

ORIGINAL RESEARCH ARTICLE

# Perspectives on the Impact of COVID-19 among Korean Americans with Chronic Hepatitis B: A Mixed Methods Exploration

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**Introduction:** The COVID-19 pandemic heavily impacted Asian Americans in the United States, especially those also managing underlying health conditions.

**Methods:** A sequential, convergent mixed methods approach was used to explore pandemic-related experiences among a cohort of Korean Americans living with chronic hepatitis B (CHB). During August 2021–January 2023, structured surveys were conducted in Korean and English with 365 Korean American adult patients at clinical sites in Los Angeles, California and Philadelphia, Pennsylvania. Surveys measured physical and mental health, sociodemographic and psychosocial characteristics, and pandemic-related hardships using a newly developed index that included seven types of hardship measures. In late 2023, a purposive sample of 30 of these patients also participated in an in-depth qualitative interview that captured personal perspectives on their COVID-19 experiences.

**Results:** Participants experienced a moderate level of COVID-19-related stressors (mean index score of 8.47 out of a possible 21) with high rates of reduced day-to-day enjoyment, fears related to their health, anti-Asian hostility, and limited access to medical care. Concerns about access to medications, financial concerns, and separation from family and friends were less common. In multivariable models, older age, stronger Korean identity, and larger body mass index were associated with lower levels of COVID-19-related stressors. Greater financial hardships and higher levels of depressive symptoms, acculturative stress, and CHB-related stigma were associated with high disease burden. Qualitative interviews taken as the pandemic waned included reflections on a wide range of negative as well as beneficial experiences.

**Conclusion:** Clinicians caring for Asian Americans living with serious chronic diseases such as CHB would do well to consider monitoring and addressing residual psychosocial consequences of the pandemic among their most vulnerable patients.

**Key Words:** Korean American ■ COVID-19 related stressors ■ chronic hepatitis B ■ mixed methods approach.

Ample evidence indicates that Asian Americans were negatively affected during the COVID-19 pandemic in the United States. A 2021 systematic review and meta-analysis of 68 studies (3.4 million patients) found that Asian American, along with African American and Hispanic individuals, were at greater risk of COVID-19 positivity and hospital/intensive care admission than White individuals.<sup>1</sup> In addition to these direct health threats and financial and social disruptions from lockdown and social distancing, Asian Americans experi-

enced the additional negative effects of political and social attacks (either personally or vicariously) related to the geographic location of initial global cases.<sup>2,3</sup>

Since the onset of containment efforts in early 2020, considerable research has documented adverse pandemic-related experiences among Asian Americans. Much of the analyses has focused on documenting anti-Asian hostility and its impact either on Asian Americans as a broad group,<sup>4-7</sup> or within specific Asian communities such as health care workers,<sup>8</sup> older<sup>9</sup> and younger adults,<sup>10,11</sup> or

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### POPULAR SCIENTIFIC SUMMARY

- The COVID-19 pandemic affected the health, financial, and social wellbeing of communities of color across the United States. In addition, Asian Americans faced anti-Asian hostility related to the geographic origin of initial global cases. Post pandemic, it is important to note how Asian American populations, especially those with preexisting conditions, face lasting health effects.
- This survey sampled Korean American patients with chronic hepatitis B (CHB) at two time points during 2021–2023. Early in the pandemic, patients ( $N = 358$ ) at two US clinics expressed their health, psychosocial, and pandemic-related hardships. Overall, most experienced moderate level COVID-19 stressors, including less daily enjoyment and concerns about access to care. Higher COVID-19 disease impact was associated with depression, financial hardship, acculturation, and CHB-related stigma. As the pandemic waned, a subset of patients ( $n = 30$ ) expressed both negative and beneficial effects with older age and Korean cultural identity consistently protective of high COVID-19 impact. These results highlight potential societal inequalities that could inform clinical management of patients with chronic conditions.

those especially vulnerable through social media exposures.<sup>12</sup> A scoping review of 35 studies found evidence of 'prevalent' anti-Asian discrimination during the pandemic, which was 'consistently associated with poor psychological outcomes'.<sup>13</sup> Other research examined differences in pandemic experiences by specific Asian ethnicity,<sup>14–16</sup> gender,<sup>7</sup> immigration history<sup>17</sup> or income.<sup>18</sup> A smaller body of research examined pandemic impact on Asian Americans through material hardships such as reduced employment,<sup>19</sup> reduced access to healthful food,<sup>20</sup> or psychological effects of separation from family and friends.<sup>21</sup>

Most of this research drew on surveys or qualitative interviews conducted during the pandemic's first year, before the onset of broad vaccination uptake and relaxation of restrictions. The majority presented single time point snapshots to rapidly assess and address the pandemic's initial impact. In contrast, however, a small but compelling set of findings across diverse populations suggested that, over the course of the pandemic, some groups experienced positive pandemic effects, including lifestyle changes and psychosocial benefits.<sup>22</sup> These differences in the effects of COVID-19 experienced across communities revealed pre-existing vulnerabilities and wide societal-level inequalities.<sup>23,24</sup>

Therefore, in light of the pandemic, it is important to understand who, within broad populations such as Asian Americans were affected by their COVID-19 experiences and which of these experiences might have lasting

effects on their health. A life course perspective considers the COVID-19 pandemic as a unique historical event within the context of individual life stages and social roles,<sup>25</sup> and an intersectional lens helps to recognize the diversity of identities and experiences within the lives of Asian Americans.<sup>26</sup> This approach is especially important in understanding the challenges faced by individuals who managed pre-existing chronic health conditions, which made them especially vulnerable to COVID-19 or its associated health issues during the pandemic.

This study drew on both structured and qualitative data collected during the COVID-19 pandemic from a cohort of Korean American adults living with chronic hepatitis B (CHB) infection. Because hepatitis B infection is endemic in many Asian countries, Asian Americans are disproportionately impacted by CHB, accounting for over 60% of the US population living with this disease.<sup>27</sup> CHB patients must adhere to medical monitoring, lifestyle restrictions, and sometimes costly medications to avoid serious complications including liver cancer and liver failure.<sup>28–31</sup> During the pandemic, public health messages for persons with CHB did not differ from those for the general population; messages primarily sought to dispel concerns regarding CHB-related contraindications for vaccine uptake. Over the course of the pandemic, however, more focused approaches emerged from evidence suggesting that among subgroups of CHB patients with more advanced liver disease, impaired liver function, or other comorbidities, COVID-19 infection could have a more severe disease course than for the persons without CHB.<sup>32</sup>

Using convergent sequential mixed methods approach<sup>33</sup> this study leverages related data from two discrete time windows during the pandemic. Structured survey data from the entire cohort were used to describe reported patterns of COVID-19 hardship during 2021–2022, after the initial acute phase of the pandemic but still during its height. Next, the analysis examined perspectives from in-depth qualitative interviews conducted during 2023 with a purposive sample taken from the larger cohort to explore post-pandemic views. The convergent mixed methods analysis contrasted immediate and more long-term COVID-19 experiences to understand the trajectory of pandemic impact and recovery and whether specific subgroups within this vulnerable population might be especially at risk for residual issues.

