic Model Results

| Characteristic                        | Odds Ratio      | 95% Confidence Intervals | P-Values |
|---------------------------------------|-----------------|--------------------------|----------|
| <b>Food Security Status</b>           |                 |                          |          |
| Food Security                         | Reference Group |                          |          |
| Food Insecurity                       | 1.35            | 1.013 - 1.801            | 0.0406   |
| <b>Gender</b>                         |                 |                          |          |
| Female                                | Reference Group |                          |          |
| Male                                  | 1.62            | 1.238 - 2.106            | 0.0004   |
| <b>Age</b>                            |                 |                          |          |
| Young Adults                          | Reference Group |                          |          |
| Middle-Aged Adults                    | 2.65            | 1.731 - 4.057            | 0.0044   |
| Old Adults                            | 3.03            | 1.992 - 4.604            | <0.0001  |
| <b>Smoking Status</b>                 |                 |                          |          |
| Never                                 | Reference group |                          |          |
| Former                                | 1.82            | 1.322 - 2.506            | 0.8247   |
| Current                               | 3.11            | 2.277 - 4.359            | <0.0001  |
| <b>Family Income to Poverty Ratio</b> |                 |                          |          |
| Wealthy/Established                   | Reference Group |                          |          |
| Poor                                  | 1.926           | 1.365 - 2.717            | <0.0001  |
| Intermediate                          | 1.191           | 0.869 - 1.632            | 0.2434   |

