Global change in hepatitis C virus prevalence and cascade of care between 2015 and 2020: a modelling study

Peer-reviewed author version

Blach, Sarah; Terrault, Norah A.; Tacke, Frank; Gamkrelidze, Ivane; Craxi, Antonio; Tanaka, Junko; Waked, Imam; Dore, Gregory J.; Abbas, Zaigham; Abdallah, Ayat R.; Abdulla, Maheeba; Aghemo, Alessio; Aho, Inka; Akarca, Ulus S.; Alalwan, Abduljaleel M.; Blome, Marianne Alanko; Al-Busafi, Said A.; Aleman, Soo; Alghamdi, Abdullah S.; Al-Hamoudi, Waleed K.; Aljumah, Abdulrahman A.; Al-Naamani, Khalid; Al Serkal, Yousif M.; Altraif, Ibrahim H.; Anand, Anil C.; Anderson, Motswedi; Andersson, Monique, I; Athanasakis, Kostas; Baatarkhuu, Oidov; Bakieva, Shokhista R.; Ben-Ari, Ziv; Bessone, Fernando; Biondi, Mia J.; Bizri, Abdul Rahman N.; Mello, Carlos E. Brandaoo; Brigida, Krestina; Brown, Kimberly A.; Brown, Robert S., Jr.; Bruggmann, Philip; Brunetto, Maurizia R.; BUSSCHOTS, Dana; Buti, Maria; Butsashvili, Maia; Cabezas, Joaquin; Chae, Chungman; Ivanova, Viktorija Chaloska; Chan, Henry Lik Yuen; Cheinquer, Hugo; Cheng, Kent Jason; Cheon, Myeong Eun; Chien, Cheng Hung; Chien, Rong Nan; Choudhuri, Gourdas; Christensen, Peer Brehm; Chuang, Wan Long; Chulanov, Vladimir; Cisneros, Laura E.; Coco, Barbara; Contreras, Fernando A.; Cornberg, Markus; Cramp, Matthew E.; Crespo, Javier; Cui, Fuqiang; Cunningham, Chris W.; Abou, Lucy Dagher; Dalgard, Olav; Dao, Doan Y.; De Ledinghen, Victor; Derbala, Moutaz F.; Deuba, Keshab; Dhindsa, Karan; Djauzi, Samsuridjal; Drazilova, Sylvia; Duberg, Ann Sofi; Elbadri, Mohammed; El-Sayed, Manal H.; Esmat, Gamal; Estes, Chris; Ezzat, Sameera; Farkkila, Martti A.; Ferradini, Laurent; Ferraz, Maria Lucia G.; Ferreira, Paulo R. Abrao; Kanizaj, Tajana Filipec; Flisiak, Robert; Frankova, Sona; Fung, James; Gamkrelidze, Amiran; Gane, Edward J.; Garcia, Virginia; Garcia-Samaniego, Javier; Gemilyan, Manik; Genov, Jordan; Gheorghe, Liliana S.; Gholam, Pierre M.; Null, Adrian Goldis; Gottfredsson, Magnus; Gray, Richard T.; Grebely, Jason; Gschwantler, Michael; Hajarizadeh, Behzad; Hamid, Saeed S.; Hamoudi, Waseem; Hatzakis, Angelos; Hellard, Margaret E.; Himatt, Sayed; Hofer, Harald; Hrstic, Irena; Hunyady, Bela; Husa, Petr; Husic-Selimovic, Azra; Jafri, Wasim S. M.; Janicko, Martin; Janjua, Naveed Z.; Jarcuska, Peter; Jaroszewicz, Jerzy; Jerkeman, Anna; Jeruma, Agita; Jia , Jidong; Jonasson, Jon G.; Kaberg, Martin; Kaita, Kelly D. E.; Null, Kulpash S. Kaliaskarova; Kao, Jia Horng; Kasymov, Omor T.; Hanku, Angela Kelly; Khamis, Faryal; Khamis, Jawad; Khan, Aamir G.; Khandu, Lekey; Khoudri, Ibtissam; Kielland, Knut B.; Kim, Do Young; Kodjoh, Nicolas; Kondili, Loreta A.; Krajden, Mel; Krarup, Henrik Bygum; Kristian, Pavol; Kwon, Jisoo A.; Lagging, Martin; Laleman, Wim; Lao, Wai Cheung; Lavanchy, Daniel; Lazaro, Pablo; Lazarus, Jeffrey, V; Lee, Alice U.; Lee, Mei Hsuan;

Global Change in Hepatitis C Virus Prevalence and Cascade of Care between 2015 and 2020: A Modeling Study.

Authors: The Polaris Observatory HCV Collaborators‡

Corresponding Author: Sarah Blach, Address: Center for Disease Analysis Foundation, 1120 W. South Boulder Rd. Suite 102, Lafayette, CO, 80026; Phone number: (720) 890-4848; Email address: sblach@cdafound.org

Reprint Author: Sarah Blach, Address: Center for Disease Analysis Foundation, 1120 W. South Boulder Rd. Suite 102, Lafayette, CO, 80026; Phone number: (720) 890-4848; Email address: sblach@cdafound.org

Author contributions: Conceptualization - HR, SB; Data curation - All authors; Formal Analysis - SB, CE, DRS, EM, HR, IG, and KRS; Funding acquisition - HR; Methodology - SB; Project administration - SB; Supervision - HR, SB; Validation - All authors; Visualization - CE, SB; Writing – original draft - SB, CE, DRS, EM, HR, IG, and KRS; Writing – review & editing - All authors

Running title: Global Prevalence of Viremic HCV

Abbreviations: Global Burden of Disease (GBD); Hepatitis C Virus (HCV); Hepatocellular Carcinoma (HCC); Ribonucleic Acid (RNA); Uncertainty Intervals (UI); Sustained viral response (SVR); World Health Organization (WHO)

Abstract

Background: Since the release of the first global hepatitis elimination targets in 2016 and until the COVID-19 pandemic started in early 2020, many countries and territories were making progress toward hepatitis C virus (HCV) elimination. This study aimed to evaluate progress towards HCV elimination at the start of the year 2020, prior to the pandemic.

Methodology: This analysis includes a literature review, Delphi process and mathematical modeling to estimate HCV prevalence and cascade of care from 1/1/2015 to 12/31/2020. Epidemiological data were collected from published sources and grey literature and were validated with local experts. A Markov model was used to forecast prevalence and disease burden for countries with data. Model outcomes were extracted to calculate population-weighted regional averages, which were used for countries or territories without data. Finally, regional and global prevalence, cascade of care and disease burden estimates were calculated based on 235 countries/territories.

Findings: Models were built for 110 countries or territories: 83 approved by local experts, 27 based on published data alone. Using data from these models, plus population-weighted regional averages for countries/territories without models, a global prevalence of viremic HCV of 0·7% (95% UI: 0·7%–0·9%) [56·9 (55·2–67·8) million infections] on January 1, 2020 was estimated. This represents a decline of 6.8 million viremic infections (7.5 million incident infections, 5.5 million deaths, 8.8 million treated and cured) from an updated 2015 prevalence estimate of 63·7 (61·8–75·8) million infections. By the end of 2020, 12·9 million persons were living with a diagnosed viremic infection. In 2020, 0·6 million patients were started on treatment.

Interpretation: In 2020, there were an estimated 56·9 million viremic infections globally. Although this represents a decline from 2015, our forecasts suggest we are not currently on track to achieve global elimination targets. As countries recover from COVID-19, this work can help re-focus efforts aimed at HCV elimination.

Funding: This study was funded by the John C. Martin Foundation, Gilead Sciences, AbbVie, ZeShan Foundation and The Hepatitis Fund.

Keywords: Hepatitis C, global, prevalence, cascade of care, hepatocellular carcinoma, cirrhosis, World Health Organization

Research in context

Evidence before this study

Over the last decade, there have been a number of global estimates of hepatitis C virus (HCV) prevalence published by this group including global prevalence assessments (published in 2014, and 2016); pediatric prevalence (2020) and prevalence among women of childbearing age (2021). The World Health Organization has also published reports on global prevalence, incidence and mortality associated with HCV (2017, 2021). Global analyses of HCV-related cancer and mortality have been undertaken by the Institute for Health Metrics and Evaluation and the International Agency for Research on Cancer. Finally, estimates of HCV incidence, and incidence among key populations including people who inject drugs, have been published by the University of Bristol and UNSW Sydney. In addition to searching institutional websites for recent publications from the aforementioned groups, we identified global studies during our country/territory-level literature search of PubMed and grey literature. The following search terms ("Hepatitis C" AND "Prevalence" AND "Country/Territory") were used to identify articles in all languages published between April 1, 2016, and March 31, 2021, that build upon our previous work.

Added value of this study

Building on our 2016 estimate of the global prevalence of HCV, this study provides a progress update for 2020, along with a revised 2015 baseline incorporating updated serosurvey results from large countries including Egypt, Brazil, Nigeria and the Democratic Republic of Congo (among others). Additionally, we report the HCV cascade of care as well as modeled outcomes and forecasts for the global burden of HCV – including measures of incidence and mortality. Our results were obtained from a literature search and the use of 110 country- or territory-specific disease burden models. To strengthen the analysis, more than 300 experts were consulted to validate the model inputs and outcomes. This led to 83 approved country/territory models, plus another 27 models that were developed based on published data alone. Additionally, we collected 2020 treatment data from 31 countries, allowing for preliminary forecasts of HCV disease burden in the years following the COVID-19 pandemic.

Implications of all the available evidence

At the beginning of 2020, there were an estimated 56·9 million viremic infections globally. Although this represents a decline from 2015, our forecasts suggest we are not currently on track to achieve global elimination targets. Of the ~56·9 million people infected with HCV in 2020, less than a quarter had been diagnosed, and only 600,000 were estimated to initiate treatment in that year. Of the more than 10 million persons initiated on DAAs between 2015 and the end of 2020, more than a third were in Egypt. With 10 years remaining in the fight to eliminate hepatitis as a public health threat, significant effort is still needed to eliminate hepatitis C virus. As decision makers evaluate their HCV elimination efforts and progress following the COVID-19 pandemic, this study provides an updated baseline for future activities.