One goal of this study was to expand the research findings on the impact of COVID-19 among specific groups of Asian Americans, in response to the need for 'disaggregate' data on this diverse population.<sup>15</sup> Korean-Americans are the fifth largest group of Asian Americans, and compared with Asian Americans in aggregate, are more likely to be born outside the US.<sup>34</sup> Despite high levels of post-secondary education, Korean Americans have lower median household incomes and lower rates of

English proficiency than Asian Americans as a whole, with only 50% born outside the US having adequate English-language skills.<sup>34</sup>

Much of the literature on the pandemic's impact on Asian Americans is focused heavily on anti-Asian discrimination during the first months of the pandemic, which was important to monitor and document at this time point in the US. These studies placed less attention on measuring and understanding other pandemic-related hardships among Asian Americans, or the evolving nature of these effects.

This study sought to address this gap in the literature by exploring pandemic-related hardships using a mixed methods approach. Qualitative data can contextualize structured findings by using a neutral rather than a loss-framed approach, thus allowing for more complex assessments including who might have experienced benefits from their pandemic experiences and how.

Asian Americans already coping with the health risks and stigma of a chronic infectious disease may be especially vulnerable during events such as the COVID-19 pandemic because of their medical vulnerability as well as the unique life experience of living in the US with CHB. Understanding how COVID-19 experiences might influence life with CHB or other health-related vulnerabilities is necessary to help restore and maintain quality-of-life for persons with chronic diseases in the aftermath of the pandemic.

## METHODS

### Study design and participant recruitment

Data for this study were part of a larger longitudinal cohort study previously described in more detail.<sup>35,36</sup> At two participating US clinical sites in Philadelphia, Pennsylvania (PA) and Los Angeles, California (CA), Korean American patients being treated for CHB were recruited over an 18-month window (August 2021–January 2023) to participate in the study. Data collection during the overall study included an enrollment questionnaire (offered in Korean or English) and follow-up questionnaire at 24 months post-enrollment, qualitative interviews (with a subset of participants), multiple hair samples to analyze cortisol as a biomarker of chronic stress, retrospective and prospective longitudinal clinical data, and GIS-based neighborhood-level data. Eligibility criteria included self-identifying as Korean American, aged 18 or older, ability to provide informed consent and complete surveys, receipt of care from the clinical sites since at least 2016, diagnosis of CHB with no diagnosis of hepatocellular cancer at enrollment, and no co-infection with hepatitis C or HIV. The research was reviewed and approved by the institutional review board (IRB) of Thomas Jefferson University, Philadelphia, PA.

### Enrollment questionnaire

The baseline questionnaire was offered in either English or Korean and could be self-administered via I-Pad or paper. For participants with vision or literacy limitations, research staff administered the questionnaire verbally. The questionnaire captured a range of sociodemographic, psychosocial, and health information, drawing on measures validated in prior research with Korean American patients conducted by our research team and other groups.<sup>37</sup> Instruments were translated and back translated by bilingual team members to ensure comparability across participants. Participants provided signed informed consent and were offered \$50 for completing the baseline questionnaire and providing an initial hair sample. Qualtrics XM statistical platform was used to capture responses to the baseline questionnaire in both English and Korean. Data were analyzed using SPSS statistical software (version 29.0.2.0). The analyses presented here included only respondents providing answers to all key variables.

### Quantitative measures

The following sociodemographic variables were captured in the baseline survey and used in these analyses: respondent gender, age, country of birth and time in the US, education, current marital and employment status, and Korean or English language preference. A measure of financial hardship asked participants how often they had trouble paying monthly bills (never/once in a while/fairly often/very often), and a measure of cultural identity asked them if they felt very Korean, mostly Korean, bicultural, mostly westernized, or very westernized. Three well-validated indices were used to measure participants' potential psychosocial challenges. The nine-item Patient Health Questionnaire (PHQ-9)<sup>38,39</sup> was used to measure depressive symptoms, with scores of 5 or greater out of a possible 27 indicative of some level of depression. The 15-item Riverside Acculturative Stress Inventory (RASI)<sup>40</sup> was used to capture stress related to participants' cultural identity (e.g., 'I feel the pressure that what "I" do is representative of the Korean group's ability'). The six-item Hepatitis B Quality of Life-Stigma Subscale (HBQOL-Stigma)<sup>41</sup> captured perceived stigma related to CHB, with statements such as 'I am embarrassed due to my Hep B' scored from 0 (never) to 4 (all of the time), and combined scores ranging from 0 to 24.

Participants self-rated their current health as excellent, very good, good, fair, or poor. Medical record data were used to determine number of years since CHB diagnosis, body mass index (BMI), and four common comorbid conditions, which can impact CHB management: hypertension, diabetes, high cholesterol, and non-alcoholic fatty liver disease (NAFLD).

To measure the perceived impact of the COVID-19 pandemic on various aspects of the participants' lives, we created a seven-item index, asking whether each statement was very true, somewhat true, not very true or not true at all for them. Potential areas of pandemic impact were drawn from both contemporaneous news stories about COVID-19 and Asian Americans, as well as other current studies about COVID-19's impact.<sup>13–21</sup> The seven items asked about experiences with financial losses, fears related to CHB-related health vulnerability, hostility toward Asians regarding COVID-19's origin, decreased access to health care, decreased access to medications, isolation from family and friends, and loss of day-to-day enjoyment. Responses to these seven items were scored from 0 (not true at all) to 3 (very true) and summed to create an index, with possible scores ranging from 0 (no COVID-19 impact) to 21 (substantial COVID-19 impact).

### Quantitative analysis

Univariate analyses were used to examine participant characteristics at enrollment and displayed counts of each of the seven COVID-19 impact items and the distribution of the summed scores were used for the total COVID-19 impact index. The reliability of the combined index was examined using Cronbach's alpha coefficient of reliability,<sup>42</sup> as well as correlations between individual items.

