



2024 latest report on hepatitis B virus epidemiology in China: current status, changing trajectory, and challenges

Ruiyi Yan^{1#}, Minghao Sun^{1#}, Huayu Yang¹, Shunda Du¹, Lejia Sun^{1,2}, Yilei Mao¹

¹Department of Liver Surgery, Peking Union Medical College (PUMC) Hospital, PUMC & Chinese Academy of Medical Sciences, Beijing, China;

²Department of General Surgery, The First Affiliated Hospital of Nanjing Medical University, Nanjing, China

Contributions: (I) Conception and design: L Sun, Y Mao; (II) Administrative support: H Yang, S Du, Y Mao; (III) Provision of study materials or patients: H Yang, S Du, Y Mao; (IV) Collection and assembly of data: R Yan, M Sun, L Sun; (V) Data analysis and interpretation: R Yan, M Sun, L Sun; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

[#]These authors contributed equally to this work.

Correspondence to: Yilei Mao, MD, PhD. Department of Liver Surgery, Peking Union Medical College (PUMC) Hospital, PUMC & Chinese Academy of Medical Sciences, No. 1 Shuaifuyuan, Wangfujing, Beijing 100730, China. Email: pumch-liver@hotmail.com; Lejia Sun, MD, PhD. Department of General Surgery, The First Affiliated Hospital of Nanjing Medical University, 300 Guangzhou Road, Nanjing 210029, China; Department of Liver Surgery, Peking Union Medical College (PUMC) Hospital, PUMC & Chinese Academy of Medical Sciences, Beijing, China. Email: sunlejia361@163.com.

Abstract: Hepatitis B virus (HBV) infection is a significant global public health concern, particularly in China, which accounts for one-third of the world's chronic HBV cases. Over the past three decades, China has made substantial progress in controlling HBV infection. Currently, the vaccination rate of the three-dose hepatitis B vaccine in China has risen to 99.6%, and the coverage of timely birth dose has reached 95.6%, significantly exceeding the global average level. The recent edition of chronic hepatitis B (CHB) prevention and treatment guideline has further expanded the treatment population to allow 94% of CHB patients meet the treatment criteria. With the complete immunization for newborns, in combination with antiviral treatment for HBV infected pregnant women, the mother-to-child transmission (MTCT) rate in China has decreased to 0.23%. The prevalence of hepatitis B surface antigen (HBsAg) has significantly declined to 5.86% in the general Chinese population. Specifically, among children under five years old, HBsAg prevalence showed the most significant reduction, from 9.67% in 1992 to 0.30% in 2020. However, challenges remain in achieving the World Health Organization (WHO)'s 2030 targets. In 2020, only 58.78% of HBV-positive individuals in China were aware of their status and 17.33% received antiviral therapy. The burden of HBV-related complications such as liver cirrhosis and hepatocellular carcinoma persists despite declining HBV infection rates. In this review, we analyzed the current status and evolving trajectory of HBV prevention and control in China, utilizing the latest data from national surveys, the Chinese Center for Disease Control and Prevention, and the WHO's 2024 report. We summarized the progress made, highlighted disparities, and outlined the persistent challenges and opportunities for HBV elimination. We recommend that future efforts focus on maintaining strict control of mother-to-child and bloodborne transmission, expanding screening strategies, improving early accessibility and diagnostic rates, addressing regional healthcare disparities, enhancing treatment accessibility and coverage, and ensuring timely antiviral therapy to ultimately achieve elimination goals.

Keywords: Hepatitis B virus (HBV); hepatitis; hepatitis B surface antigen (HBsAg); epidemiology; mother-to-child transmission (MTCT)

Submitted Dec 20, 2024. Accepted for publication Jan 02, 2025. Published online Jan 17, 2025.

doi: 10.21037/hbsn-2024-754

View this article at: <https://dx.doi.org/10.21037/hbsn-2024-754>

Introduction

Hepatitis B virus (HBV) infection is a major public health problem worldwide and among the most prevalent causes of liver cirrhosis, liver cancer, and viral hepatitis-related fatalities (1). The World Health Organization (WHO) estimated that the global seroprevalence of hepatitis B surface antigen (HBsAg) is 3.2%, with 254 million individuals chronically infected with HBV and ~820,000 people succumbing to HBV-related disorders by 2024 (2). To take proactive measures towards the sustainable development goal of preventing and treating hepatitis, the WHO sanctioned the “Global Health Sector Strategy on Viral Hepatitis” in 2016, setting an objective to eliminate viral hepatitis as a public health menace by 2030, with the aim of reducing new infections by 90% and mortality by 65%. Therefore, HBV infection remains a formidable challenge leading to a significant disease burden (3).