Introduction

Hepatitis C virus (HCV) is a bloodborne virus with the potential to cause liver fibrosis, hepatocellular carcinoma (HCC) and liver-related deaths. Currently, there is no protective vaccine available, but the advent of direct acting antiviral (DAA) therapies that achieve sustained viral response (SVR) in >95% of people has drastically improved HCV management, even in patients with cirrhosis. Diagnosis of HCV is also improving with the increased availability of point of care diagnostics, including confirmatory tests for HCV ribonucleic acid (HCV RNA). Additionally, strategies to prevent contact with infected blood and blood products as well as blood-contaminated objects can effectively control the transmission of HCV.[1] Since no efficient HCV vaccine regimen is available,[2] HCV treatment and prevention of new infections remain the key measures for HCV elimination. However, if strategies are developed and implemented to both prevent new infections and effectively treat HCV cases (through efficient diagnosis/early detection of patients, and timely linkage to medical care and treatment) HCV can be eliminated as a public health threat.[3]

In 2016, the 69th World Health Assembly passed a resolution to eliminate viral hepatitis as a public health threat by 2030,[4] and the World Health Organization (WHO) introduced global targets (65% reduction in mortality, 80% reduction in incidence, ≥90% diagnosed, ≥80% treated) for the care and management of HCV.[5] In June 2021, interim guidance for country validation of viral hepatitis elimination was released, with the inclusion of new absolute targets (annual incidence ≤5 per 100,000 and annual mortality ≤2 per 100,000).[6] The Center for Disease Analysis and the Polaris Observatory have been evaluating the global prevalence of HCV for almost a decade. Our first estimate, published in 2014, quantified viremic infections globally based on indexed and non-indexed (e.g., government reports) data published between 2000 and 2013.[7] This analysis was novel in its estimation of viremic infections (HCV RNA-positive) rather than serological evidence of past or present infection (anti-HCV-positive).[8-10] The second analysis, published in 2016, was expanded and strengthened through the use of disease burden modeling, through which we developed consistent, 2015 year-end prevalence estimates at an expanded scope (country/territory, regional, and global). The literature search was also extended through March 31, 2016.[11] Prevalence estimates from this publication were selected as the baseline for the WHO's Global Hepatitis Report 2017,[1] and served as a starting point for many countries or territories HCV elimination efforts.

The objective of this analysis was to evaluate national, regional, and global progress towards HCV elimination at the start of 2020. This time point was selected because it serves as both a reset point for countries/territories which may have deferred their HCV elimination efforts amidst the current crisis of the COVID-19 pandemic, and an assessment of HCV elimination progress five years after the approval and adoption of DAAs for clinical use. Furthermore, this analysis evaluates the cascade of care (viremic infections, diagnosed, treated, cured) at the Global Burden of Disease (GBD) Region and global level, based on available country/territory data through 2020.

Methods

This analysis integrates a literature review, a Delphi process, and modeling to estimate HCV prevalence and the cascade of HCV care among persons of all ages [age 0 (newborn) and older]. Empirical and programmatic data reflecting calendar year (January 1 through December 31) 2020 were retrieved and entered into the models. Model stocks (including prevalence, previously diagnosed) were summarized as beginning-of-year (January 1) outputs, while model flows (including incidence and disease progression) were summarized for the calendar year. Data were extracted for 2015 to serve as a revised baseline for the evaluation of HCV elimination progress, with 2020 data extracted to develop an annual, complete-year cascade of HCV care. Beginning-of-year 2020 data were extracted to generate an updated prevalence estimate for countries/territories. After extracting model data for countries/territories with models, population-weighted regional averages were calculated by GBD region. These regional averages were then applied for countries/territories without sufficient data to generate a model, in order to calculate regional and global estimates inclusive of 235 countries/territories. Prevalence estimates were described at the national, regional, and global levels, with the cascade of care described regionally and globally. The details of the data collection, scoring of data sources, Delphi process, and mathematical modeling are described briefly below and, in the appendix p4-20.

Country/Territory-level data collection and selection criteria

To evaluate HCV prevalence (including the diagnosed and undiagnosed population), a literature search of PubMed and non-indexed reports was performed to identify studies published between April 1, 2016, and March 31, 2021 (appendix p15). The outcomes of this search were combined with the outcomes of our previous analysis (encompassing studies published from January 1, 2000 – March 31, 2016). Non-indexed government reports, personal communication with country/territory experts, and additional studies identified through manual searches of references noted in publications were included when better data

were not available. The scope of the analysis included all countries/territories with a population of more than 1·5 million people, with *ad hoc* inclusions of nine countries/territories with smaller populations. These nine countries/territories were included following a request from country collaborators, ministries of health, or the WHO. Articles were scored using a multi-objective decision-analysis approach based on how well the prevalence estimate could be extrapolated to the general population (including population sampled, geographic scope and sampling procedure), the study sample size, and the year of analysis.[7,11]

To estimate the population diagnosed with HCV, data were collected from (in order of priority) national notification or registry data, peer-reviewed literature, and expert opinion. When notification or registry data were used, the case definition was consulted to determine if notifications reflected anti-HCV, HCV RNA, or both. When necessary, the spontaneous clearance rate (based on previous publications surrounding the natural history of HCV) or country-provided viremic rate was used to adjust notified cases to estimate HCV RNA-positive annual diagnosed cases. In countries/territories where HCV was a notifiable infection and a reliable number of newly diagnosed cases was reported annually (including deduplication to ensure each patient was only reported once), the total number of diagnosed cases could be calculated by summing annual viremic diagnosed cases and subtracting mortality and cures.

The number of individuals treated annually through the end of 2020 was estimated from (in order of priority) national databases, audit sales data, government reports, estimates from major treatment centers, and drug suppliers. The scope of the population treated was collected to ensure that the final estimate for treatment reflected both the private and public markets. When treatment data were provided for a portion of the market, data were adjusted in discussions with the expert panel to capture sales or treatments in channels not reflected in the drug sales data or national database (appendix p33).

Similar to the prior analysis, a Delphi process was used to gain country/territory expert consensus and validate collected data to use as model inputs (*approved* country/territory data) (appendix p19-20).[11] Experts were identified through HCV-related scientific contributions, or through referrals and recommendations from leading researchers or WHO regional offices. In countries/territories where an analysis had not previously been conducted, two or more meetings were held to achieve consensus around input and output variables, and to validate the outputs against available empirical data. Country/territory models that were approved in the prior analysis were revisited for new data, and discussions were held with country experts to verify the inclusion of any novel prevalence studies.

For countries/territories where meetings with local experts could not be scheduled, published estimates were used (*estimated* country/territory data). Two epidemiologists reviewed and scored all published studies according to the methodology described above, and the highest-scored studies used for modeling. When inputs other than prevalence rate were unavailable for a country/territory, the population-weighted regional average (calculated using countries/territories within the same GBD Region) was used.

Country/Territory-level HCV disease burden modeling

After reviewing and scoring available studies, a Microsoft Excel®-based (version 365) Markov model of HCV infection, described previously,[12-14] was populated with the highest-scoring epidemiological data for the country/territory of interest (appendix p16-18). The highest scoring prevalence study was selected as the base value for modeling, while other studies were used to estimate the high and low (including blood donor data) values for uncertainty analysis. Next, the model was used to forecast the total HCV prevalence (including the undiagnosed population) forward from the year of report to the beginning of 2020, accounting for annual incidence, mortality, and cure. From a methodological perspective, the biggest difference between the present and previous analysis[11] is the calculation of incidence: first, the incident HCV infections were partitioned into vertically and horizontally acquired infections. Second, both vertically and horizontally acquired infections were calculated as a function of prevalence of chronic HCV infections (among women of childbearing age for vertically acquired infections) in a dynamic model. The change in horizontally acquired infections was calculated dynamically, whereby the annual rate of change in incidence followed the rate of change in prevalence. Previously, HCV incidence was assumed to remain constant after the last year of data. As a result, a falling HCV prevalence due to treatment expansion leads to a reduction in incidence in the updated model. On the other hand, although the model does not consider populations susceptible to HCV infection partitioned by risk group, it implicitly allows for re-infection, whereby a rising HCV prevalence leads to an increased incidence. The changes to incidence forecasting were applied to 2020 estimates as well as the revised 2015 estimates and are discussed in greater detail in the appendix p12.

Within the model, the number of diagnosed (viremic) infections was calculated annually for the beginning of the calendar year, accounting for disease progression and mortality within the diagnosed population, as well as cures and newly diagnosed cases/infections over the course of the previous year. For this analysis, the number of persons ever diagnosed with HCV was also calculated separately using the number of total

viremic cases diagnosed in 2015 plus all newly diagnosed viremic cases from 2015 through 2020 — without accounting for mortality or cure.

After the last year of available treatment data, forecasts for future treatment starts were developed as follows: the default forecast approximated a logarithmic decline from the year of peak treatment in each country/territory to 50% of the peak treatment level over the course of five years (appendix p6). After five years, the number of patients treated annually was assumed to stay constant, unless better data were available to inform forecasts. This forecast was initially developed considering the trajectory of treatment initiations following the launch of pegylated-interferon (Peg-IFN) (unpublished data) and was later validated following the launch of DAAs (appendix p6). When country/territory-specific data were available to inform forecasts, those were used.

Global and Regional Estimates and Sensitivity Analysis

GBD regional population-weighted averages from approved and estimated models were calculated and applied for countries/territories with missing data to estimate the global HCV prevalence, cascade of care and disease burden. The uncertainty in prevalence for approved and estimated models was used to model the prevalence uncertainty at GBD regional level which were then applied to countries with missing data. Six countries/territories with approved or estimated models (Australia, Egypt, Georgia, India, Mongolia, and Pakistan) were excluded from initial calculations (but were included in final summaries at a regional and global level) because their underlying epidemic or interventions were not representative of those seen in neighboring countries/territories. Countries/territories without a formal GBD designation were assigned an imputed GBD Region (appendix p 21). After applying the GBD regional averages for countries without data, data were summarized for 235 countries/territories by GBD region, WHO region, World Bank (WB) income groups, and/or globally.