Bivariate relationships between total COVID-19 impact score and cohort characteristics at baseline were examined. For categorical variables, mean group scores were compared using *t*-tests and *p*-values. For continuous variables, correlations between COVID-19 impact score and each variable are presented with *p*-values.

Combined associations between the covariates and index scores were examined using two multivariable linear regression models, which were created to model the predictors of COVID-19 impact scores. The first model included all covariates from the bivariate analyses. The second, more parsimonious model retained only those covariates with a relationship to the index score significant at  $p < 0.10$ , using backward selection. The more inclusive level of  $p < 0.10$  was used due to the exploratory goals of the analysis and to retain information about the contribution of variables with borderline significance.<sup>43</sup> To further validate the combined index, seven additional models were estimated using each of the index measures individually as an outcome, comparing results with the model predicting the combined index.

### Qualitative interviews

A subsample of cohort participants was recruited to complete one-on-one in-depth interviews, a year or more after their enrollment survey. The goal of in-depth

interviews was to explore in more detail the emerging findings from baseline questionnaire data and add contextual understanding of the relationship between key psychosocial variables and health patterns. We used a quota sampling strategy to balance across gender, clinical sites (Los Angeles and Philadelphia) and language preference, as well as iterative and purposive case selection within strata to capture the cohort's diversity in age, socioeconomic resources, health histories, and immigration stories.

From the total cohort, 49 participants were sequentially contacted as potential in-depth interview participants, to reach the goal of 30 completed interviews. Among those who did not complete the in-depth interviews, seven refused, five initially agreed but did not follow through with scheduling, and seven did not respond despite multiple attempts to contact each.

Audio-recorded telephone interviews were conducted by two Korean American graduate research assistants in English (GL) or Korean (EK). The interview guide used a phenomenological approach to explore the lived experience of participants' diagnosis and disease course, immigration and cultural identity, disease-related stigma, and health care experiences.<sup>44</sup> Participants provided verbal informed consent for the qualitative interviews and received an additional \$40 for their time. A sample size of 30 completed interviews was selected using the qualitative research standard of 'informational power', which predicts sample completion and informational saturation based on the focused nature of the topic, anticipated interview length, and volume of data from each participant.<sup>45</sup>

### Qualitative analysis

Qualitative interviews were transcribed verbatim and Korean-language interviews were subsequently translated into English by a native speaker (EK), in consultation with other native speaking team members (HSJ, MC). This analysis used a modest amount of qualitative content that consisted of specific or implied considerations of participants' COVID-19 pandemic experience. Text that contained discussion of COVID-19 was captured and reviewed by four team members (AK, KS, EK, GL) to identify initial patterns for thematic analysis. Themes for coding were developed deductively based on existing research by our team and others, as well as inductively from the data. The four co-authors (including a native Korean language speaker) independently coded two transcripts, expanding the coding guide with additional themes and codes, and reaching agreement on any differences through discussion and consensus.<sup>46</sup> Two coders (EK, GL) then coded the remaining interviews. Statistical software NVivo (Lumivero, version 14) was used to support analysis.

Qualitative results report the thematic analysis of participants' perspectives on their COVID-19 pandemic experience from the qualitative in-depth interviews conducted in 2023. Themes and example quotes from participants are presented.

## RESULTS

### Participants' characteristics

A total of 552 clinic patients were identified as potentially study-eligible through medical record review; 140 potentially eligible patients did not return for care, partly due to decreased use of in-person visits during the pandemic and did not respond to outreach via text or phone call. Among those contacted for direct recruitment ( $n = 412$ ), 4 (1%) declined to return to the clinic during the enrollment period, and 16 (3.8%) were found on further screening to be ineligible. Among the 392 screened and eligible patients, 27 (6.8%) refused to participate, primarily citing time constraints; the remaining 365 patients were enrolled in the study.

A total of 358 participants provided complete data for this analysis (Table 1). The study cohort was largely male, 55% aged 19–94 years with 57.5% aged 50 and older. Only 3% were born in the United States, with approximately 60% having immigrated 30 or more years ago. The majority (62%) were currently employed, 56% had at least a college degree, and 79% were currently married. Most reported experiencing no financial hardship; 72.9% said they never had trouble meeting monthly bills and 15.6% reported that this happened fairly or very often. Most participants (81.2%) chose to complete the enrollment survey in Korean, and in terms of cultural identity, most saw themselves as either very (31.0%) or mostly (27.7%) Korean, and 33.8% selected 'bicultural'. Participant PHQ-9 scores ranged from 0 to 22, with an average score of 3.6, suggesting that most participants did not have clinically significant depressive symptoms. However, the average acculturative stress score was 24.3 (range 0–51), indicating that most participants experienced these stressors in their current lives. Specific to their experience with CHB, participants on average reported modest levels of CHB-related stigma (mean 5.4, range 0–24).

Participants received their hepatitis B diagnosis an average of 28 years earlier at the time of the study (range of 5–57 years). Many participants had comorbidities in addition to CHB, including diabetes (15.4%), hypertension (33.8%), high cholesterol (36.0%), and NAFLD (34.1%), and only 38.3% were at the recommended weight for their height, with 34.3% being overweight and 25.4% having obesity. Only 5 participants (1.4%) rated their health as excellent, and

61 (17%) saw their health as very good. More commonly, participants rated their health as good ( $n = 139$ , 38.8%) or fair ( $n = 130$ , 36.3%), with 23 participants (6.4%) rating their health as poor.

### COVID-19 impact measures and summed index

Figure 1 presents some aspects of COVID-19-related hardships that were more commonly experienced than others, with illness-related fears very or a little bit true for 72% of participants, and loss of day-to-day enjoyment very or a little true for 63%. Almost half (48%) reported experiencing more anti-Asian hostility during the pandemic, and reduced access to medical care and financial hardship were also common (47 and 44% very or a little true, respectively). Approximately one quarter (28%) felt the pandemic had isolated them from family and close friends, and 5% of participants had difficulty accessing medications. The summed index of COVID-19 impact (Figure 2) had moderate reliability ( $\alpha = 0.70$ )<sup>42</sup> and appears normally distributed, with an average score of 8.47 and a range of 0–21. The pair-wise correlation between individual index items ranged from 0.04 to 0.43, with a mean correlation of 0.25.

