# Trends in decompensated cirrhosis and hepatocellular carcinoma diagnosis among people with a hepatitis B notification in New South Wales: a data linkage study

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## Introduction

- Around 296 million individuals are living with chronic HBV worldwide.
- HBV-associated end-stage liver disease (ESLD) is the leading cause of death, most notably decompensated cirrhosis (DC) and hepatocellular carcinoma (HCC).
- Enhanced HBV diagnosis and timely linkage to care are required to achieve the 2030 WHO elimination targets.
- In many countries, including Australia, HBV diagnosis and treatment uptake remain suboptimal.

## Aims

- Among people with an HBV notification in New South Wales (NSW), Australia, we aimed to:
  - Evaluate trends and factors associated with HBV-related DC and HCC diagnoses, along with trends in liver mortality.
  - Assess trends in late HBV notifications.

## Methods

- In NSW, HBV notifications (1993-2017) were probabilistically linked to:
  - hospital admissions, (2001-2018)
  - all-cause mortality, (1993-2018)
  - cancer registry (1994-2014)
  - HBV treatment (2010-2018)
  - Alcohol-use disorder, DC, and HCC diagnoses were inferred using hospital discharge diagnosis codes (ICD-10) and diagnosis through cancer registry (for HCC). Liver-related mortality was defined by any death following a DC or HCC diagnosis. Late HBV notifications were defined by an HBV notification after, at the time or within two years before DC or HCC diagnosis.

## Results

**Table 1. Demographic characteristics among people with an HBV notification in NSW 1993-2017, by DC and HCC diagnosis, n=59,911**

| Characteristics (n, %) | All HBV n=59,911 | DC, 01-18 n=1,196 | HCC, 01-18 n=1,001 |
|---|---|---|---|
| Birth cohort, n (%)* | | | |
| ≥1965 | 32,679 (55) | 239 (20) | 118 (12) |
| 1945-1964 | 22,128 (37) | 649 (54) | 562 (56) |
| ≤1944 | 5,009 (8) | 308 (26) | 320 (32) |
| Male sex* | 32,990 (55) | 917 (77) | 820 (82) |
| Country of birth* | | | |
| Australia | 8,544 (21) | 398 (34) | 108 (11) |
| Americas, Europe, New Zealand | 3,949 (10) | 213 (18) | 143 (14) |
| Africa | 1,338 (3) | 25 (2) | 27 (3) |
| East Asia | 11,306 (28) | 209 (18) | 325 (33) |
| Oceania and Southeast Asia | 12,489 (31) | 281 (24) | 341 (34) |
| Western Asia | 2,605 (6) | 62 (5) | 49 (5) |
| HCV co-infection | 3,952 (7) | 288 (24) | 121 (12) |
| History of alcohol-use disorder diagnosis | 2,252 (4) | 371 (31) | 104 (10) |

* Among people with available information

**Figure 1. Trends in the numbers and age-standardised rates of DC and HCC diagnoses and liver mortality among people with an HBV notification in NSW, 1993-2017, n=59,911**