Sensitivity analysis was conducted using Crystal Ball® (Release 11.1.3708.0), an Excel® add-in by Oracle®. This software allows us to use customized distributions to capture the uncertainty for any given variable. It then changes one input variable at a time and records the impact of each input variable on the desired forecast (outcome) variable (in this case the 2020 global viremic prevalence). Finally, the software ranks inputs by their impact on the forecast variable. Probability distributions [15] used for key inputs have been described previously.[11] Monte Carlo simulation was used to estimate 95% uncertainty intervals (UI). To calculate regional and global uncertainty ranges, two sources of uncertainty were considered — country/territory-level uncertainty in prevalence (based on literature search results and expert panel

discussions) and the contribution of each country/territory to regional/global prevalence. The 2020 country/territory prevalence estimates and 95% UIs were consolidated and defined as assumption variables. Sensitivity analysis was run to identify countries/territories that accounted for the greatest variation in global prevalence through their estimated prevalence range and inclusion in regional averages. Due to the scarcity of low/high ranges around the collected (largely empirical) diagnosis and treatment data, uncertainty in these inputs could not be modeled. Given the limitations of these input data, we applied the uncertainty in prevalence to regional and global cascades of care.

Role of the funding source

This analysis was funded by a grant from the John C. Martin Foundation (2019-G024) through the Polaris Observatory. Grants for analyses in high-income countries/territories were provided by Gilead Sciences (IN-US-987-5808) and AbbVie, and country/territory analyses were supported by ZeShan Foundation (2021-0101-1-CDA-HEP-10) and The Hepatitis Fund. The funders had no role in the study design, data collection, data analysis, interpretation of data, decision to publish, or preparation of the manuscript. CE, DRS, EM, HR, IG, KRS and SB had access to the underlying data and models. All authors had full access to the data for their country and accept responsibility to submit for publication. SB, CE, DRS, EM, IG, and KRS were responsible for directly accessing and verifying the data.

Results

Data collection identified 7,881 studies through PubMed with a publication date between April 1, 2016, and March 31, 2021. When combined with prevalence studies published prior to 2016[7,11] and expert input, prevalence estimates were available for 115 countries/territories, accounting for 93% of the world's population. Treatment data were available for 110 countries/territories while diagnosis data, including annually diagnosed and total previously diagnosed, were available for 93 and 87 countries/territories, respectively. Among countries reporting treatment data, data were obtained from (categories are not mutually exclusive) drug sales (including generics) data (39%), expert consensus (27%), national databases (26%) and published studies (8%). Among countries with diagnosis data, previously diagnosed estimates were obtained from expert consensus (45%), published studies (33%) and national surveillance or blood donor databases (22%). Estimates of annual diagnosed were from national surveillance or blood donor databases (42%), expert consensus (41%), and published studies (16%).

Models were built for 110 countries/territories that had (at minimum) data on HCV prevalence by age and sex. The inputs and outputs for 83 models were *approved* by country/territory/territory experts and 27 were *estimated* using published data alone. This represents the addition of 12 new countries/territories that were previously not included as *approved* or *estimated*, and the validation of 16 country/territory models that were previously *estimated* and are now *approved* (appendix p18). The remaining countries/territories had insufficient data to create a model. Treatment data were available for 15 countries/territories that had insufficient data to create a model, representing 5% of the world's population, but less than 1% of HCV treatments from 2015 to 2019.

The evolution of the analysis is shown in Figure 1. The quality score of input prevalence data for *approved* or *estimated* countries/territories (1 being lowest quality, 3 being highest quality) is shown in the appendix, p34. The 2020 viremic HCV prevalence (percent and number) of the same countries/territories is shown in Figure 1A, while the prevalence of all countries/territories, including those with an extrapolated prevalence, is shown in Figure 1B. Lastly, the number of viremic infections for all countries/territories is shown in Figure 1C.

The numerical prevalence and total infections in 2015 and 2020 for *approved* and *estimated* countries/territories are shown in Table 1. The model input data for prevalence, quality score, year of prevalence estimate, uncertainty range, viremic rate, source of prevalence age distribution, and all corresponding references are included by country/territory in the appendix p22-27. Input data, by country/territory for previously diagnosed and newly diagnosed, annual treated and all corresponding references are included in the appendix p28-33.

The global prevalence of viremic (HCV RNA+) HCV infection was estimated to be 0·7% (95% UI: 0·7%–0·9%) at the beginning of 2020, corresponding to 56·9 (55·2–67·8) million viremic infections. This represents a reduction of 6·8 million viremic infections from a revised 2015 (beginning of year) estimate of 63·7 (61·8–75·8) million viremic infections [0·9% (0·8%–1·0%) prevalence]. The change in viremic infections resulted from the addition of 7·5 (7·3 – 8·9) million new chronic infections, the subtraction of 8·8 (8·5 – 10·4) million cured infections and the subtraction of 5·5 (5·3 – 6·5) million deaths (both all cause and liver related) from 2015 through the end of 2019 (Figure 2a). The progression of viremic infections from 2015 to 2020 among the 20 countries/territories with the largest number of viremic infections is shown in Figure 2b. Most notably, Egypt's national treatment program treated almost 3·5 million people from 2015-2019, moving them from 5th most infections globally in 2015 to 17th by 2020.

The cascade of care was estimated in two ways (Figure 3). First, a cumulative cascade was calculated relative to the 2015 baseline, which showed 33% (21·1 million) of the viremic population in 2015 (63·6 million) had ever received a diagnosis ever diagnosed (Figure 3), with 9·5 million people cumulatively initiated on treatment (45% of 21·1 million diagnosed) between 2015 and 2019 (Figure 4, appendix p35). The annual cascade for 2020 considered only persons who were still HCV RNA positive (i.e., adding chronic incident cases, and removing cured and mortality from both the prevalent and diagnosed segment). In 2020, an estimated 23% (12·9 million) of the viremic HCV population (56·8 million) was diagnosed and living with a viremic infection; and only 1·1% of prevalent cases were initiated on treatment in 2020 (641,000 treated out of 56·8 million viremic) (Table 2). The total number of treated patients was 10·5 million from 2015 through the end of 2020.

Regional estimates for 2020 HCV prevalence and cascade of care are shown in Table 2. In 2020, prevalence among GBD regions was highest in Europe, Eastern [2·9% (2·3%-3·2%)] and Asia, Central [2·6% (2·4%-2·8%)] while Asia, South [14·5 (13·2-24·2) million] and Asia, East [10·0 (8·6-11·9) million] had the largest numbers of viremic infections. The number of viremic infections remained constant or decreased between 2015 and 2020 in all regions, with the exception of Sub-Saharan Africa, East. In 2020, as in 2015, most viremic infections were concentrated in lower-middle income [26·0 (19·0-46·7) million] and upper-middle income countries [19·8 (14·4-24·8) million].

Based on annual treatment trends, over 1 million persons were expected to initiate treatment in 2020 (Figure 5a). Empirical treatment data for the year 2020 were available for 31 countries/territories. In countries/territories reporting 2020 data, the number of treated patients decreased 44% (mean) relative to 2019 (376,000 treated in 2020 compared with 675,00 treated in 2019). Of note, in 2020, Rwanda's screening and treatment campaign resulted in a more than a 20-times increase in the number of treatments, relative to 2019. Removing Rwanda from the calculation would suggest a 47% decline in the number of treated, globally in 2020 (360,000 treated in 2020 compared with 674,000 treated in 2019). Global treatment declines in 2020 were not only experienced as a result of the COVID-19 pandemic. In 2019, Egypt treated 1·9 million patients in the height of their elimination program, and future treatment numbers were expected to be markedly lower in the coming years following this success (Figure 5a).

Based on empirical data and future treatment forecasts, the annual number of new (incident) chronic infections was expected to remain relatively constant (2% decline from 1·43 million in 2020 to 1·40 million 2030) with an average of 1·42 million new infections expected each year through 2030 (Figure

5b). By 2030, end stage outcomes including liver deaths, hepatocellular carcinoma (HCC) and decompensated cirrhosis were expected to increase by 14-17% relative to 2020 (257,000 liver deaths in 2020 to 290,000 in 2030; 190,000 incident HCC in 2020 to 220,000 in 2030; and 148,000 incident decompensated cirrhosis in 2020 to 174,000 in 2030) (Figure 5b).

The top ten sources contributing the most to the global prevalence range (as per the sensitivity analysis) are shown in appendix p36. The top ten uncertainties listed account for more than 95% of the total variance in global prevalence.

The comparison of this and previous analyses is shown in appendix p37. Improvements in the quality [scale of 1 (lowest) to 3 (highest)] and availability of data have been observed since our last analysis, with the addition of high-quality estimates in countries/territories where data were previously unavailable, including Armenia (score = 2), Bhutan (score = 3), the Democratic Republic of the Congo (score = 2), Kyrgyzstan (score = 2), Rwanda (score = 3), and Tanzania (score = 3). Additionally, countries/territories are engaging in high-quality screening programs and serosurveys, to monitor progress [e.g., Egypt (score = 3)], or update older, lower-quality estimates, [e.g., Viet Nam (score = 3, previous score = 1)].

Discussion

The 2020 global prevalence estimate of 0·7% (0·7%–0·9%) or 56·9 (55·2–67·8) million infections is lower than estimates from previous years.[9-11] This is primarily due to two factors — the first being newer published serosurveys that resulted in a reassessment of the baseline 2015 prevalence estimate. The uncertainty intervals captured uncertainties in country/territory-level prevalence estimates on the overall forecasts. In total, 39 countries/territories had a new model or study that resulted in the country/territory level 2015 prevalence estimate deviating +/-20% from the prior analysis. Most notably, we were able to develop a new model for the Democratic Republic of the Congo (DRC) using data from a large-scale dried blood spot survey.[16] This survey tested for HCV RNA and found a viremic prevalence of 0·9%,[16] which resulted in a lower number of infections than our previous estimate based on the regional average (2·1%).[11] Additionally, relative to our previous study, more than 1 million fewer viremic infections in 2015 were estimated from both Egypt and Brazil, where new prevalence studies were available. Overall, our new 2015 prevalence estimate [0·9% (0·8%–1·0%)] is still within range of our original estimate published in 2016 [1·0% (0·8%–1·1%)].[11] However, it should be noted that the current estimate represents beginning of year 2015, while the initial analysis reflected end of year 2015.[11]

The second factor contributing to a lower 2020 prevalence than previous estimates is the cumulative impact of time (aging, all-cause- and liver-related deaths, and incident infections) as well as treatment. The Markov model forecasts 2020 prevalence with annual adjustment for incidence, mortality, and cure. Between 2015 [63·7 (61·8–75·8) million viremic infections] and 2020 [56·9 (55·2–67·8) million viremic infections], we estimated there were 7·5 (7·3 – 8·9) million new chronic infections, 5·5 (5·3 – 6·5) million deaths (both all cause and liver related) and 8·8 (8·5 – 10·4) million cured infections (Figure 2a). The ability to present 2020 prevalence (including estimates of the undiagnosed population) and cascade of care alongside revised 2015 baseline estimates reflects the utility of modeling in elimination monitoring activities.