China is facing a substantial burden of hepatitis B infection. According to a recent estimation, approximately 75 million people in China are afflicted with hepatitis B, accounting for nearly one-third of the 254 million individuals

chronically infected with HBV worldwide (4–6). From 1970 to 1992, owing to loopholes in domains such as injection and blood transfusion management, there was an explosive increase in HBV carriers in China. With the incorporation of the hepatitis B vaccine into planned immunization management, utilization of immunoglobulins, advancement of medical technology, and continuous enhancement of people’s awareness regarding HBV, the number of chronic hepatitis B (CHB) infections in China significantly declined. From 1992 to 2020, health officials in China conducted four nationally representative serological surveys to monitor and evaluate national HBV prevention and control circumstances (4,7). The latest HBV Epidemic Status survey was conducted in 31 provinces (cities and autonomous regions) across the country in 2020 (4), initiated by the “13th Five-Year Plan” for Infectious Diseases. This survey encompassed 91,896 individuals, and the latest national HBV serological survey results were disclosed for 2024 (4). Additionally, based on a previous report from 2016 to 2020, the WHO officially released the latest *Global Hepatitis Report 2024*, which is the first comprehensive report integrating the epidemiology of viral hepatitis, covering the scope of services provided, and offering data on improved actions (5).

Overall, the prevalence of HBsAg among the general population in China and children aged 1–4 years has decreased significantly. The prevalence of HBsAg among the general population of China is 5.86% (75 million), which is higher than the global average of 3.2%. Among the survey participants, approximately 58.78% of those aged ≥15 years and older who were infected with hepatitis B were aware of their infection status, which was higher than the previous estimate. Additionally, 17% of the respondents with known indications for antiviral therapy were administered it, while the corresponding global data were only 13% (2,4).

The latest data on the HBV prevalence in China holds significant value for both national and global efforts to eliminate the burden of hepatitis. It highlights the remarkable achievements made in hepatitis prevention and control in China over the past few decades and underscores the ongoing challenges in the fight against hepatitis. We systematically analyzed the current status and evolving trends of hepatitis prevention and control in China by integrating data from recent national surveys, the Chinese Center for Disease Control and Prevention, and the WHO reports (4–6). By summarizing the progress and disparities in hepatitis B elimination efforts over the past 30 years, we identified the key difficulties impacting current prevention and control measures. This review provides crucial data to

Highlight box

Key findings

- China has made substantial progress in controlling hepatitis B virus (HBV) infection over the past three decades.
- The prevalence of hepatitis B surface antigen (HBsAg) in the general population in China steadily decreased to 5.86%.
- The overall mother-to-child transmission (MTCT) rate in China dropped to 0.23%.
- The HBsAg seroprevalence among children aged 1–4 years has significantly declined to 0.3%, approaching the 2030 targets set by the World Health Organization.

What is known and what is new?

- China has the largest burden of hepatitis B worldwide, with one-third of global chronic HBV cases.
- Over the past 30 years, China has continuously reduced HBsAg prevalence in general population and achieved effective MTCT prevention, reducing the transmission rate to 0.23%.
- Gaps remain in early diagnosis, with many chronic HBV carriers unaware of their infection status and inadequate antiviral therapy coverage.

What is the implication and what should change now?

- Future efforts should focus on maintaining strict control of MTCT, expanding screening and treatment coverage, improving early accessibility and diagnostic rates, and addressing regional healthcare disparities.

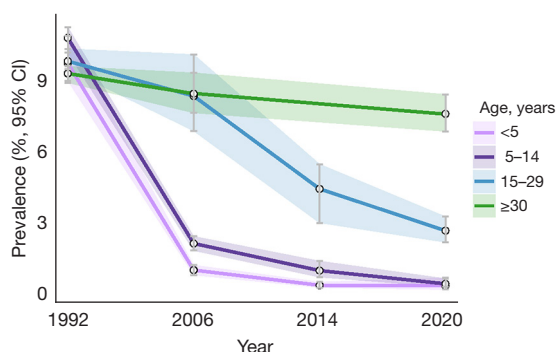


Figure 1 Trends in HBsAg prevalence in China (1992–2020), stratified by age (<5, 5–14, 15–29, and ≥30 years). Data from the fourth national serological survey, 2020 (4). CI, confidence interval; HBsAg, hepatitis B surface antigen.

support future planning for major infectious disease control, the establishment of national key research programs, and the implementation of hepatitis elimination strategies.