### Bivariate relationships: Participant's characteristics and COVID-19 impact

Bivariate comparisons (Table 2) of COVID-19 impact index scores indicated that participants' reported experiences of the pandemic's impact did not differ significantly by gender, employment, education, or marital status, nor by language preference. However, those reporting financial hardship had higher average COVID-19 impact index scores (9.57 vs. 8.26,  $p = 0.03$ ) as did those with fair or poor self-rated health (9.04 vs. 8.04,  $p = 0.02$ ). Those who expressed their cultural identity as being 'very' or 'mostly Korean' had lower COVID-19 impact index scores than those who felt 'bicultural' or 'westernized' (8.17 vs. 8.90,  $p = 0.09$ ) and those with hypertension also had lower scores (7.89 vs. 8.76,  $p = 0.05$ ). Age was negatively correlated with COVID-19 impact index score ( $-0.15$ ,  $p = 0.005$ ) as was BMI ( $-0.15$ ,  $p = 0.005$ ) and years of residence in the US ( $-0.09$ ,  $p = 0.09$ ), but there was no association between impact index score and time since hepatitis B virus (HBV) diagnosis.

The strongest correlations with COVID-19 impact scores were observed with the three measures capturing different aspects of stress or distress. Those reporting greater depressive symptoms on the PHQ-9 reported greater negative impact from the pandemic (0.25,  $p < 0.001$ ), as did those experiencing more acculturative stress (0.32,  $p < 0.001$ ), and those with greater sense of CHB-related stigma (0.22,  $p < 0.001$ ).

**Table 1. Patient Characteristics**

Demographic characteristics	Baseline cohort (N = 365)	In-depth interview participants (n = 30)
	Number (%)	
<b>Gender</b>		
Male	198 (55.3)	16 (53.3)
Female	160 (44.7)	14 (46.7)
<b>Age (years)</b>		
19–59	152 (42.5)	20 (66.7)
60–84	206 (57.5)	10 (33.3)
<b>Years in the United States (years)</b>		
< 10	3 (0.8)	1 (3.3)
10–30	127 (36.6)	10 (33.3)
>30	217 (59.5)	15 (50.0)
Born in the US	11 (3.1)	4 (13.4)
<b>Employment status</b>		
Currently working	222 (62.0)	18 (60.0)
Not working	136 (38.0)	12 (40.0)
<b>Education level</b>		
<High school graduate	23 (6.4)	0 (0)
High school graduate+	134 (37.4)	10 (33.3)
College graduate+	201 (56.2)	20 (66.7)
<b>Marital status</b>		
Married	284 (79.3)	22 (73.3)
Not married	74 (20.7)	8 (26.7)
<b>Language preference</b>		
Korean	293 (81.8)	15(50.0)
English	65 (18.2)	15 (50.0)
<b>Financial hardship (trouble paying monthly bills)</b>		
Never	261 (72.9)	20 (67.7)
Once in a while	41 (11.5)	7 (23.3)
Fairly often	36 (10.1)	2 (6.7)
Very often	20 (5.6)	1 (3.3)
<b>Psychosocial characteristics</b>		
PHQ-9 Depressive Symptoms Score, mean (range 0–22)	3.6 ± 4.1	5.8 ± 6.2
Riverside Acculturative Stress Index Score, mean (range 0–51)	24.3 ± 9.2	24.3 ± 9.2
Hepatitis B Stigma Score, mean (range 0–24)	5.4 ± 5.6	5.4 ± 5.6
<b>Western identity index</b>		
Very Korean	111 (31.0)	6 (20.0)
Mostly Korean	99 (27.7)	4 (13.3)
Bicultural	121 (33.8)	14 (46.7)
Mostly westernized	18 (5.0)	5 (16.7)
Very westernized	9 (2.5)	1 (3.3)
<b>Health characteristics (self-rated)</b>		
Excellent	5 (1.4)	1 (3.3)
Very good	61 (17.0)	5 (16.7)
Good	139 (38.8)	10 (33.3)
Fair	130 (36.3)	13 (43.3)
Poor	23 (6.4)	1 (3.3)
Years since HBV diagnosis, mean (range 5–57)	28.0 ± 9.8	26.7 ± 10.7

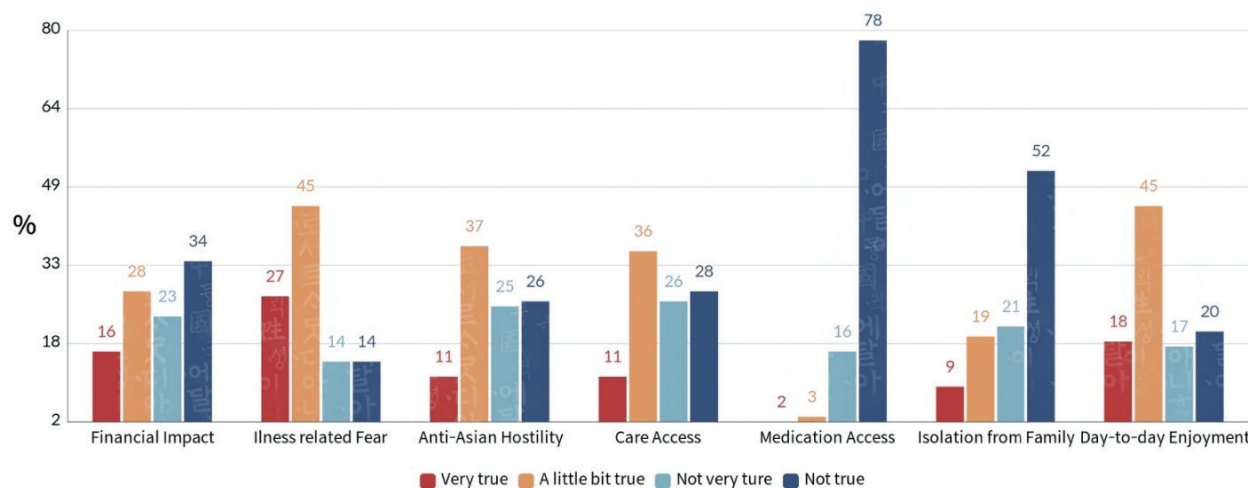
(Continued)

**Table 1. (Continued)**

Demographic characteristics	Baseline cohort (N = 365)	In-depth interview participants (n = 30)
	Number (%)	
Diabetes (per medical record)	55 (15.4)	2 (6.7)
Hypertension (per medical record)	121 (33.8)	7 (23.3)
High cholesterol (per medical record)	129 (36.0)	9 (30.0)
Non-alcoholic fatty liver disease (per medical record)	122 (34.1)	10 (33.3)
<b>Weight status</b>		
Underweight (BMI < 18.5)	8 (2.2)	0 (0.0)
Recommended weight (BMI 18.50–24.9)	137 (38.3)	12 (40.0)
Overweight (BMI 25–29.9)	122 (34.1)	10 (33.3)
Obese (BMI ≥30)	91 (25.4)	8 (26.7)

**Abbreviations:** BMI = body mass index; PHQ-9 = Patient Health Questionnaire; HBV = hepatitis B virus.

**Figure 1. Responses to Seven Items Measuring COVID-19 Pandemic Impact and Total Index Score<sup>a</sup>**



<sup>a</sup>Responses were solicited to the following question:

Here are some ways that COVID-19 may have impacted you since it began in the Spring of 2020. For each of these statements, I would like you to tell me if it is very true, a little bit true, not very true, or not true at all for you.