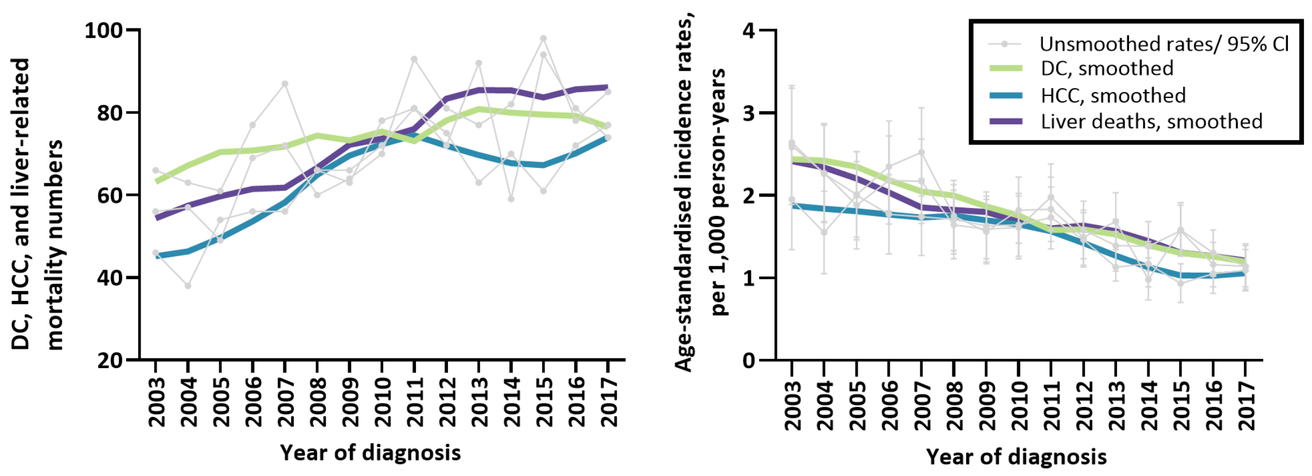


**Figure 2: Trends in HBV treatment uptake among people with an HBV notification in NSW, 2009-2017, n=17,340**

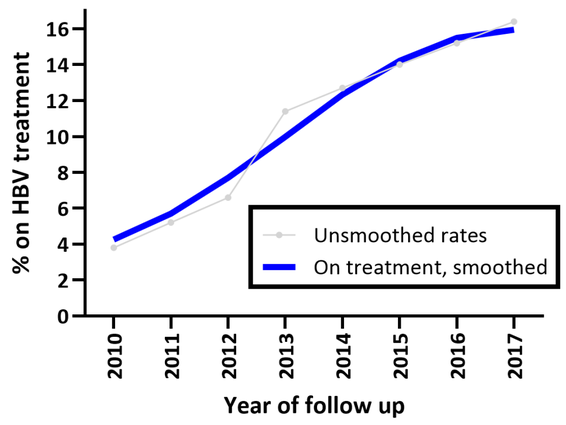


**Figure 3: Time from HBV notification to DC (n=1,172) and HCC (n=989) diagnosis among people with an HBV notification in NSW, 1993-2017**

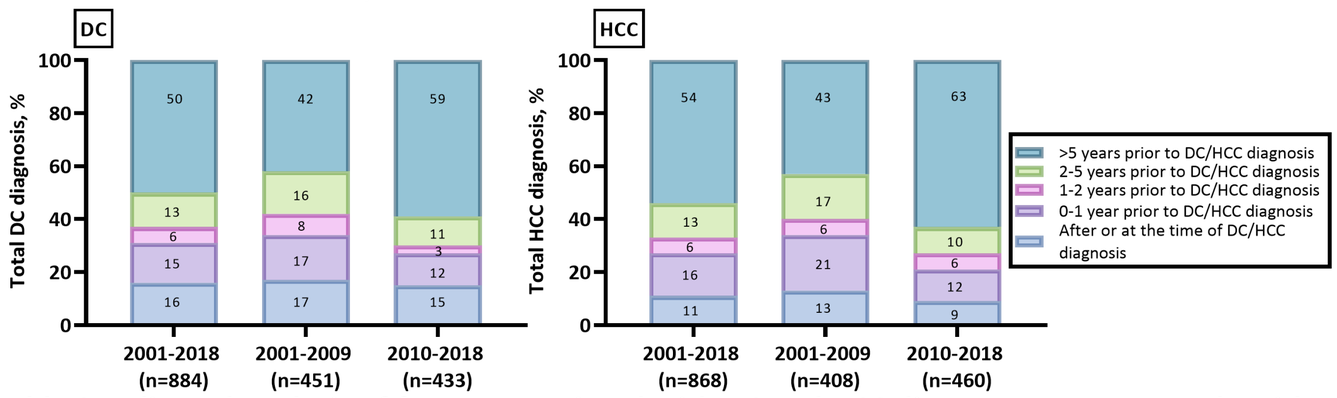


**Table 2. Adjusted analysis of factors associated with DC and HCC diagnoses among people with an HBV notification in NSW, 1993-2017, n=59, 911**