Steady decrease in HBsAg prevalence among the general population in China

Over the past 30 years, the prevalence of HBsAg among the general population of China has been steadily declining. The latest national serum survey in 2020 indicated that the current prevalence in China is 5.86%, representing a 39.9% decrease compared with that in 1992 (8) (*Figure 1*). Specifically, the most significant decline was among children under five years of age, exceeding 96% from 1992 to 2020 and dropping from 9.67% to 0.30%. HBV was once highly endemic (HBsAg prevalence ≥8%) in China, with serosurveys in 1992 revealing a 9.72% prevalence of HBsAg (8). China implemented comprehensive strategies to prevent HBV transmission, including immunization, promotion of safe injection practices, blood donation screening, and surveillance. China transitioned to a higher intermediate endemic area for HBV infection (HBsAg prevalence, 5–7.99%) (7,9). National surveys have shown a decrease in the prevalence of HBsAg in the general Chinese population, from 9.72% in 1992 to 7.18% in 2006. International studies have estimated 79–86 million cases of chronic HBV infections in China (10).

Nevertheless, the latest national survey conducted in 2020 revised these data; ~75 million cases of chronic HBV infection exist in China. According to recent international model estimations, the prevalence of HBsAg in China is

expected to reach approximately 5.0% by 2024, approaching the level of a lower-intermediate endemic area (10) (*Figure 2*).

Furthermore, a meta-analysis of HBV infections in China from 1973 to 2021 revealed that the seroprevalence of HBsAg varied among the major regions/territories of China (*Figure 3*). All patients, except those in Hong Kong witnessed a decline in HBsAg seroprevalence (11). Further, North China shows the lowest HBsAg seroprevalence [2.5%, 95% confidence interval (CI): 2.2–2.8%] among six regions in China. Decline in HBsAg seroprevalence was observed at the provincial level during this period, although at different magnitudes. Overall HBsAg seroprevalence varied more than 3.5-fold at the provincial level, with the highest prevalence observed in Tibet and the lowest seroprevalence observed in Beijing and Shanxi. The disequilibrium in HBV infection rates across Chinese mainland may be predominantly explained by the differential coverage and initiation time of HBV vaccination among regions (12). The HBV infection rate was higher in Taiwan and Hong Kong than that in Chinese mainland, which might be mainly due to the high historical prevalence of HBV infection, despite excellent vaccination coverage (10,13–15).

Nationwide meta-analyses and annual percentage change (APC) analyses have also revealed a significant decline in HBsAg seroprevalence in both men (from 8.8% in 1973–1992 to 4.6% in 2006–2021) and women (from 6.3% in 1973–1992 to 3.9% in 2006–2021). The HBsAg seroprevalence was significantly higher in men than in women (*Figure 4*). However, the rate of decline was twice as fast in men as in women during the study period (APC: -3.90 vs. -1.82), thereby reducing sex-specific differences over time. Similarly, both rural and urban populations exhibited significant declines in HBsAg seroprevalence, with a stronger trend observed in urban areas (APC = -4.34 , 95% CI: -4.74 to -3.93) compared to rural areas (APC = -3.01 , 95% CI: -3.78 to -2.24) (*Figure 4*). The urban-rural disparity might be attributed to the relatively scarce medical resources in the rural areas of our country. Therefore, all aspects, including the government, healthcare providers, and communities, should make joint efforts to curb HBV transmission in rural populations.

Additionally, variations in HBsAg seroprevalence trends by age were examined, revealing declines across most age groups, including individuals aged <5 years, 5–14 years, 15–29 years, and ≥30 years (4,11) (*Figure 1*). Over the past four decades, there has been a 7.7% annual decrease in HBsAg seroprevalence in children aged <5 years, reflecting