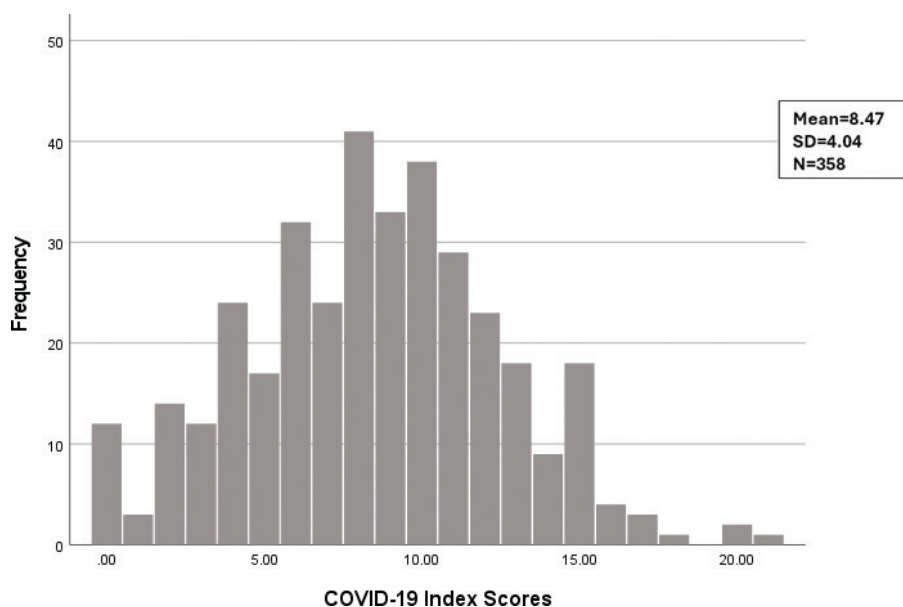
1. The COVID-19 pandemic in the US has been hard on me financially.
2. The COVID-19 pandemic has made me more worried about getting sick.
3. I have felt more anti-Asian discrimination because people blame Asians for the COVID-19 pandemic.
4. I have had more difficulty getting the care I need from my doctors during the COVID-19 pandemic.
5. I have had difficulties getting my antiviral medications for my liver disease during the COVID-19 pandemic.
6. I have felt more isolated from my family and the people I am close to during the pandemic.
7. I have had trouble doing the day-to-day things I enjoy during the pandemic.

### Multivariable models: Participants' characteristics and COVID-19 impact

In the full multivariable linear regression model (Table 3), older age and Korean cultural identity remained significantly protective of higher levels of COVID-19 impact, and financial hardship remained associated with greater levels of COVID-19 impact with borderline statistical significance (0.085,  $p = 0.09$ ). In comparison to the bivariate relationship, after adjusting for other covariates, greater number of years since HBV diagnosis was also associated with higher COVID-19 impact index score (0.086,  $p = 0.09$ ). The PHQ-9 depressive symptoms

were strongly associated with impact score in the bivariate analysis and were still positively associated with the multivariable model, but less statistically significant (0.106,  $p = 0.06$ ). Stigma related to hepatitis B was positively associated with COVID-19 impact index score. However, the strongest relationship was observed between acculturative stress and COVID-19 impact (0.332,  $p < 0.001$ ).

The second more parsimonious model included only the seven predictors significant at  $p = 0.10$ . Age remained strongly protective ( $-0.208$ ,  $p < 0.001$ ), as did Korean identity ( $-0.136$ ,  $p = 0.006$ ), and a larger body size was also protective, with borderline significance ( $-0.084$ ,

**Figure 2. Distribution of Summed Scores, COVID-19 Impact Index<sup>a</sup>**

**Abbreviations:** SD = standard deviation.

<sup>a</sup>Responses to 7 Index items were summed to create a COVID-19 Impact Index (alpha = 0.70), with possible scores ranging from 0 (no impact) to 21 (great impact).

$p = 0.09$ ). Four characteristics of adverse experiences were associated with higher COVID-10 impact index scores: financial hardship (0.082,  $p = 0.09$ ), PHQ-9 depressive symptoms (0.101,  $p = 0.05$ ), acculturative stress (0.328,  $p < 0.001$ ) and hepatitis B-related stigma (0.107,  $p = 0.03$ ). The  $R^2$  (coefficient of determination) for the most parsimonious model was 0.21, meaning the model explained 21% of the variance in COVID-19 impact index scores.

To further explore the validity of the combined index, seven additional models were estimated, modeling each individual COVID-19 hardship. Although most covariates demonstrated similar patterns of association as in the combined score model, some differences were observed. For example, financial hardship was significantly greater for men, while women expressed significantly greater hardship while obtaining medical care. Isolation from family and friends was greater among younger, unmarried, and English-speaking participants, and those experiencing greater CHB-related stigma and acculturative stress expressed more difficulty with day-to-day enjoyment (data not shown).

### Perspectives on the burden of the COVID-19 pandemic

The 30 participants (aged 19–82 years) from the larger group who completed in-depth interviews were balanced by gender ( $n = 16$  male and  $n = 14$  female), clinical site ( $n = 15$  in Philadelphia, PA and  $n = 15$  in Los Angeles, CA) and language preference (15 English/15 Korean)

(Table 1). Their average COVID-19 impact score of 8.8 did not differ significantly from the cohort average score of 8.4 ( $p = 0.64$ ) (data not shown). Interview length averaged 66 min but ranged in length from 45 to 118 min, with additional time for informed consent and other logistics.