Figure 2. Prevalence of Hepatitis B or C by Family Income Levels

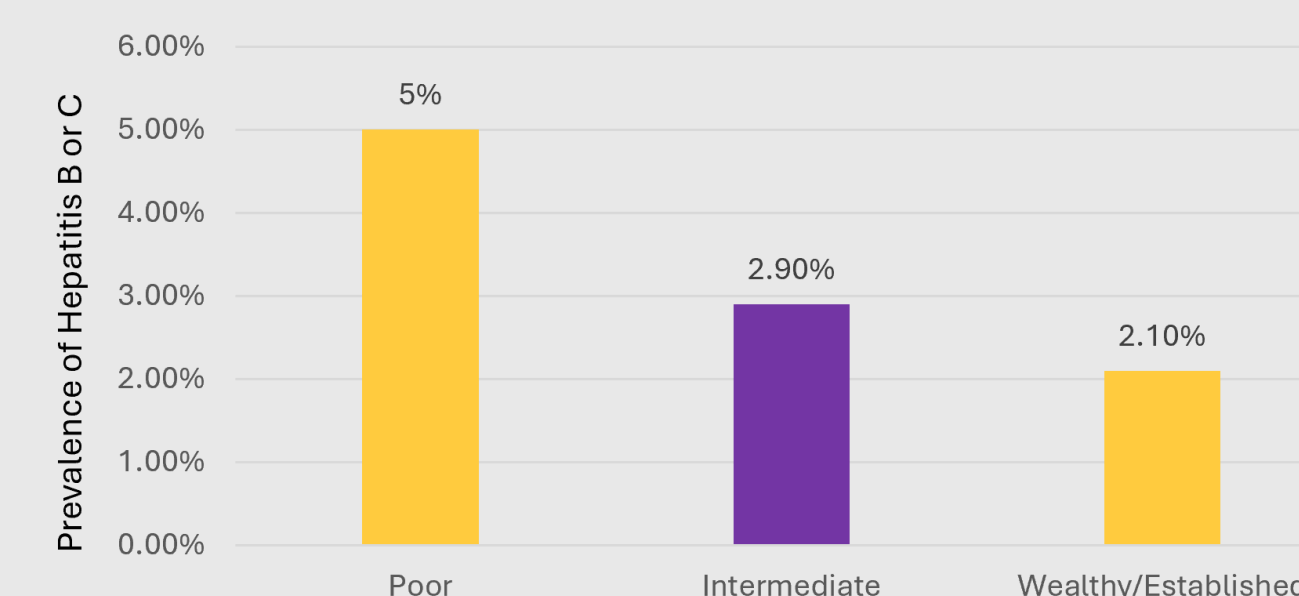


Figure 3. Prevalence of Hepatitis B or C by Gender

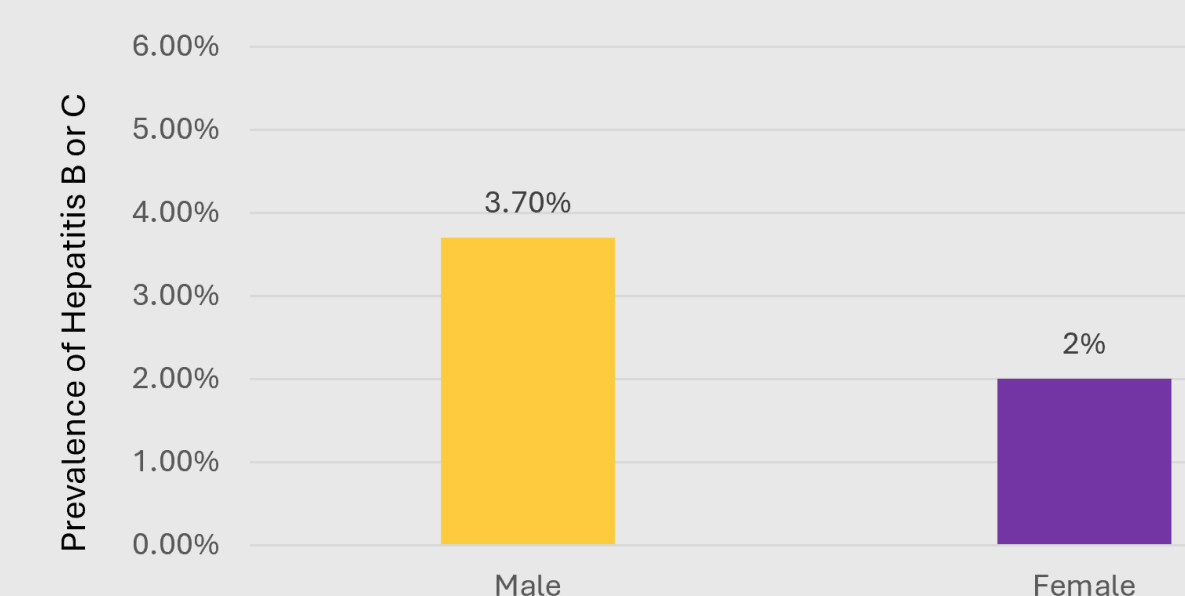