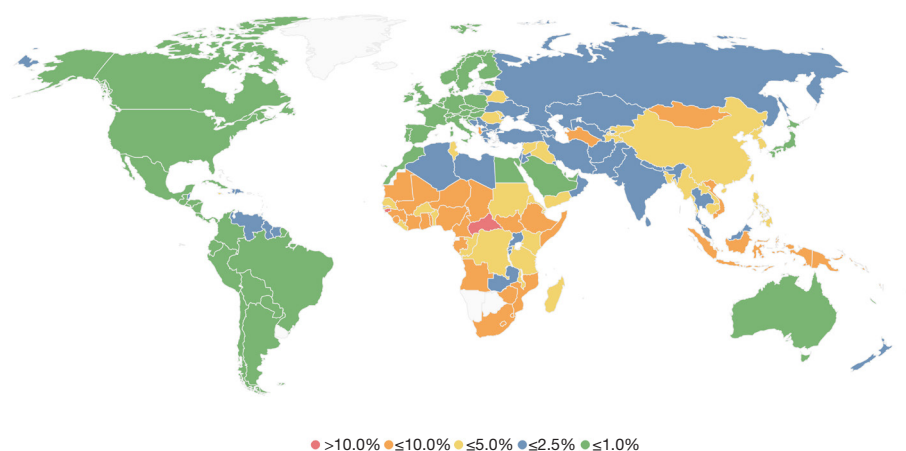


Figure 2 Global prevalence of HBsAg across different regions, 2024. Data from Polaris database of HBsAg prevalence global distribution (6). HBsAg, hepatitis B surface antigen.



Figure 3 HBsAg prevalence among the major regions/territories of China, 2006–2021. Data from meta-analysis for HBsAg seroprevalence in the general population in China (11). HBsAg, hepatitis B surface antigen.

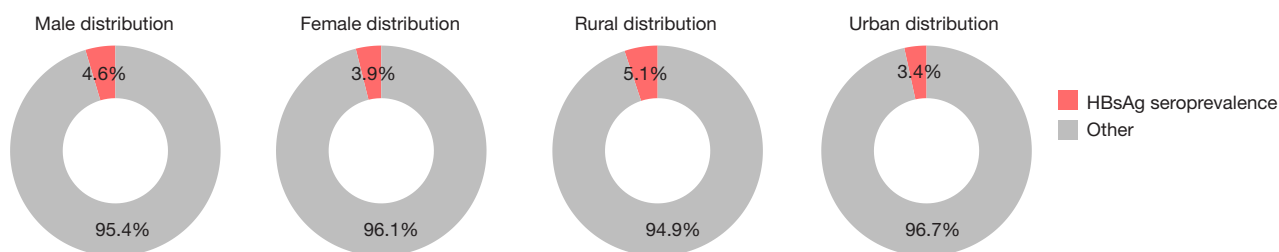


Figure 4 Gender and rural-urban disparities in HBsAg prevalence, 2006–2021. Data from meta-analysis for HBsAg seroprevalence in the general population in China (11). HBsAg, hepatitis B surface antigen.



Figure 5 HBV vaccination coverage in China during 2004–2022 period, including timely birth dose of HepB and the full 3-dose regime. Data from WHO and the UNICEF database based on national vaccination progress reports (<http://apps.who.int/gho/data/node.main.A824?lang=en>) (22). HBV, hepatitis B virus; HepB, hepatitis B vaccination; TBD, timely birth dose; WHO, World Health Organization; UNICEF, United Nations International Children's Emergency Fund.

the success of China's immunization strategy. Notably, there was an increase in HBV prevalence among persons ≥ 60 years, reflecting long-lasting infection acquired in early childhood (16). For older adults aged >60 years, all were born before 1960, that is, 20–30 years before the initiation of HBV vaccination. In addition to the absence of preventive measures at that time, the high prevalence of HBV infection is expected to have contributed to the elevated HBV seroprevalence in older birth cohorts (11).

According to a 2024 WHO hepatitis report, the global prevalence of HBV infection will be 3.2% (254 million cases) in 2022 (5). China is situated in the Western Pacific Region, where the prevalence rate of HBV was the second highest worldwide at 5.0% (96.8 million cases), surpassed only by the African Region with a rate of 5.8% (64.7 million cases) (*Figure 1*) (2). The WHO estimated that the prevalence of HBsAg in China in 2022 would be approximately 5.6%, constituting 31.5% of the global rate and 82.2% of that in the Asia-Pacific region. These outcomes were comparable to those of a survey in China (4). Although the prevalence rate of HBsAg in China has declined significantly, due to the large number of the HBV-infected population infected with the HBV, there still exists a relatively heavy disease burden.

Goal of HBV transmission elimination in China

China's strategies for the prevention of HBV transmission

focus on neonatal vaccination, elimination of mother-to-child transmission (MTCT) and blood-borne transmission. In regions where hepatitis B is prevalent, including China, MTCT during childbirth is the primary source of chronic HBV infection, which is estimated to contribute to 30–50% of new cases (17). The WHO Global Health Sector Strategy on Viral Hepatitis aims to eliminate hepatitis B as a public health threat by 2030, with a reduction in the prevalence of HBsAg positivity to below 0.1% in children aged 5 years (18,19).