### Health-related impact

The first group of themes captured in the qualitative discussions focused on the health-related impact of participants' COVID-19 pandemic experience. Most commonly, participants reported fears about COVID-19, which were felt to be strongest during the initial months of the pandemic, and that they might have more serious COVID-19 consequences due to their underlying chronic disease (Table 4). One participant described her initial fear as follows, 'What if I catch COVID? What happens to my liver, you know, what would happen to the infection?' (participant #2154, Female, aged 61 years, English language preference). Not all participants, however, recalled viewing their CHB as relevant to COVID-19-related risk. '...Hepatitis B with relation to COVID-19, I didn't think there was any relationship to be concerned about. It's a completely separate issue, so I didn't think anything more about that' (participant #1083, Male, aged 62 years, English language preference).

Participants who contracted COVID-19 reported a range of experiences. An older female participant reported that she had been very ill, and expressed resentment towards younger, non-Korean coworkers who seemed to take fewer precautions and suffer fewer

**Table 2. Bivariate Relationship Between COVID-19 Impact Score and Cohort Characteristics, August 2021-January 2023 (N = 358)**

Characteristics	Mean COVID-19 impact score	p
<b>Gender</b>		
Male	8.16	0.11
Female	8.85	
<b>Employment status</b>		
Currently working	8.58	0.75
Not working	8.32	
<b>Education level</b>		
< College graduate	8.67	0.41
College graduate or beyond	8.31	
<b>Marital status</b>		
Married	8.51	0.68
Not currently married	8.28	
<b>Preferred language</b>		
Korean	8.44	0.77
English	8.60	
<b>Financial hardship: trouble paying monthly bills</b>		
Never or once in a while	8.26	0.03
Fairly often or very often	9.57	
<b>Western identity index</b>		
Very or mostly Korean	8.17	0.09
Bicultural; mostly or very westernized	8.90	
<b>Self-rated health</b>		
Excellent, very good, or good	8.04	0.02
Fair or poor	9.04	
<b>Diabetes</b>		
Yes	8.51	0.94
No	8.46	
<b>Hypertension</b>		
Yes	7.89	
No	8.76	
<b>High cholesterol</b>		
Yes	8.35	0.67
No	8.53	
<b>Non-alcoholic fatty liver disease</b>		
Yes	8.27	0.40
No	8.65	
<b>Bivariate correlations with COVID-19 impact score</b>		
Age	-0.15	0.005
Years in the US	-0.09	0.09
PHQ-9 Depressive Symptoms Score	0.25	<0.001
Riverside Acculturative Stress Index Score	0.32	<0.001
Hepatitis B Stigma Index Score	0.22	<0.001
Body mass index	-0.15	0.005
Years since HBV diagnosis	0.05	0.30

**Abbreviations:** HBV = hepatitis B virus; PHQ-9 = nine-item Patient Health Questionnaire.

ill effects when infected. ‘The entire store got infected because of them ... I really thought I was going to die .... And the severity of illness is different for Koreans compared to them. They are inherently very healthy kids .... Their physical strength is different’ (participant #2172, Female, aged 59 years, Korean language preference). In contrast, one participant described strong fears initially but then relief after experiencing COVID-19 infection. ‘It definitely concerned me in the beginning. If I did get COVID-19, I felt like because I had an underlying condition ... I’m just as good as gone .... but as it progressed I did get it and it was kind of like a little cold ... and that was it’ (participant #1035, Female, aged 43 years, English language preference).

Another perspective described the COVID-19 pandemic as a serendipitous sense of shared caution and vulnerability, which helped participants feel safer regarding their CHB as well. ‘I can’t recall facing any specific ... problems due to my condition. On the contrary, wearing masks and taking precautions might have been helpful in a way, making me more cautious in certain respects’ (participant #1118, Male, aged 82 years, Korean language preference).

### Impact of COVID-19 beyond health

Two broad themes of hardship emerged when participants reflected on how the COVID-19 pandemic had impacted their lives beyond health concerns. Isolation was seen by one participant as a type of hidden burden, with unacknowledged consequences on well-being. ‘Being separated from everybody else has some sort of negative impact on I guess everybody, including myself, even if I say I don’t feel it or I don’t see it’ (participant #1083, Male, aged 62 years, English language preference). A second theme focused on the stress the pandemic added to managing challenging life events, such as death of a spouse, as well as day-to-day life responsibilities, such as work or family caregiving. For one participant, this heightened pressure was related to high school and college. ‘The COVID pandemic raised my stress levels ... when I was applying for college, and it was already a pretty stressful time. But other than that, I don’t think it directly influenced my current journey with hepatitis B’ (participant #1142, Male, aged 19 years, English language preference).

However, three types of unanticipated positive impacts, so-called ‘silver linings’, were mentioned by participants during the in-depth interviews. Interestingly, these were all reported by male participants. Two participants felt grateful for the time that lockdown had provided to put aside their work lives, and ‘slow down’. ‘Personally, it was great, it kind of forced me to have a break ... because I’ve been hustling for many years ... it was kind of a blessing in disguise’ (participant #2139, male, aged 39, English language preference). ‘I was

**Table 3. Multivariable Linear Regression Models, Predicting Participants' (N = 358) Scores on COVID-19 Impact Index, August 2021-January 2023**

Participants' characteristics	Full model		Reduced model <sup>a</sup>	
	Standardized coefficient	p	Standardized coefficient	p
Age	-0.207	0.006	-0.203	<0.001
Male gender	-0.011	0.85		
Currently working	0.050	0.37		
College graduate or beyond	-0.063	0.22		
Currently married	0.051	0.31		
Years in the US	0.041	0.52		
English language preference	-0.006	0.93		
Trouble paying bills fairly/very often	0.085	0.09	0.082	0.09
Very/mostly Korean identity	-0.139	0.01	-0.136	0.006
Excellent/very good/good health	-0.052	0.32		
Years since HBV diagnosis	0.086	0.09		
Body mass index	-0.071	0.20	-0.084	0.09
Diabetes	0.054	0.29		
Hypertension	-0.074	0.17		
High cholesterol	-0.035	0.51		
Non-alcoholic fatty liver disease	-0.034	0.51		
PHQ-9 Depressive Symptoms Score	0.106	0.06	0.101	0.05
Riverside Acculturative Stress Index Score	0.332	<0.001	0.328	<0.001
Hepatitis B Stigma Index Score	0.110	0.03	0.107	

**Abbreviations:** HBV = hepatitis B virus; PHQ-9 = nine-item Patient Health Questionnaire.

<sup>a</sup>Reduced model retains only those independent predictors with *p* < 0.10.

raising my young daughter, so we would just spend time together, and we would go to the park, and yeah, we still had a lot of good fun times' (participant #2139, male, aged 40, English language preference).