Our results are in line with the recent WHO's *Global progress report on HIV, viral hepatitis and sexually transmitted infections, 2021*[17] although there are some notable differences in the analyses and outcomes. Data for the WHO global progress report was collected through a series of activities, that included sharing CDAF and other partner data from 2019 with countries/territories as a reference point for their global reporting activities. Countries/territories then chose to either keep the data or replace with their own estimates. In the event that the data available to and reported by national programs reflected only part of the story (i.e., older data were reported because newer data were not available; data were reported from the public sector but excluded efforts from the private sector; etc.), WHO could only report what had been provided or endorsed by countries. While many of the underlying data sources overlap with our analysis, the main difference in outcomes was that the CDAF team worked with local experts to determine the appropriate way to adjust sub-national data to the national level, and then model forward the results to the latest year (in this case 2020). The Delphi process and engagement of expert panels with a range of stakeholders represents a strength of our analysis. CDAF facilitators are trained to identify and challenge cognitive and motivational biases, including in situations where ministry of health is either not familiar with the data or would anchor to specific studies. Delphi process allows us to engage a range of national stakeholders and experts (from MOH and from outside of MOH) to provide balanced feedback and challenge one another's assumptions. As a result, the outcomes of the two analyses are complementary, but not identical.

Of the more than 10 million persons initiated on DAAs between 2015 and the end of 2020, more than a third were in Egypt. As a result of this monumental effort to screen and treat the entire population, Egypt's rank in the list of countries/territories with the largest number of viremic infections fell from fifth in 2015 to 17th by 2020. This effort is expected to reduce not only the number of HCC cases and liver related

deaths in the country but also the cost associated with managing HCV in the future.[18] Globally, the number of patients initiated on treatment declined in 2020 relative to 2019; the cause of this decline is likely multifactorial. First, the Egyptian program has nearly concluded,[18] thus reducing Egypt's relative contribution to global treatment efforts after 2019. Additionally, in many settings, previously diagnosed patients under care have already received treatment. Treatment efforts in special populations (including incarcerated populations or people who use drugs) vary substantially by country, with many countries still enforcing sobriety restrictions.[19] Efforts to move beyond patients already diagnosed and under care may be stymied as many countries lack general population screening programs that could allow the number of treated patients to be maintained in the future. Although disease notification systems and patient registries exist in a number of countries, they are not universally reliable for estimating the number of people currently diagnosed and in need of treatment. Many countries with high-quality patient registries are finding that only 20-30% of diagnosed cases have been treated, indicating that linkage to care remains a bottleneck. As a result, current outreach efforts to test and link to care undiagnosed patients and patients lost to follow-up, especially among vulnerable populations, have not been sufficient to maintain the annual number treated. Additionally, the COVID-19 pandemic impacted logistics and distribution systems as well as access to health care and hepatitis screening and treatment services. Some countries reported stable treatment figures in 2020, but steep declines in new diagnoses. This may signal a problem for future elimination efforts. The overall impact of the pandemic is uncertain and will depend on the strength of current and future hepatitis elimination programs as well as the future impact of COVID-19, especially in light of COVID-19 vaccination efforts with substantial variations in vaccine availability.

To monitor progress toward the 2020 and 2030 elimination goals, and to guide future efforts in elimination planning, the cascade of care is presented in two formats (cumulative[1] and annual[20]). The cumulative 2015-2019 cascade of care compares 'ever diagnosed' and 'ever treated' against a baseline of viremic prevalence in 2015, providing an easy visual for progress toward the 2020 and 2030 targets. However, since the true number of viremic infections changes each year with the addition of new infections and the subtraction of mortality and cured (unlike other diseases such as HIV or HBV without curative therapies), this cascade format may hide a growing viremic population, and is less useful for understanding the current needs in a country/territory or region. The annual cascade of care provides a snapshot of current progress and future needs but does not fully appreciate previous efforts. A great example of the different insights gleaned from the two cascades is seen in Figure 3c for lower-middle income countries/territories. Through the end of 2019, 21·1 million (28%) of the 63·7 million infected population was ever diagnosed, and 9·5

million (70%) of 21·1 million ever diagnosed patients were initiated on treatment. However, because 95% of patients initiated on treatment are cured of their HCV (and HCV must first be diagnosed before it can be cured), the annual cascade reflects that only 12·9 million (14%) of 56·9 million infections remaining in 2020 are living with a diagnosis. Focusing only on cumulative efforts misses the fact that the majority of the currently infected population remains undiagnosed. Similarly, focusing on cumulative treated may obscure annual declines in treatment. As countries evaluate their progress toward elimination, it will be important that they not only monitor cumulative past efforts but also maintain an annual snapshot of the cascade to highlight current gaps.

Our study has some limitations, many of which have been discussed previously. The availability and quality of data continue to limit the accuracy of forecasts. The inclusion of ranges addresses the uncertainty in the available data; however, these uncertainty intervals may not capture all sources of bias, including measurement bias, selection bias due to missing data, and model misspecification bias. Small improvements in the quality and availability of data have been observed since our last analysis, with the addition of high-quality estimates in countries/territories where data were previously unavailable (including Armenia, Bhutan, the Democratic Republic of the Congo, Kyrgyzstan, Rwanda, and Tanzania). Additionally, countries/territories are engaging in high-quality screening programs and serosurveys, to monitor progress (e.g., Egypt), or update older, lower-quality estimates, (e.g., Viet Nam and Nigeria). That said, paucity of data remains a problem for many parts of the world. Of 250 countries/territories in the world, only 110 countries/territories had sufficient data to generate a model. Uncertainty in treatment data is also a concern, especially in countries/territories producing generic medications (e.g., India) and countries/territories where national programmatic data are collected but only reflect the public sector. Where possible, these uncertainties have been addressed by comparing multiple sources of data (national program data, generic sales data, humanitarian program data, expert consensus). As described previously, using models to forecast 2015 and 2020 HCV prevalence runs the risk of being inaccurate. Although we report the cascade of care through calendar year 2020, the prevalence estimate is emphasized for the beginning of year 2020 to acknowledge uncertainty around country responses due to the COVID-19 pandemic. For the model forecasting, we assume two years of disrupted treatment, followed by a return to previous trends. However, some countries have reported relatively near discontinuation of new screening and diagnosis in 2020 but with only small changes to treatment in the same year. This may mean our treatment projections in future years are overly optimistic.

Conclusion —The global prevalence of HCV declined from 2015 however, there were still 57 million viremic infections remaining in 2020 with only 12·9 million diagnosed. More than 10 million people have initiated DAA therapies since 2015, with more than a third of treatments occurring in Egypt. With the Egyptian program reaching near completion in 2019, global treatment forecasts dropped substantially. Treatment further declined in 2020, partially due to the depletion of "warehoused" patients, the COVID-19 pandemic, and other factors. If treatment remains below 1 million patients per year, as is currently estimated, then liver deaths and other end-stage outcomes could be expected to increase globally by 2030. Thus, it is imperative that countries continue to pursue HCV elimination efforts through screening, diagnosis, and timely treatment. The data presented here provide a call to action for the global hepatitis community and can act as a reset point for countries revisiting HCV elimination efforts in the wake of the COVID-19 pandemic.

Declaration of Interests

SB, CE, DRS, EM, IG, KRS are employees of the CDA Foundation. The CDA Foundation has received funding from the John C Martin Foundation, ZeShan Foundation, The Hepatitis Fund, Gilead Sciences and AbbVie. NT reports grants or contracts from Gilead Sciences, Genentech, Roche; consulting fees from EXIGO Mgmt LLC, ENYO, PPD Pharma; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from University of Maryland. FT reports institutional research funding from Allergan, Inventiva, BMS, Gilead Sciences; consulting fees or honoraria for lectures from Allergan, Esanum, Gilead Sciences, AbbVie, BMS, Falk, Boehringer, Galapagos, Intercept, Inventiva, Novo Nordisk, Novartis, Pfizer, Ionis. Additionally, FT reports being Co-Editor Journal of Hepatology. AC reports consulting fees from AbbVie, Gilead Sciences and MSD; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie, Gilead Sciences and MSD. GJD reports grants or contracts from AbbVie, Gilead Sciences and Merck. AA reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie, Gilead Sciences, MSD, Sobi, Intercept and Mylan. IA reports investigator initiated study grant to their institution from Gilead Sciences; consulting fees from Gilead Sciences and GSK; payment or honoraria for lectures from Gilead Sciences, GSK and Merck; support for attending meetings and/or travel from Gilead Sciences and Merck; advisory board participation for Gilead Sciences and GSK. MAB reports contracts for lectures/presentations, with no impact on the contents, from Gilead Sciences. Funding from AbbVie for research project, not for personal use and with no impact on the contents or reporting. SA reports research grants from AbbVie and Gilead Sciences; honoraria for