First of all, hepatitis B vaccination is the most effective method for preventing HBV infection. China initiated a universal infant hepatitis B vaccination (HepB) program in 1992, recommending a timely birth dose (TBD) of HepB and a full 3-dose regimen. In 2005, the government began providing free Hep B vaccination services to all newborns. To reduce the MTCT rate of HBV further, China launched a program for the Triple Elimination of MTCT for human immunodeficiency virus (HIV), syphilis, and HBV (PMTCT) in 2011. This program-free routine prenatal screening program for HBsAg prescribes additional antiviral drugs to HBsAg-positive women during pregnancy. The PMTCT program also ensures free hepatitis B immunoglobulin (HBIG) for all infants born to HBsAg-positive women (20).

Owing to these efforts, in China, coverage rates for three-dose HepB have increased from 30.0% in 1992 to 99.6% in 2020, while TBD coverage from 22.2% to 95.6% during the same period (21) (*Figure 5*). Compared to the

most recent global data, only 85% of infants received three doses of HepB before 1 year of age, 46% received TBD coverage, and 14% received HBIG along with the full vaccination regimen (2). According to the latest 2020 nationwide seroprevalence survey, the prevalence of HBsAg in children has decreased significantly from 9.67% in 1992 to 0.30% in 2020 nationwide seroprevalence survey (4). In the meanwhile, the global HBsAg prevalence among children aged 5 years or younger was estimated to be 0.7% (95% CI: 0.6–1.0%), corresponding to 5.6 million (95% CI: 4.5–7.8) children with HBV infection (2). Consequently, the HBsAg prevalence among children under 5 years of age in China is lower than the global average but still above the global goal of <0.1% by 2030. This demonstrates China's significant efforts and accomplishments in hepatitis B prevention through immunization programs.

Prevention of MTCT of HBV in China is also manifested in the comprehensive management of HBsAg-positive women of childbearing age. The prevalence of HBsAg among Chinese women aged 15–49 years in their childbearing years significantly decreased from 8.18% in 1992 to 6.61% in 2006, and further decreased to 5.87% in 2020. Stratified age analysis revealed that the prevalence of HBsAg among women at peak childbearing ages (20–29 and 30–39 years old) decreased to 2.83% and 5.89%, respectively, representing a reduction of 65.02% and 27.91%, respectively, compared to that in 1992. Furthermore, for women aged between 15 and 19 years who will enter the highest fertility age within the next 5 years, HBsAg prevalence has been reduced to <1% (4).

A real-world study (the SHIELD program) involving 30,109 pregnant women in China demonstrated that the overall nationwide MTCT rate (vertical transmission in pregnant women with HBV infection) was as low as 0.23% (23). Among HBV infected pregnant women, those with hepatitis B e-antigen (HBeAg) typically exhibit elevated HBV DNA levels and significantly higher MTCT rates (24–26). In 2020, 12.73% of HBsAg-positive women of childbearing age tested positive for HBeAg, representing a decrease from the proportion observed in 2006 (23.50%) (25,27,28). Initiating oral antiviral therapy during the second or third trimester of pregnancy in women with high HBV DNA levels can reduce the MTCT of HBV (29). Finally, the SHIELD program indicated that with comprehensive management, including passive and active immunoprophylaxis of infants and antiviral prophylaxis of mothers, the HBV MTCT rate decreased to 0.16% in hospitals and 0.03% in community settings (23).

In addition, ensuring blood and injection safety plays a critical role in cutting off the bloodborne transmission of HBV. Since 2015, China has achieved 100% coverage of HBV nucleic acid testing for donations at blood banks. To ensure safe injections in health facilities, China has officially prohibited the reuse of disposable sterile medical devices in healthcare settings since 2000, and all reusable injection equipment had been eliminated in 2010 (30). Also, the government provides clean syringes to injection drug users to reduce HBV transmission via contaminated injection paraphernalia. Between 2014 and 2021, each injection drug user received approximately 240 clean needles per year (31). By the end of 2021, there were 578 needle exchange sites across 11 provinces. Therefore, a significant reduction in HBV transmission through blood has been witnessed.