Two other positive experiences reported by male participants focused on their work. One respondent recalled that virtual events provided unanticipated success in building community and lifting spirits for isolated early career musicians, when in-person events were cancelled. Finally, some respondents managed to avoid the expected financial hardships; for example, a restaurant owner reported that, to his surprise, converting from sit-down to takeout service increased his sales during the COVID-19 pandemic.

## DISCUSSION

When interpreting the impact of the pandemic as experienced by this cohort of Korean Americans with CHB infection, it is important to consider the findings of this study in the context of its relevant timepoints during the pandemic's trajectory. By August 2021, when participants from the larger longitudinal cohort provided structured responses about the negative impact of COVID-19, 70% of American adults and 90% of those aged 65 and older had received at least one dose of the

COVID-19 vaccine.<sup>47</sup> Across the 18 months of baseline survey collection, rates of COVID-19-related deaths rose again in the fall and winter of 2021–2022. The federal COVID-19 Public Health Emergency (PHE) officially ended in May 2023.<sup>48</sup> Among the survey respondents, no evidence was found of seasonal or yearly differences in average COVID-19 impact scores across the 18-month data period, perhaps because questions asked respondents to reflect on their cumulative pandemic experience to date.

In contrast, reflections captured during the qualitative interviews began as the PHE was ending and respondents were asked to look back in time across the entire pandemic. For some respondents, infection and serious illness remained a current threat. Not surprisingly, respondents' self-reported experience with the diverse types of pandemic-related hardships most commonly cited illness fears and restrictions in daily life as the two most burdensome, which were arguably universally true for most of the US population, especially among those with other pre-existing health conditions.<sup>49,50</sup> However, these two issues were followed closely by access to medical care, Anti-Asian hostility, and financial concerns, which speak more directly to participants' lives as both immigrants and persons living with a serious chronic disease. In this population, many of whom depend on anti-viral medications to control their CHB, access to

**Table 4. Reflections about the COVID-19 Experience among Korean Americans with Chronic Hepatitis B Infection (N = 30) from In-depth Interviews Conducted April–November 2023**

Health Impact	Theme	Example Quote	
Negative	Heightened awareness of infection risk due to CHB or past experiences	<p>‘You know there there’s a lot of unknowing viruses, diseases going on. I realized it, but before this, a lot of people weren’t really careful. There’s a lot of Asians these days, even though COVID-19 is kind of over, they still wear masks, and they want to be careful which is good. But most people, they don’t realize there’s still a lot of diseases and viruses going on outside. I know that and, you know, I’m one of the victims too. From losing somebody in my family long, long time ago and I’m trying to be careful. I’ll just make sure. Wash hands all the time ... Make sure wear a mask, stay 6 feet away. I know things that I have to do’ (participant #1067, male aged 53 years, English language preference).</p> <p>‘And not really knowing much about the COVID in general. Yeah, you know, not only me but everybody in the whole world. And then until the vaccine started to be being administered, you know, I was worried. I would say I was a bit worried that, you know, what if I catch COVID? And especially this kind of long COVID experience. What happens to my liver, you know, what would happen to the infection? So yeah, the thoughts went through my mind’ (participant #2154, female aged 61 years, English language preference).</p> <p>‘I think I’ve been more cautious not to catch COVID-19 since I have an underlying condition. I got vaccinated to protect myself from infection. Yes, that’s what I did. I think I still need to get vaccinated again’ (participant #2034, female aged 62 years, Korean language preference).</p> <p>‘It was hard for everyone during COVID, including workplaces. For me, I got COVID about a month ago. A ... coworker got it and didn’t tell anyone, and then the entire store got infected because of them. For three and a half years, I had managed not to get it, but then I did, and I really thought I was going to die. It was so tough .... And the severity of illness is different for Koreans compared to them. They are inherently very healthy kids. We’re different from them. Their physical strength is different’. (participant #2172, female aged 59 years, Korean language preference).</p>	
		Initial fears due to CHB/ waned over time	<p>‘Um, it definitely concerned me in the beginning. If I did get COVID-19, I felt like because I had an underlying condition that I was like, oh, I’m just as good as gone. But you know, as it progressed on, I did get it, and it was kind of like a little cold, and for two days, and that was it’ (participant #1035, female aged 43 years, English language preference).</p>
		No different for CHB population	<p>‘No, not at all. I mean, I think hepatitis B with relation to COVID-19, I didn’t think there was any relationship to be concerned about. It’s a completely separate issue, so I didn’t think anything more about that’ (participant #1083, male aged 62 years, English language preference).</p>
		Silver lining—shared vulnerability	<p>‘Well, during that time, I can’t recall facing any specific disruptions or problems due to my condition. On the contrary, wearing masks and taking precautions might have even been helpful in a way, making me even more cautious in certain respects’ (participant #1118, male aged 82 years, Korean language preference).</p>
Non-health impact			
Negative	Isolation from family and friends	<p>‘But you know COVID-19 itself being separated from everybody else has some sort of negative impact on I guess everybody, including myself, even if even if I say I don’t feel it or I don’t see it. But you know, talking with other people and stuff like that definitely have impacted. But I would agree whether I would admit it or not’ (participant #1083, male aged 62 years, English language preference)</p>	
	Life challenges	<p>‘Well, it was stressful. Oh, because you have a family that you have to take care of and there was a lot of uncertainty at the beginning. At home to sit there and do nothing ... but I guess that has nothing to do with the HBV, I guess. It was the same for everyone’ (participant #2174, male aged 45 years, English language preference).</p> <p>‘Before COVID, my husband passed away on November 28, 2019, which was Thanksgiving Day. And then, right in December, COVID hit. So, when COVID came, my husband had just passed. There were so many documents and things to sort out by myself. There was a lot of paperwork to deal with. So, it took me about two years during the COVID-19 period to get through all of that’ (participant #1102, female aged 69 years, Korean language preference)</p> <p>‘Well, obviously when COVID was still really big, it definitely changed like my day-to-day life. You know as well as everyone else’s. And I think I feel like, the COVID pandemic kind of raised my stress levels a bit as a whole, just ‘cause that’s like when I was applying for college, and it was already a pretty stressful time. But other than that, I don’t think it directly impacted my current journey with hepatitis B’ (participant #1142, male aged 19 years, English language preference).</p> <p>‘I thought ‘If you get caught in something like this, you should just talk about it’. But they (co-workers) hide (COVID-19 infection). When they would get money from the government for not coming to work due to being sick, they would talk. But now that’s stopped, so they hide it because they won’t get paid otherwise’ (participant #2172, female aged 59 years, Korean language preference).</p>	
Positive	Silver lining—slowing life down	<p>‘Personally, it was great. It kind of forced me to have a break from my, from my life a little bit, because I’ve been hustling for many years. So, for that, for that three months where we were forced to shut down, it was kind of a blessing in disguise’ (participant #2139, male aged 39 years, English language preference).</p> <p>‘I was raising my young daughter, so we would just spend more time together, and we would go to the park, and yeah, we still had a lot of good fun times’ (participant #2139, male aged 40 years, English language preference)</p>	
	Silver lining—bringing people together	<p>‘I’m a musician, most of our activities were forced to move online, whatever we could. We were supposed to have a competition, so we had to rethink our strategy. But we eventually did do it virtually. Even though it was very difficult for us to just reshuffle everything that we were normally doing. Because everybody got depressed, everybody just stopped doing all the things that they will do, and I think this was a very positive experience that we were able to still provide opportunity for them to continue doing music’ (participant #1136, male aged 40 years, English language preference).</p>	
	Silver lining—economic benefit	<p>‘I run a restaurant. But you couldn’t eat inside during COVID-19. So, I switched to takeout. I changed the restaurant to takeout because you couldn’t eat inside. It turned out that sales actually increased’ (participant #2024, male aged 54 years, Korean language preference).</p>	