lectures/consultancy from AbbVie, BMS, Gilead Sciences, and MSD. MIA reports research funding from Prenetics and Pfizer. MJB reports research support and consulting fees from AbbVie, Gilead Sciences, and Specialty Rx Solutions. KAB reports the following disclosures: Sagimet, Gilead Sciences, Salix, Novo Nordisk, Allergan, Intercept. RSBJ reports Grants and Research Support from AbbVie and Gilead Sciences. PB reports research grants from Gilead Sciences, speakers fees from Gilead Sciences and AbbVie, and travel grants from Gilead Sciences and AbbVie. PB is the chair of Swiss Hepatitis and sits on the board of SAMMSU and the Swiss Hepatitis C Association. MRB reports consulting fees from Gilead Sciences, payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie, Gilead Sciences and EISAI-MSD. MRB also reports support for attending meetings and/or travel from Gilead Sciences and AbbVie, and participation on a data safety monitoring board or advisory board for Roche, AbbVie, Gilead Sciences, Janssen, EISAI-MSD. MRB is the coordinator of the working group for the implementation of the resolution (n.397, April 2018) for HCV infection control in Tuscany, Italy. DB reports travel grants from AbbVie and Gilead Sciences and research grants from Gilead Sciences. MBu reports grants or contracts from Gilead Sciences and AbbVie, consulting fees from Gilead Sciences, payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences and AbbVie. JC reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie and Gilead Sciences and support for attending meetings and/or travel from AbbVie and Gilead Sciences. HLYC reports consulting fees from AbbVie, Aligos, Arbutus, Hepion, GSK, Janssen, Merck, Roche, Vir Biotech, Vaccitach, Virion Ther, and Gilead Sciences; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences, Viatris and Roche; and support for attending meetings and/or travel from Gilead Sciences and AbbVie. HC reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or education events from Gilead Sciences and AbbVie; and support for attending meetings and/or travel from Gilead Sciences. KJC reports support for the present manuscript from the Philippine Department of Health and the Philippine Council of Health Research and Development. PBC reports financial support for studies not related to the current manuscript from Gilead Sciences, AbbVie, MSD and Echosens. WLC reports consulting fees from Gilead Sciences, AbbVie, BMS and PharmaEssentia. VC reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie, MSD, Gilead Sciences and R-Pharm. LEC reports Speakers Bureau for Gilead Sciences, Bristol, AbbVie, Roche, Bayer and collaboration with BMS, Exelixis, Viking, Novonordisk, Avant Sante, Madrigal, Cellpharma MC reports personal fees from AbbVie, Gilead Sciences, Merck Sharp & Dohme

(MSD), GlaxoSmithKline (GSK), Janssen-Cilag, Spring Bank Pharmaceuticals, Novartis, Swedish Orphan Biovitrum (SOBI), Falk Foundation, grants, and personal fees from Roche. MEC reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Liberum Independent Medical Education. JC reports grants or contracts from Gilead Sciences, AbbVie, MSD and Intercept Pharmaceuticals; consulting fees from Gilead Sciences, AbbVie, Intercept and Shionogui; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences, Rubio, Intercept, Amgen and AbbVie; support for attending meetings and/or travel from Gilead Sciences and AbbVie; leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid as President SEPD; receipt of equipment, materials, drugs, medical writing, gifts or other services from Echosens. VL reports grants or contracts from Gilead Sciences and AbbVie; consulting fees from AbbVie and Gilead Sciences; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences and AbbVie; support for attending meetings and/or travel from Gilead Sciences and AbbVie. SD reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie and Gilead Sciences; support for attending meetings and/or travel from AbbVie and Gilead Sciences. A-SD reports honoraria for lectures/consultancy from AbbVie, Gilead Sciences, and MSD. MHE reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences, Abbott and Biotest; support for attending meetings and/or travel from EASL 2019. RF reports grants from AbbVie, Gilead Sciences, Roche. SF reports consulting fees from Gilead Sciences and AbbVie, payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences, AbbVie, Merk and AOP Orphan. SF also reports support for attending meetings and/or travel from AbbVie and Gilead Sciences, and participation on a data safety monitoring board or advisory board for AOP Orphan and Sobi. EG reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from SAB Gilead Sciences, SAB AbbVie and SAB Janssen. EG also reports participation on a Data Safety Monitoring Board or Advisory Board for Aligos, Janssen and Assembly. JGS reports consulting fees and payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences. LSG reports speaker fees from, Advisory Board of AbbVie, Gilead Sciences. PMG reports consulting fees and payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences and AbbVie. MG reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences and reports participation on an advisory board from Gilead Sciences. MG is on the Nordic

advisory board related to COVID-19. JG reports grants or contracts from Gilead Sciences, AbbVie, Camurus, Cepheid, Hologic and Indivior, and, payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences, AbbVie, and Cepheid. JG is the President of the International Network on Health and Hepatitis in Substance Users. JG has received HCV testing platforms and tests from Cepheid and HCV tests from Hologic. MG reports grants from AbbVie, Gilead Sciences, and MSD; speaking honoraria/advisory board fees from AbbVie, Gilead Sciences, MSD, Janssen, Roche, Intercept, Norgine, AstraZeneca, Falk, Shionogi. AH reports support for the present manuscript and grants from Gilead Sciences. The grant is from the Hellenic Scientific Society for the Study of AIDS, Sexually Transmitted and Emerging Diseases. AH also reports payment or honoraria for educational events from Gilead Sciences and AbbVie as the co-chair for the Hepatitis B and C Public Policy Association. MH reports investigator-initiated grant funding from Gilead Sciences and AbbVie. HH reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events and support for attending meetings and/or travel from Gilead Sciences and AbbVie. HH also reports support for participation on a Data Safety Monitoring Board or Advisory Board from Gilead Sciences and AbbVie. IH reports payment for presentations from AbbVie. PJ reports honoraria for lectures from AbbVie and Gilead Sciences; support for attending meetings and/or travel from AbbVie and Gilead Sciences. JJ reports consulting fees from AbbVie and Gilead Sciences; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie and Gilead Sciences; support for attending meetings and/or travel from AbbVie and Gilead Sciences; participation on a Data Safety Monitoring Board or Advisory Board from AbbVie and Gilead Sciences. AnJ reports research support in the form of grants or contracts from AbbVie; honoraria for lecture from Gilead Sciences. AgJ reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie and MSD; support for attending meetings and/or travel from AbbVie, MSD, and Gilead Sciences. MK reports payment to their institution in the form of grants or contracts from Gilead Sciences Fellowship 2020; payments made to him for lectures, presentations, speakers bureaus, manuscript writing or educational events from Nordic Drugs, Gilead Sciences, and MSD/Merck. LAK reports speaker and teaching grants from Gilead Sciences Science and AbbVie. MK reports institutional grants/contracts from Roche, Hologic and Siemens. PK reports payment or honoraria for lectures from AbbVie s.r.o. and Gilead Sciences Slovakia s.r.o.. DL reports unpaid leadership or fiduciary role in other board, society, committee or advocacy group including Swiss Hepatitis Strategy and Viral Hepatitis Prevention Board. JL reports grants and speaker fees from AbbVie, MSD, and Gilead Sciences, outside the submitted work. RTM reports occasional consulting fees from

AbbVie, Gilead Sciences, and Bayer; support for attending meetings and/or travel from AbbVie, Gilead Sciences, and Bayer; participation on a Data Safety Monitoring Board or Advisory Board from AbbVie, Gilead Sciences, and Bayer. SM reports support for attending meetings and/or travel in the form of travel expense for congress from RojanPharma Co; stock or stock options from RojanPharma Co. CM reports grants or contracts from Gilead Sciences; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences, Astellas, Intercept and Bayer; support for attending meetings and/or travel from Gilead Sciences and AbbVie; participation on a Data Safety Monitoring Board or Advisory Board for Gilead Sciences and AbbVie. BM reports grants or contracts from Gilead Sciences and Swiss National Science Foundation; consulting fees from Alexion, AbbVie, Gilead Sciences, BMS, Roche, Intercept, Triogen and AstraZeneca; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences, Roche, AstraZeneca and AbbVie; support for attending meetings and/or travel from Gilead Sciences; leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid as Co-President of Swiss Society of Gastroenterology. YAN reports grants or contracts from Coalition for Global Hepatitis Elimination and Gilead Sciences. FN reports consulting fees from Gilead Sciences and AbbVie; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences, Roche and AbbVie; support for attending meetings and/or travel from AbbVie and Gilead Sciences; participation on a Data Safety Monitoring Board or Advisory Board for Genfit. SO reports consulting fees from Gilead Sciences; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational from Gilead Sciences. JO reports grants or contracts from Gilead Sciences; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Mylan Philippines and Menarini Philippines. MO reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences, Bayer and Roche. ALO reports grants or contracts from Gilead Sciences and AbbVie; consulting fees from AbbVie; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences and AbbVie; support for attending meetings and/or travel from Gilead Sciences and AbbVie; participation on a Data Safety Monitoring Board or Advisory Board for AbbVie. CQP reports grants or contracts from Gilead Sciences; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences. GVP reports serving as an advisor/lecturer for AbbVie, Dicerna, Gilead Sciences, GlaxoSmithKline, Ipsen, Janssen, Merck Sharp & Dohme, Novo Nordisk, Roche and research grants from AbbVie, Gilead Sciences. MPR reports support for the present manuscript from Gilead Sciences;

consulting fees from AbbVie and Gilead Sciences; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie, Gilead Sciences and MSD; support for attending meetings and/or travel from AbbVie and Gilead Sciences. MGP reports consulting fees from Gilead Sciences and Myralis and payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences. MGP will serve as a member of the new directory of the Brazilian Hepatology Society starting in January 2022. AR reports grants or contracts from AbbVie, Gilead Sciences, Intercept and Merck; consulting fees from AbbVie, Gilead Sciences, Intercept; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie, Gilead Sciences, Intercept, Amgen, Novo Nordisk and Novartis; participation on a Data Safety Monitoring Board or Advisory Board for AbbVie, Gilead Sciences, Intercept, Janssen, Novo Nordisk and Novartis; stock or stock options for AbbVie. GR reports research grants from AbbVie, Janssen Pharmaceuticals, MSD, and has acted as a consultant/advisor for AbbVie, BMS, Gilead Sciences and MSD. LR reports grant funding from Bayer, Boston Scientific, Exact Sciences, Gilead Sciences, Glycotest, Redhill Biopharma, TARGET PharmaSolutions and FUJIFILM Medical Systems and serving on advisory boards for AstraZeneca, Bayer, Eisai, Exact Sciences, Gilead Sciences, QED Therapeutics and TAVEC. SKR reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences and Eisai; participation on a Data Safety Monitoring Board or Advisory Board for AstraZeneca. OS reports serving as a lecturer/speaker for MSD, AbbVie, Gilead Sciences. RS reports completing sponsored lectures for AbbVie and for MSD. FMS reports grants from AbbVie, Gilead Sciences; serving as a consultant for AbbVie, Gilead Sciences, Bristol Myers Squibb, Merck Sharpe Dohme; speaker fees from AbbVie, Gilead Sciences, Bristol Myers Squibb, Merck Sharpe Dohme. CS reports consulting fees from Gilead Sciences, Merck/MSD and AbbVie; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences, Merck/MSD and AbbVie. KS reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Expopoint, Dynamicom Education Srl, Lundbeck AS, AbbVie, Gilead Sciences, MSD, Boehringer Ingelheim, GlaxoSmithKline, Ruma GmbH, Orion, Reckitt Benckiser, Professio and Unimedic Pharma; support for attending meetings and/or travel from Azanta, Lundbeck, Gilead Sciences, MSD, Invidior, Camurus and AbbVie; participation on a Data Safety Monitoring Board or Advisory Board for Invidior, Azanta, Nordic drugs, Gilead Sciences, AbbVie, Unimedic, MSD, Camurus and Takeda; leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid as member of the Division for Mental Health and Substance Abuse Services at the Council for Choices in Health Care in Finland (Ministry of Social