Lack of timely diagnosis and standard treatment is the primary challenge in hepatitis B prevention

Timely diagnosis and standardized treatment are crucial strategies for reducing HBV-related mortality, and their deficiency is the primary challenge in HBV prevention. WHO has set a target for HBV diagnosis and antiviral treatment rates to reach 90% and 80% respectively by 2030. However, in 2023, the Polaris Observatory Collaborators estimated that among 257.5 million HBsAg positive individuals worldwide, only 36.0 million will be diagnosed, and only 6.8 million of the estimated 83.3 million eligible for treatment will receive antiviral treatment (2). The diagnostic rate in China is slightly higher than that globally, with 58.78% of individuals with positive HBsAg already aware of their status through screening or testing prior to the survey (4). Among those who were aware of their HBV infection status, 38.25% had indications for antiviral treatment, whereas only 17.33% had received it (4).

It is estimated that at least 30 million HBsAg-positive individuals in China are still unaware of their infection status; thus, they are unable to receive standardized diagnosis and treatment. Additionally, ~14 million individuals in need of antiviral treatment for HBV have not received intervention (4). The estimated Chinese HBV testing rate in the 2020 survey data has not yet reached the WHO target, but is significantly higher than the global average at that time and exceeds previous estimates of 20–36% (4,30). Moreover, the Chinese government mandates that medical institutions screen for hepatitis B in all pregnant women during antenatal care and in

patients undergoing surgery, hospitalization, hemodialysis, or invasive diagnosis and treatment. Free hepatitis B screening for pregnant women and blood donors as well as a significant increase in the number of surgeries among inpatients (from 14.0 million in 2002 to 50.8 million in 2016) have greatly improved the detection and diagnosis of HBV infection (32).

Current antiviral drugs can suppress HBV replication and reduce liver disease progression, which is necessary for most patients with CHB. These include entecavir (ETV), tenofovir disoproxil fumarate (TDF), and tenofovir alafenamide fumarate (TAF) (33). Since 2005, the guidelines for the prevention and treatment of CHB in China have undergone five editions: the 2005, 2010, 2015, and 2019 editions, and the latest 2022 edition. The latest 2022 guidelines have expanded the scope of HBV antiviral therapy compared to 2019, potentially increasing the number of individuals requiring antiviral therapy in China to more than the previously estimated 17 million (34). The 2024 version of the WHO Hepatitis B Prevention and Treatment Guidelines also includes expanding the population eligible for treatment as an important revision, aiming to enable at least 50% of HBsAg-positive individuals to receive antiviral treatment (35). However, there are differences in treatment thresholds between the Chinese and WHO guidelines, particularly regarding whether patients with HBV DNA <2,000 IU/mL and aged >30 years need to initiate antiviral therapy.

Achieving coverage for HBV diagnosis and treatment remains a challenging target, both in China and globally. According to our country's latest guideline, it is estimated that nearly 95% of patients with detectable HBV DNA are eligible for antiviral treatment (36). By incorporating the WHO guideline recommendations, CHB patient treatment coverage can be further increased by lowering AST to platelet ratio index (APRI) diagnostic thresholds and alanine aminotransferase (ALT) treatment thresholds, potentially expanding China's CHB patient treatment coverage rate (37).

Spectrum of liver disease due to hepatitis B has changed in recent 3 decades

A major concern associated with chronic HBV infection lies in its potential long-term complications, with approximately 15–40% of patients at risk of developing liver cirrhosis, hepatocellular carcinoma (HCC), liver transplantation (LT), and HBV-related death (38). The 2020 national serological survey on HBV was the first to incorporate research into the liver disease status of a population positive for HBsAg.

Among individuals aged ≥ 15 with positive HBsAg, the weighted proportions of carriers (with no evidence of liver damage), CHB (with liver enzyme abnormalities), cirrhosis, and suspected HCC were 78.03%, 19.63%, 0.84%, and 0.15% respectively (4).

The annual reduction in the prevalence of HBV infection has also influenced the spectrum of HBV-related liver diseases. The age-standardized incidence rate (ASIR) and age-standardized DALY rate (ASDR) were used to quantify the disease burden of HBV infection. Based on data from the Global Burden of Diseases Study 2019 (GBD 2019), the ASIRs for global acute hepatitis, cirrhosis, other chronic liver diseases, and liver cancer decreased from 1990 to 2019 (39). A similar trend has been observed in China. Enhanced vaccination coverage and the accessibility of highly effective nucleos(t)ide analogs have contributed to the gradual decline in the ASIR of HBV-associated diseases in China [APC, -2.3 (-2.4 to 2.1)] (40). For instance, the ASIR of acute hepatitis B in China dropped from 2,699.35/100,000 in 1990 to 1,384.26/100,000 in 2019, representing a 48.7% reduction. Similarly, there has been a decline in the ASIRs and ASDRs for HBV-related liver cancers over the recent 30 years (40). Among other liver diseases that cause liver cancer, ASIRs and ASDRs have remained stable in alcohol-related liver cancer and have increased in metabolic dysfunction-associated steatotic liver disease (MASLD) (41,42).