Figure 4. Prevalence of Hepatitis B or C by Age

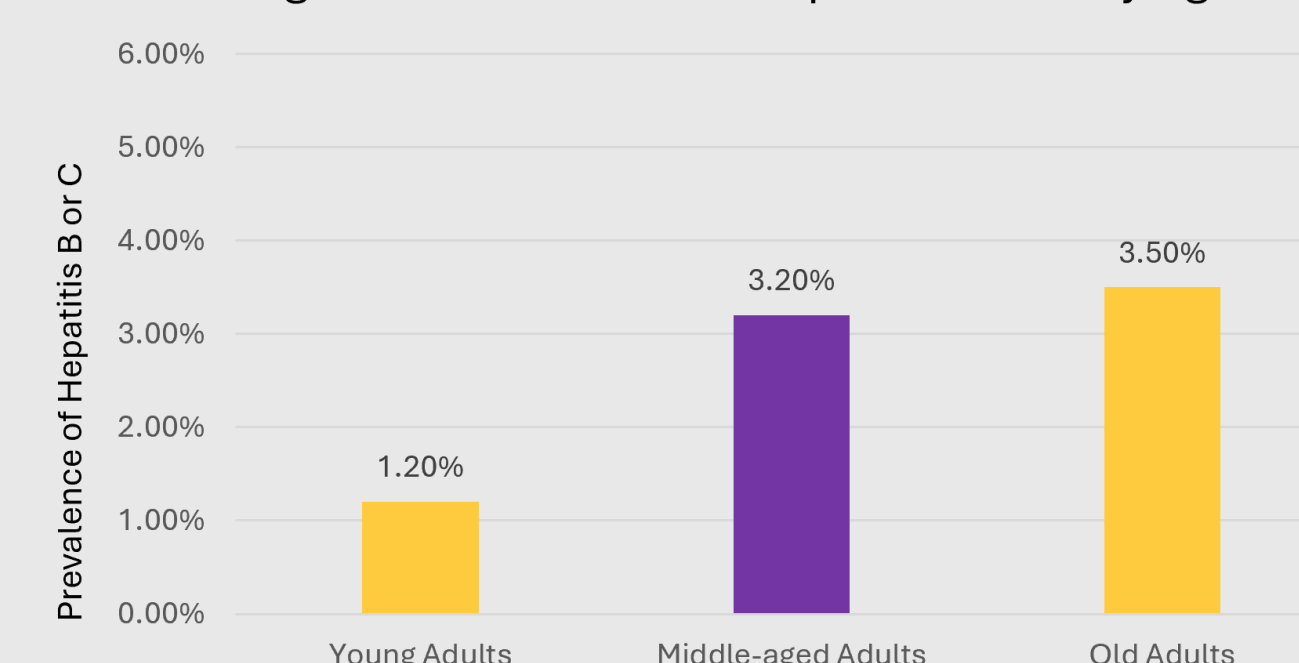


Figure 5. Prevalence of Hepatitis B or C by Smoking Status

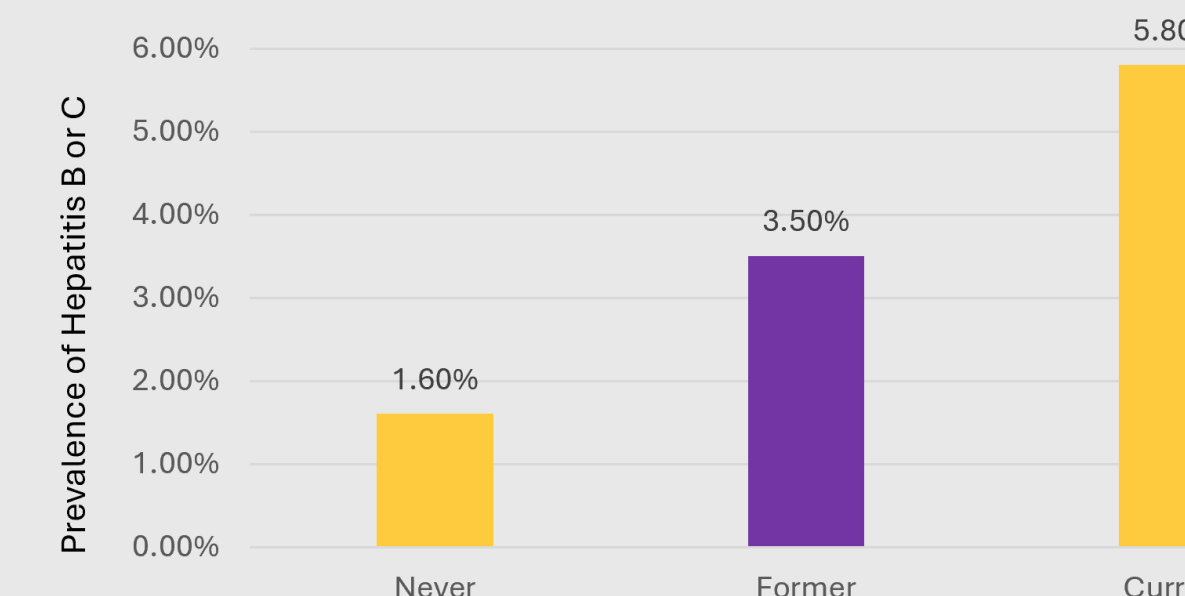
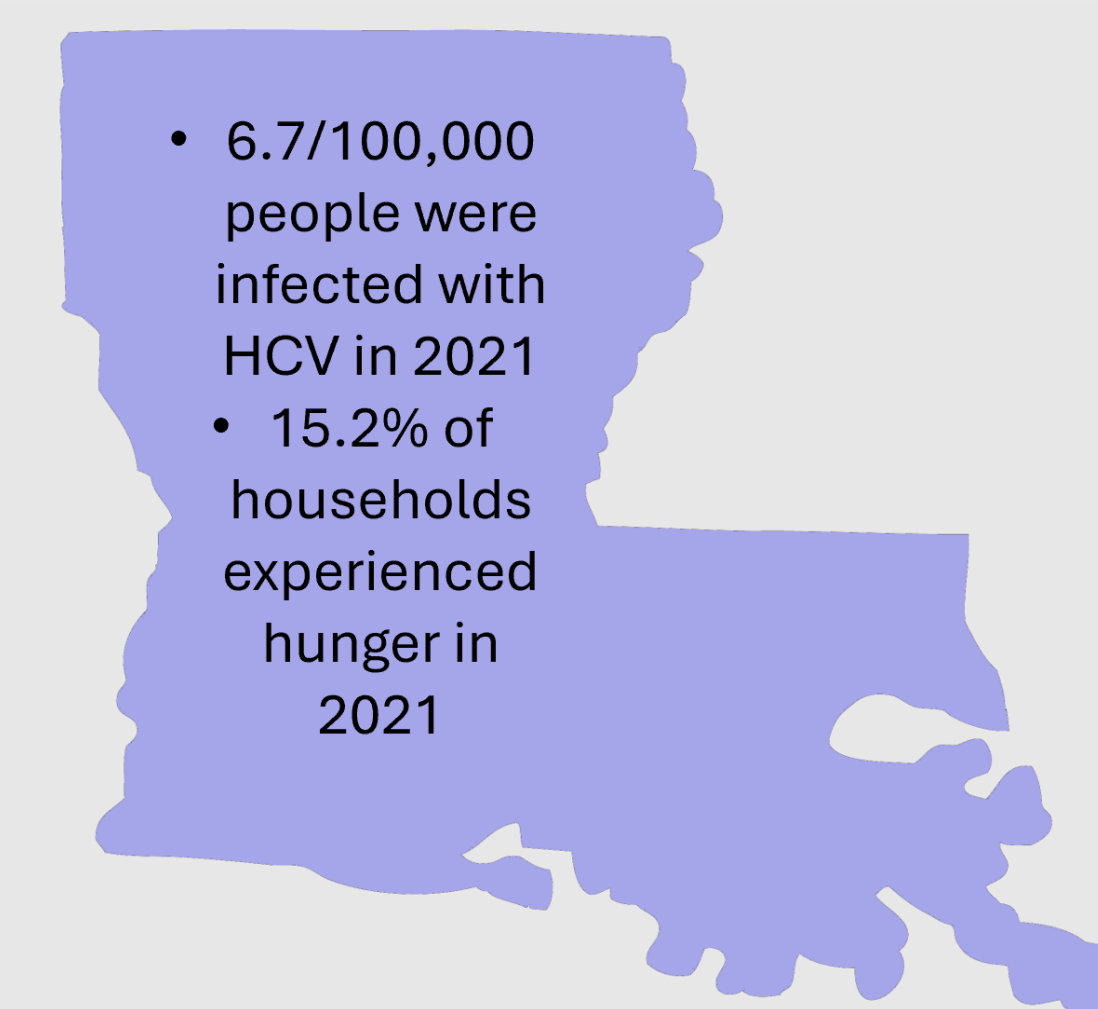