Affairs and Health, 2018–2019), member of the National Hepatitis C Strategy Group (Ministry of Social Affairs and Health, 2017–2019) and member of the HIV and HCV Expert Group (National Institute for Health and Welfare, 2017-2020). CWS reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences and Roche Diagnostics. JS reports grants or contracts from Gilead Sciences; consulting fees from Gilead Sciences, AbbVie and Merck Sharp Dohme; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from Gilead Sciences, AOP Orphan, AbbVie, Herbacos Recordati and Merck Sharp Dohme; support for attending meetings and/or travel from Gilead Sciences, AbbVie and AOP Orphan; participation on a Data Safety Monitoring Board or Advisory Board for AOP Orphan, Swedish Orphan Biovitrum and Alnylam. RES reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie; support for attending meetings and/or travel from AbbVie; participation on a Data Safety Monitoring Board or Advisory Board for BMS, Lilly, Roche and Gilead Sciences. CAMS reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie; participation on a Data Safety Monitoring Board or Advisory Board for AbbVie; leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid for NZ Society of Gastroenterology. VS reports grants from Gilead Sciences and AbbVie. IT reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from AbbVie, MSD, Roche, Swedish Orphan Biovitrum, Gilead Sciences; Support for attending meetings and/or travel from AbbVie, MSD. KT reports grants from AbbVie, Gilead Sciences, Roche. DV reports grants or contracts from National Institutes of Health (NIH), Gilead Sciences, and ViiV. HV reports the following patents planned, issued or pending: Glycomics on PNF after liver transplantation and Glycomics on HCC recurrence after liver transplantation. TV reports grants or contracts from Gilead Sciences, Janssen Pharmaceuticals, AbbVie; consulting fees from AbbVie and Gilead Sciences; support for attending meetings and/or travel from Gilead Sciences and AbbVie. FGV reports travel support by Gador Argentina for ILTS 2018/2019 and AASLD 2018/2019; reports leadership of fiduciary role in a non-profit foundation as follows - President Fundacion para la Docencia e Investigacion de las Enfermedades del Higado (www.fundieh.org.ar). AV reports speaker fees for Gilead Sciences, AbbVie, and MSD. LW reports institutional research grants from AbbVie, Bristol-Myers Squibb, and Gilead Sciences; consulting for Gilead Sciences, Huahui, MSD, Pfizer; serving as a speaker for Ascletis Pharma, Bristol-Myers Squibb, Gilead Sciences and Kaiyin. NW reports unrestricted grants for research from AbbVie and Gilead Sciences; being a Clinical Investigator, Lecturer or Member of Advisory Boards for AbbVie, Gilead Sciences, GSK, MSD. VW-SW reports research grants from Gilead

Sciences; consultancy for 3V-BIO, AbbVie, Allergan, Boehringer Ingelheim, Echosens, Gilead Sciences, Inventiva, Merck, Novartis, Novo Nordisk, Pfizer, ProSciento, Sagimet Biosciences, TARGET PharmaSolutions, Terns; lectures for Abbott, AbbVie, Echosens, Gilead Sciences, Novo Nordisk; Stock: Co-founder of Illuminatio Medical Technology Limited. SZ reports advisory Boards and/or Speaker's Bureau for AbbVie, BioMarin, Gilead Sciences, Intercept, Janssen, Merck/MSD, Novo Nordisk, SoBi. HR reports serving as a member of advisory boards for Gilead Sciences, AbbVie, Abbott, Merck, and VBI Vaccines. CDA has received research funding from Gilead Sciences, Assembly Biosciences, AbbVie, and Roche. CDA Foundation has received research grants from Gilead Sciences.

Acknowledgements

This analysis was funded by a grant from the John C. Martin Foundation (2019-G024) through the Polaris Observatory. Grants for analyses in high-income countries/territories were provided by Gilead Sciences (IN-US-987-5808) and AbbVie, and country/territory analyses were supported by ZeShan Foundation (2021-0101-1-CDA-HEP-10) and The Hepatitis Fund. The funders had no role in the study design, data collection, data analysis, interpretation of data, decision to publish, or preparation of the manuscript. CE, DRS, EM, HR, IG, KRS and SB had access to the underlying data and models. All authors had full access to the data for their country and accept responsibility to submit for publication. SB, CE, DRS, EM, IG, and KRS were responsible for directly accessing and verifying the data.

We thank the Epidemiological Research Group on the Burden of Viral Hepatitis and Measures for its Elimination (VH-Epi) (19HC1001; led by JT) funded by the Ministry of Health, Labour and Welfare of Japan).

Data Sharing Statement

For a period of 1 year after publication, the authors will share the data used in the maps and figures in an Excel format after written request to the corresponding author. Data sharing will be limited to government agencies, academic institutions, and non-profit organizations, and will not apply to for-profit or consulting organizations. Additionally, select country level, regional and global data from the manuscript will be available publicly on the Polaris Observatory Website https://cdafound.org/polaris-countries-dashboard/

References

1. WHO. Global hepatitis report, 2017. Geneva: World Health Organization, 2017.

2. Page K, Melia MT, Veenhuis RT, et al. Randomized Trial of a Vaccine Regimen to Prevent Chronic HCV Infection. *The New England journal of medicine* 2021; **384**(6): 541-9.

3. Cooke GS, Andrieux-Meyer I, Applegate TL, et al. Accelerating the elimination of viral hepatitis: a Lancet Gastroenterology & Hepatology Commission. *The Lancet Gastroenterology & Hepatology* 2019; **4**(2): 135-84.

4. Global health sector strategy on viral hepatitis 2016–2021, Towards ending viral hepatitis. Geneva, Switzerland: World Health Organization.

5. WHO. Combating hepatitis B and C to reach elimination by 2030. Geneva, Switzerland: World Health Organization, 2016.

6. WHO. Interim guidance for country validation of viral hepatitis elimination, 2021.

7. Gower E, Estes C, Blach S, Razavi-Shearer K, Razavi H. Global epidemiology and genotype distribution of the hepatitis C virus infection. *J Hepatol* 2014; **61**(1S): S45-S57.

8. Lavanchy D. The global burden of hepatitis C. *Liver Int* 2009; **29 Suppl 1**: 74-81.

9. Lavanchy D. Evolving epidemiology of hepatitis C virus. *Clin Microbiol Infect* 2011; **17**(2): 107-15.

10. Mohd Hanafiah K, Groeger J, Flaxman AD, Wiersma ST. Global epidemiology of hepatitis C virus infection: New estimates of age-specific antibody to HCV seroprevalence. *Hepatology* 2013; **57**(4): 1333-42.

11. Blach S, Zeuzem S, Manns M, et al. Global prevalence and genotype distribution of hepatitis C virus infection in 2015: a modelling study. *The Lancet Gastroenterology & Hepatology* 2016; **2**(3): 161-76.

12. Razavi H, Waked I, Sarrazin C, et al. The present and future disease burden of hepatitis C virus (HCV) infection with today's treatment paradigm. *J Viral Hepat* 2014; **21 Suppl 1**: 34-59.

13. Sibley A, Han KH, Abourached A, et al. The present and future disease burden of hepatitis C virus (HCV) infections with today's treatment paradigm - volume 3. *J Viral Hepat* 2015.

14. Hatzakis A, Chulanov V, Gadano AC, et al. The present and future disease burden of hepatitis C virus (HCV) infections with today's treatment paradigm - Volume 2. *Journal of Viral Hepatitis* 2015; **22**(s1): 26-45.

15. Malcolm DG, Roseboom JH, Clark CE, Fazar W. Application of a Technique for Research and Development Program Evaluation. *Operations Research* 1959; **7**(5): 646-69.

16. Parr JB, Lodge EK, Holzmayer V, et al. An Efficient, Large-Scale Survey of Hepatitis C Viremia in the Democratic Republic of the Congo Using Dried Blood Spots. *Clin Infect Dis* 2018; **66**(2): 254-60.

17. World Health Organization. Global progress report on HIV, viral hepatitis and sexually transmitted infections, 2021. Accountability for the global health sector strategies 2016–2021: actions for impact. Geneva, Switzerland: World Health Organization, 2021.

18. Hassanin A, Kamel S, Waked I, Fort M. Egypt's Ambitious Strategy to Eliminate Hepatitis C Virus: A Case Study. *Glob Health Sci Pract* 2021; **9**(1): 187-200.

19. Maticic M, Zorman JV, Gregorcic S, Schatz E, Lazarus JV. Changes to the national strategies, plans and guidelines for the treatment of hepatitis C in people who inject drugs between 2013 and 2016: a cross-sectional survey of 34 European countries. *Harm Reduct J* 2019; **16**(1): 32.

20. Safreed-Harmon K, Blach S, Aleman S, et al. The Consensus Hepatitis C Cascade of Care: Standardized Reporting to Monitor Progress Toward Elimination. *Clin Infect Dis* 2019; **69**(12): 2218-27.