**Abbreviations:** CHB = chronic hepatitis B; HBV = hepatitis B virus.

medication was less of a concern during COVID-19 than access to medical care itself. Possibly due to the tight-knit nature of Korean American culture, especially among the Los Angeles, CA patients, loss of contact with family and friends was also less of a burden for many participants.

One notable pattern observed was the association between lower average COVID-19 impact scores and older age, which remained strongly significant in the final model, after adjusting for other influences. Despite being at risk of more severe health consequences if they contracted COVID-19, the oldest participants may have been buffered from other pandemic-related hardships such as employment and family caretaking and may have been able to maintain their day-to-day routines and social connections. This protection may have been especially true in more traditional multi-generational families and communities, in which caring for older persons remains a strong Korean cultural value.<sup>51</sup>

In the final model, only one other physical attribute was associated with impact score. Persons with higher BMI reported lower COVID-19 impact scores, although this relationship was not strongly significant. Living in the US with smaller stature as an adult may confer a greater sense of physical vulnerability to illness or adverse situations or be a marker for more adverse circumstances across the life course, including perinatal or childhood malnutrition.

Although self-reported ongoing financial hardship was not common among study participants, it was also associated with greater COVID-19 impact. The well-recognized pandemic-related disparities in the larger US population are reflected within this group of participants as well, confirming that limited financial resources going into the pandemic increased the hardship of the pandemic itself.

In addition to age, two measures related to cultural identity were the strongest predictors of COVID-19 impact. A self-identity as more strongly Korean was protective, and a higher level of acculturative stress related to encounters with non-Korean culture was associated with greater risk of adverse pandemic impact. Taken together, these results suggest that Korean Americans who stayed primarily within their family or neighborhood cultural enclaves during the pandemic drew support from these buffering resources, while those with more westernized identities and day-to-day lives that included more negative encounters with other cultures experienced more COVID-19-related challenges. In addition to cultural stressors, participants with greater feelings of stigma about their CHB, and those with greater depressive symptoms also found the pandemic more challenging.

When the qualitative interview participants were asked to 'look back' regarding their pandemic experiences, it is clear that the open-ended stories contribute complementary interpretations of the

pandemic's impact, and therefore do not confirm, but rather expand on findings from the baseline survey's more 'in the moment' structured index questions. In general, qualitative reflections include recognition that initial anxiety about CHB-related vulnerability typically resolved over time for many patients, although heightened vigilance was common. Also, participants reflected on some unexpected benefits from the pandemic, mostly that it allowed for a more relaxed lifestyle during lockdown.

The majority of participants were aged 60 or older, and many had other common chronic conditions in addition to CHB. For these individuals, who had been living with chronic liver infection for decades, strategies to successfully navigate the pandemic with an 'underlying condition' were possibly not much different than those taken by others in their age group.

However, for some respondents, contracting COVID-19 was a serious and frightening illness experience. For others, depending on their life course stage, both major events, such as the death of a spouse or trying for college acceptance, and daily hardships, such as work or family care, were made more difficult by the pandemic. Moreover, the quantitative results provide a framework for interpreting qualitative comments, by reminding us that the COVID-19 pandemic experience was more difficult, at least subjectively, within the context of existing challenges of financial hardship, depression, cultural conflict, and the internalized shame of living with CHB.

### Limitations and areas for further research

Because our data began mid-pandemic, we do not know if these CHB patients would have reported similar rates of depressive symptoms, acculturative stress, or CHB-related stigma pre-pandemic. Because the survey data are cross-sectional, it is most reasonable to see relationships between psychosocial resources and challenges on the one hand, and COVID-19 hardships on the other, as potentially bidirectional.

Another limitation is that in this analysis COVID-19 impact response patterns from these respondents were measured with a newly created set of items, which were drawn from the existing literature, but had not been previously validated in this population. We combined the items into a single index, which was normally distributed and displayed moderate reliability, confirming the utility of a single metric for exploring the experience of pandemic-related hardship. Nevertheless, there would be additional value in further analyzing the correlate patterns for each specific type of COVID-19 hardship within this or other populations. Two of our covariates, PHQ-9 and CHB-related stigma scores, were 'right skewed' with most respondents having relatively low scores, and therefore estimated

effects of these covariates should be interpreted accordingly. Finally, the qualitative in-depth interview was designed to explore many dimensions of the participants' lives and CHB experiences and did not focus solely on the pandemic. Therefore, a more targeted approach may have yielded more insights about COVID-19 experiences.

## CONCLUSION

This study offers insight about diverse individuals and their recent lived experiences within three uniquely intersecting identities – as Korean immigrants in the US, as Asian Americans during COVID-19, and perhaps most significantly, as persons managing an uncommon and potentially life-threatening chronic disease throughout their lifetime. The COVID-19 pandemic has arguably heightened our collective awareness of medical vulnerability. However, for these Korean Americans, this 'underlying condition' has always required navigating daily life to, on one hand, take precautions to delay disease progression, and on the other, enjoy a full life free from disease-related stigma or fears. Although these participants largely demonstrated resilience in recovering this balance post-pandemic, clinicians caring for CHB patients should be aware of the potential impact of cultural stress, disease-related stigma, and depression on their patients' quality of life and long-term health.<sup>36</sup>

## ARTICLE INFORMATION

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