Figure 6. Prevalence of Hepatitis B or C by Food Security Status



## Conclusions

- The bivariate analysis showed that 5 factors (FI, gender, age, smoking status, and family income) were all significantly associated with HBV/HCV as the p-values were less than 0.05
- After adjusting for others in the logistic regression, these 5 factors remained statistically significant (p<0.05)
- Both results of univariate analyses and logistic regression indicate that food-insecure, males, older adults, current smokers, and poor individuals are more likely to develop HBV/HCV.
- Current smokers were more likely (OR=3.11, p<0.0001) to develop HBV/HCV than any never-smokers
- These implications signify the need to further research FI and HBV/HCV
- Other statistically significant predictor variables were gender, age, smoking status, and family income
- Adds to the scholarly conversation by addressing a group infected with a singular disease and associations with FI
- The results are also important as they provide new areas to be targeted to reduce HCV/HBV infection
- In the future, this study should be re-conducted with more predictor variables such as IDU and on a more extensive scale
- IDU could serve as the linking factor between FI and HBV/HCV so researching it further would be relevant



(CDC, 2023; Friend Committee on National Legislation, 2023)

## References

- Canadian Cancer Society. (n.d.). *Hepatitis B and C*. Retrieved July 1, 2024, from [https://cancer.ca/en/cancer-information/reduce-your-risk/get-vaccinated/hepatitis-b-and-c#:~:text=How%20do%20people%20get%20HBV,be%20spread%20through%20unprotected%20sex. CDC. \(2023, August 7\). Rates of reported cases of acute Hepatitis C virus infection, by state or jurisdiction — United States, 2021. \[https://www.cdc.gov/hepatitis/statistics/2021surveillance/hepatitis-c/figure-3.3.htm#:~:text=The%20state%20specific%20rates%20of,Louisiana%2C%20Florida%2C%20and%20Maine. Friends Committee on National Legislation. \\(2023, November 6\\). \\*Top 10 Hungriest States in the U.S.\\* Hake, M., Dewey, A., Engelhard, E., & Dawes, S. \\(2024\\). \\*May 2024 Map the Meal Gap 2024 A Report on County and Congressional District Food Insecurity and County Food Cost in the United States in 2022\\*. Mayo Clinic. \\(2023, August 23\\). \\*Hepatitis C\\*. <https://www.mayoclinic.org/diseases-conditions/hepatitis-c/symptoms-causes/syc-20354278> Strike, C., Rudzinski, K., Patterson, J., & Millson, M. \\(2012\\). Frequent food insecurity among injection drug users: Correlates and concerns. \\*BMC Public Health\\*, 12\\(1\\). <https://doi.org/10.1186/1471-2458-12-1058> World Health Organization. \\(2024a, April 9\\). \\*Hepatitis B\\*. <https://www.who.int/news-room/fact-sheets/detail/hepatitis-b> World Health Organization. \\(2024b, April 9\\). \\*Hepatitis C\\*. <https://www.who.int/news-room/fact-sheets/detail/hepatitis-c>\]\(https://www.cdc.gov/hepatitis/statistics/2021surveillance/hepatitis-c/figure-3.3.htm#:~:text=The%20state%20specific%20rates%20of,Louisiana%2C%20Florida%2C%20and%20Maine.\)](https://cancer.ca/en/cancer-information/reduce-your-risk/get-vaccinated/hepatitis-b-and-c#:~:text=How%20do%20people%20get%20HBV,be%20spread%20through%20unprotected%20sex.)

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