| Characteristic, n % | DC, 09-18 n=608* | aHR | 95% CI | *P* | HCC, 09-18 n=545* | aHR | 95% CI | *P* |
|---|---|---|---|---|---|---|---|---|
| Birth cohort | | | | | | | | |
| Born ≥1965 | 151 (<1) | 1.00 | | | 83 (<1) | 1.00 | | |
| Born 1945-1964 | 345 (2) | 3.90 | 3.19, 4.76 | <0.001 | 347 (2) | 6.14 | 4.78, 7.88 | <0.001 |
| Born ≤1944 | 112 (3) | 8.15 | 6.26, 10.61 | <0.001 | 115 (3) | 11.61 | 8.63, 15.61 | <0.001 |
| Sex | | | | | | | | |
| Female | 144 (1) | 1.00 | | | 94 (<1) | 1.00 | | |
| Male | 462 (1) | 1.90 | 1.56, 2.30 | <0.001 | 448 (1) | 3.65 | 2.90, 4.59 | <0.001 |
| Country of birth | | | | | | | | |
| Australia | 218 (3) | 1.00 | | | 72 (1) | 1.00 | | |
| Americas, Europe, New Zealand | 100 (3) | 1.12 | 0.86, 1.47 | 0.395 | 71 (2) | 1.86 | 1.29, 2.68 | 0.001 |
| Africa | 15 (1) | 1.06 | 0.62, 1.82 | 0.835 | 17 (1) | 3.02 | 1.74, 5.27 | <0.001 |
| East Asia | 103 (1) | 0.80 | 0.60, 1.08 | 0.140 | 167 (2) | 2.72 | 1.93, 3.86 | <0.001 |
| Oceania and Southeast Asia | 138 (1) | 0.88 | 0.68, 1.15 | 0.353 | 190 (2) | 2.64 | 1.90, 3.68 | <0.001 |
| Western Asia | 31 (1) | 0.85 | 0.56, 1.28 | 0.440 | 23 (1) | 1.38 | 0.83, 2.28 | 0.215 |
| Co-infection with HCV | | | | | | | | |
| No | 433 (1) | 1.00 | | | 460 (1) | 1.00 | | |
| Yes | 167 (5) | 2.17 | 1.74, 2.70 | <0.001 | 79 (2) | 2.24 | 1.70, 2.95 | <0.001 |
| LHD of residence at HBV | | | | | | | | |
| Rural NSW | 106 (2) | 1.00 | | | 50 (1) | 1.00 | | |
| Outer metro NSW | 280 (1) | 1.32 | 1.03, 1.69 | 0.026 | 264 (1) | 1.38 | 0.99, 1.91 | 0.059 |
| Metro NSW | 213 (1) | 1.08 | 0.83, 1.39 | 0.564 | 225 (1) | 1.20 | 0.86, 1.68 | 0.288 |
| History of alcohol-use disorder | | | | | | | | |
| No | 402 (1) | 1.00 | | | 476 (1) | 1.00 | | |
| Yes | 206 (10) | 7.19 | 5.83, 8.86 | <0.001 | 69 (3) | 3.08 | 2.31, 4.11 | <0.001 |

## Conclusions

- Evidence for declining risk of HBV-related DC, HCC, and liver-related mortality, suggesting an impact of highly effective antiviral therapy from the mid-2000s.
- Although the proportion of HBV-related DC and HCC cases with late hepatitis notification has declined, around 1 in 4 of those with HCC have a late HBV diagnosis.
- Strategies to reduce HBV disease burden must include enhanced HBV screening, increased HBV treatment coverage for eligible individuals, and addressing liver disease risk factors such as HCV co-infection and AUD.

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