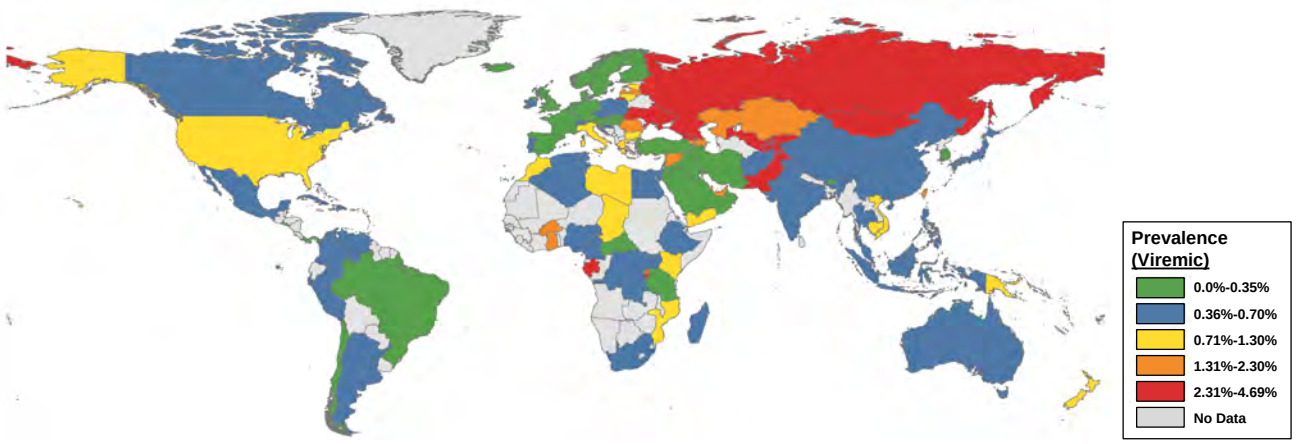
Tables (included separately)

Table 1. Modeled HCV viremic prevalence and number of viremic infections for 110 countries with approved or estimated models (all ages, 0+), beginning of years 2015 and 2020.

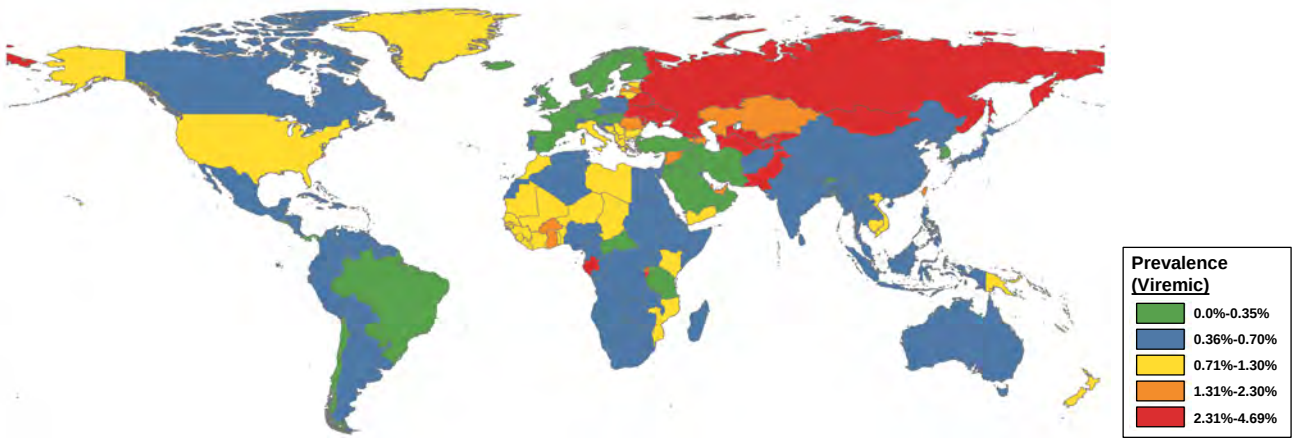
Table 2. Regional and global viremic prevalence (2015 and 2020) and annual cascade of care in 2020.

Figure 1. Evolution of country/territory HCV prevalence estimates (beginning of 2020)

A. 2020 Viremic HCV infection prevalence among countries/territories with approved or estimated models



B. Viremic HCV infection prevalence all countries/territories



C. Number of viremic HCV infections all countries/territories

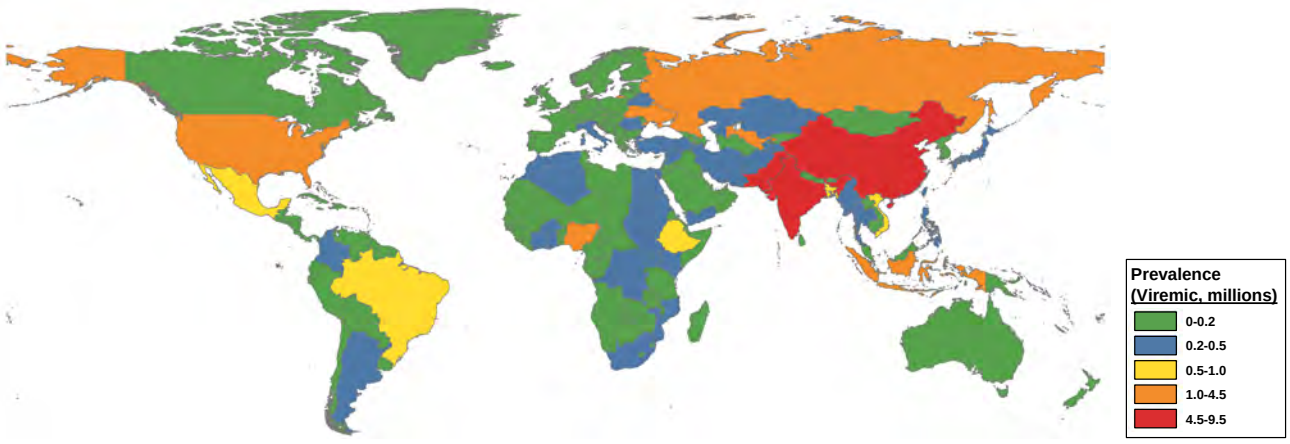
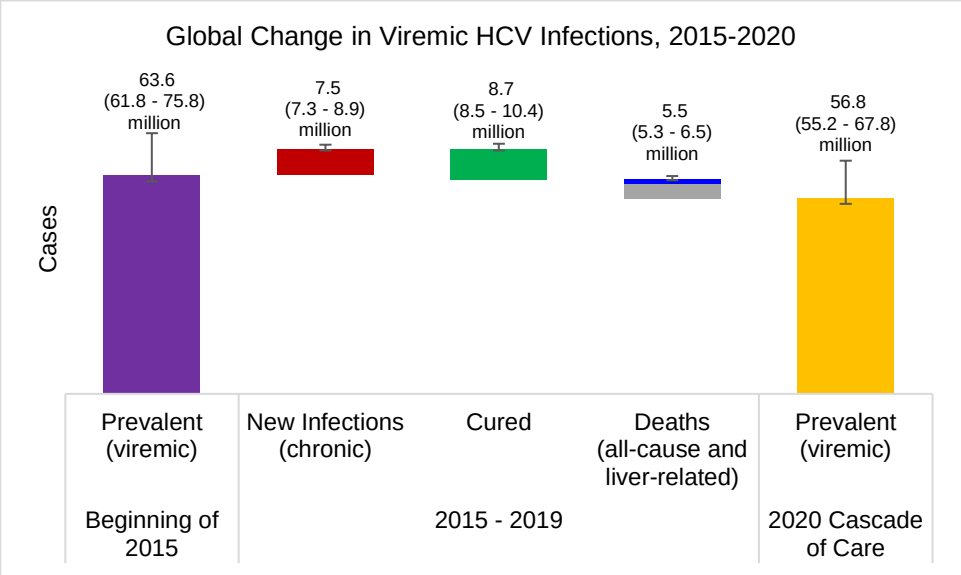


Figure 2. Change in viremic HCV infections from 2015 to 2020, a) Waterfall chart indicating the number of global viremic infections from 2015 through 2020, including the number of incident infections, treated/cured and deaths; b) Sankey diagram of viremic HCV infections in 2020, compared with viremic infections at the beginning of 2015 including the fraction attributable to treatment and cure, among countries accounting for more than 70% of viremic infections in 2015 *(bar width is proportional to the size of the population).*

a)



b)