According to the 2024 WHO Global Hepatitis Report, an estimated 1.3 million people will die from viral hepatitis in 2022, which is a communicable disease with increasing mortality. Among them, hepatitis B was responsible for 1.1 million. Although China has effectively prevented perinatal HBV infections, the burden of previous chronic HBV infections remains high in the general population. National surveys in China have consistently indicated a decline in the prevalence of HBsAg among individuals over 50 years of age, reflecting excess or premature deaths due to HBV cirrhosis and HCC, which is consistent with the aging of the HBsAg-positive population and the natural history of HBV infection. In China, HBV-related liver diseases account for over 30% of the global HBV mortality, with 0.308 million deaths per year.

From 1990 to 2019, the net drift of incidence and mortality was -2.3% (-2.4 – 2.2%) and -5.6% (-5.8 – 5.3%) per year, respectively, for HBV-associated diseases (40), indicating a rapid decrease in incidence and mortality in China. In 2019, the number of HBV-associated deaths was ~162,000, among which liver cancer caused the highest

Table 1 Progresses and gaps towards elimination of hepatitis B in China and globally

Assessment items	Global, 2022 (2,5)	China, 2020 (4)	WHO, 2030
Incidence	1.23 million (estimated in 2022, 0.81–1.53 million)	1.05 million (in 2023) (6)	90% reduction* (equivalent to 0.1% prevalence of HBsAg among children)
Death from HBV-related disease burden (45) (in 2021)	649,184	218,550	65% reduction*
HBsAg prevalence in general population	3.2%	5.86%	NA
HBsAg-positive population	254 million	75 million	NA
Hepatitis B virus vaccination	85%	99.6%	90%
TBD	46%	95.6%	90%
HBIG and full vaccination	14%	100%	NA
Blood safety (% of donations screened)	97	Nucleic acid test 100%	100%
HBV diagnosis rate	14%	58.78%	90%
Antiviral treatment coverage	8%	17.33%	80%
HBsAg prevalence among children aged 5 years or younger	0.70% (2)	0.30%	0.1%

*, all the reduction goals are based on global 2015 levels (5). WHO, World Health Organization; HBsAg, hepatitis B surface antigen; HBV, hepatitis B virus; TBD, timely birth dose; HBIG, hepatitis B immunoglobulin.

mortality rate (5.8 per 100,000), followed by cirrhosis [2.2 per 100,000 for HBV, 2.3 per 100,000 for hepatitis C virus (HCV)] and acute hepatitis (<1 per 100,000 for HBV or HCV). Deaths from various liver diseases caused by hepatitis B decreased from 1990 to 2019 by 74.83%, 34.71%, and 23.34% for acute hepatitis, cirrhosis, other chronic liver diseases, and liver cancer, respectively (43). Specifically, alcohol use was regarded to be associated with the deaths of HBV-related cirrhosis and other chronic liver diseases, with a large proportion (57.9%) of mortality among those patients being attributable to alcohol use (40,44).

Challenges and future directions of HBV control in China

Although China has made significant progress in interrupting the transmission of HBV, the burden of HBV-related diseases remains substantial (*Table 1*). While the HBsAg prevalence in the general population has decreased to 5.86%, a nearly 20% reduction compared to the previous survey, it remains relatively high globally, slightly above the 5.0% prevalence rate in the Western Pacific region. Due to China's large population, approximately one-third of the world's HBV carriers are in China, contributing to a considerable remaining disease burden. The global

Hepatitis Policy Index (HPI) trends from 2019 to 2023 indicate that there is still significant room for improvement in China's HBV elimination policy (46). Furthermore, the prevalence of HBsAg among middle-aged and elderly individuals shows an upward trend. In particular, for individuals aged over 60 years, all were born prior to 1960, 20–30 years before the initiation of the HBV vaccination program. The lack of preventive measures at that time, coupled with the high prevalence of HBV infection, likely contributed to the elevated HBV seroprevalence in older birth cohorts (11).

As mentioned above, less than 60% of the HBsAg patients are aware of their infectious status and less than 20% receive interventions in China. Considering the current disease burden of HBV infection, future efforts should prioritize diagnosis and antiviral therapy. First, it is crucial to enhance screening strategies, improve early accessibility, and increase HBV diagnosis rates. A 2022 study on the cost-effectiveness of universal screening for chronic HBV infection in China concluded that a five-test universal screening strategy for individuals aged 18–70 years, to be implemented within the next decade, represents the optimal approach for China and could prevent 3.46 million liver-related deaths (47). For the antiviral treatment, both guidelines and consensuses on HBV prevention in China

and globally have expanded the indications recently. Another Modeling shows that implementing a universal treatment strategy for HBsAg-positive individuals has the highest cost-effectiveness (48).

Additionally, for chronic HBV carriers, significant challenges persist in attaining the targets to reduce mortality. In 2019, hepatitis B-related liver diseases led to 162,000 deaths in China, with over 98% attributable to cirrhosis and other chronic liver diseases caused by hepatitis B (26.04%) and liver cancer caused by hepatitis B (72.18%) (43). The GBD data revealed that HBV accounted for 68% of cirrhosis cases and 65% of HCC cases in China, whereas the corresponding figures were 42% and 56% globally (49). Although a downward trend in the mortality of liver disease caused by HBV has been observed, HBV is still a major cause of liver disease-related mortality in China and many other countries such as India and Nigeria (40,43,50). For HBV-related complications such as HCC, regular monitoring is critical for early detection and treatment, which are significant in improving patient survival (51). On the other hand, for individuals who are positive for HBV DNA, one of the ideal therapeutic goals is to achieve clinical cure (also referred to as functional cure). Antiviral treatment should be initiated as early as possible to minimize inflammation and fibrosis, thereby reducing the incidence of end-stage liver disease. Previous studies have shown that the proportion of patients achieving clinical cure of hepatitis B after long-term treatment remains below 10%. However, China's recent combination therapy strategy has successfully raised the HBV clinical cure rate to over 30% for the first time (52). Over the next decade, achieving functional cure for CHB patients remains a major challenge for the international medical community, and new drug targets and therapeutic strategies need further development.

Last but not least, there are still regional disparities in HBV screening and treatment. Therefore, through resource decentralization, establishing community-based, population-wide HBV screening, referral systems, and standardized treatment will contribute to the construction of a more comprehensive hepatitis B prevention and control system. In addition, national drug price negotiations and collective procurement significantly reduce the cost of antiviral medications, thereby increasing treatment accessibility. For instance, the monthly cost of TDF has decreased from 1,500 CNY to below 10 CNY after collective procurement. This initiative helps reduce the disparities in HBV control across different geographic regions, urban and rural areas, and social-economic groups.

In conclusion, over the past three decades, China has made remarkable progress in controlling HBV infection through comprehensive strategies, particularly universal vaccination programs. However, significant challenges remain in achieving WHO's 2030 HBV elimination targets. Future efforts should focus on expanding screening strategies, improving treatment accessibility, and addressing regional healthcare disparities to achieve the elimination goals.

Acknowledgments

None.

Footnote

Peer Review File: Available at <https://hbsn.amegroups.com/article/view/10.21037/hbsn-2024-754/prf>

Funding: This work was supported by grants from the National High-Level Hospital Clinical Research Funding (No. 2022-PUMCH-B-034 to Y.M.), Chinese Academy of Medical Sciences Initiative for Innovative Medicine (No. 2021-I2M-1-058 to Y.M.), National Natural Science Foundation of China (No. 32271470 to H.Y., 82300754 to L.S.), Beijing-Tianjin-Hebei Basic Research Cooperation Special Project (No. 22JCZXJC00200 to Y.M.).

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://hbsn.amegroups.com/article/view/10.21037/hbsn-2024-754/coif>). H.Y. and S.D. serve as the unpaid editorial board members of *HepatoBiliary Surgery and Nutrition*. Y.M. serves as the Editor-in-Chief of *HepatoBiliary Surgery and Nutrition*. The other authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Cite this article as: Yan R, Sun M, Yang H, Du S, Sun L, Mao Y. 2024 latest report on hepatitis B virus epidemiology in China: current status, changing trajectory, and challenges. *HepatoBiliary Surg Nutr* 2025;14(1):66-77. doi: 10.21037/hbsn-2024-754