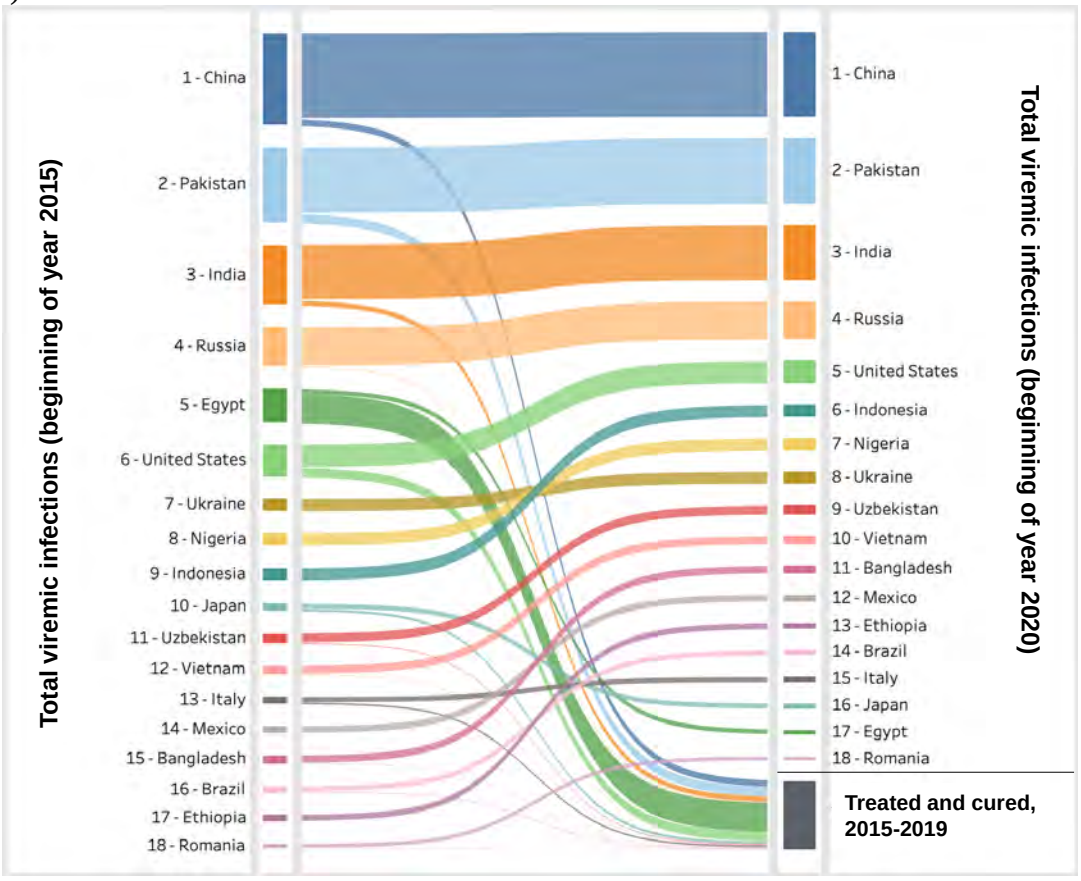
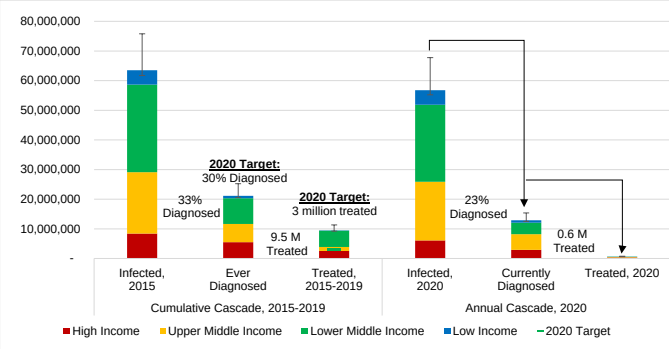
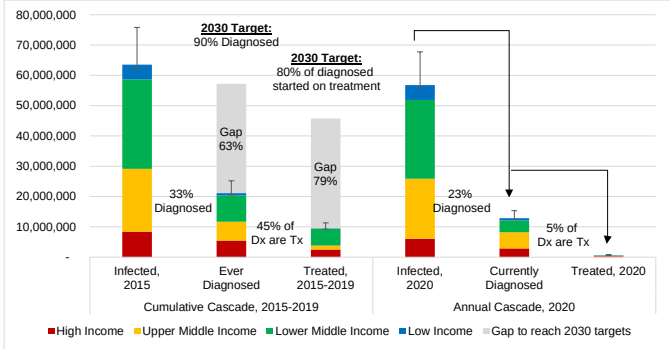


Figure 3. Cumulative and annual cascade of care from 2015 through the beginning of 2020, a) globally by income group, compared against the 2020 targets; b) globally by income group, compared against the 2030 targets; c) by individual income group, compared against the 2030 targets.

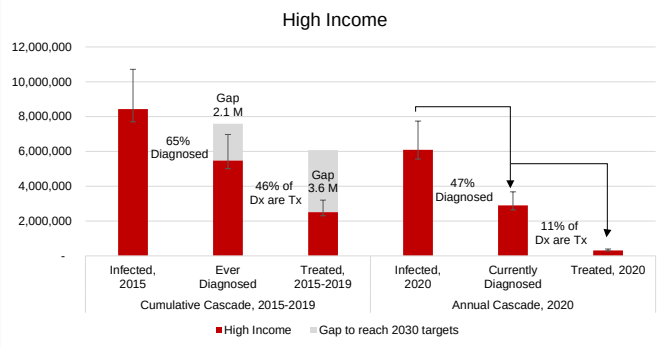
a)

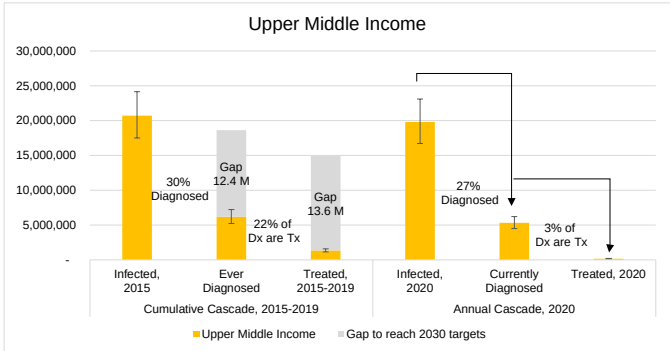


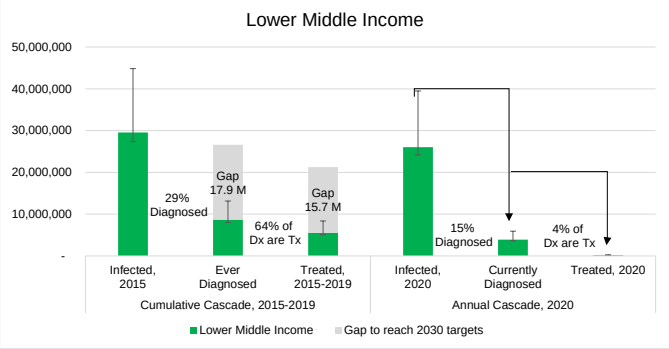
b)



c)







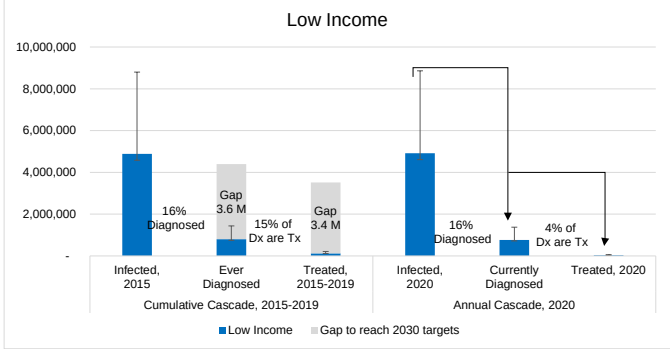


Figure 4. Cumulative number of patients initiated on treatment from 2015 through the end of 2019 for countries/territories accounting for more than 90% of treatment starts

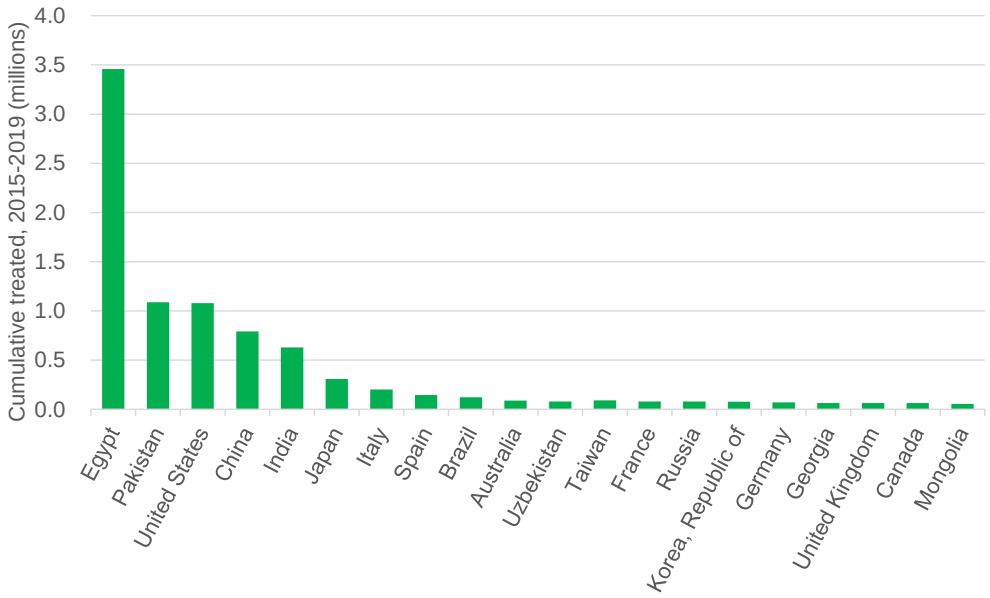
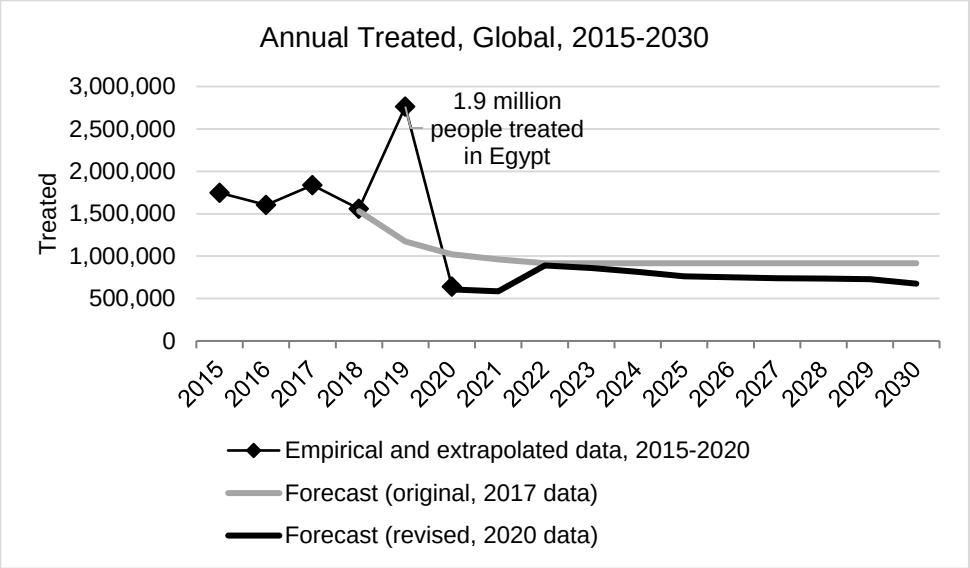
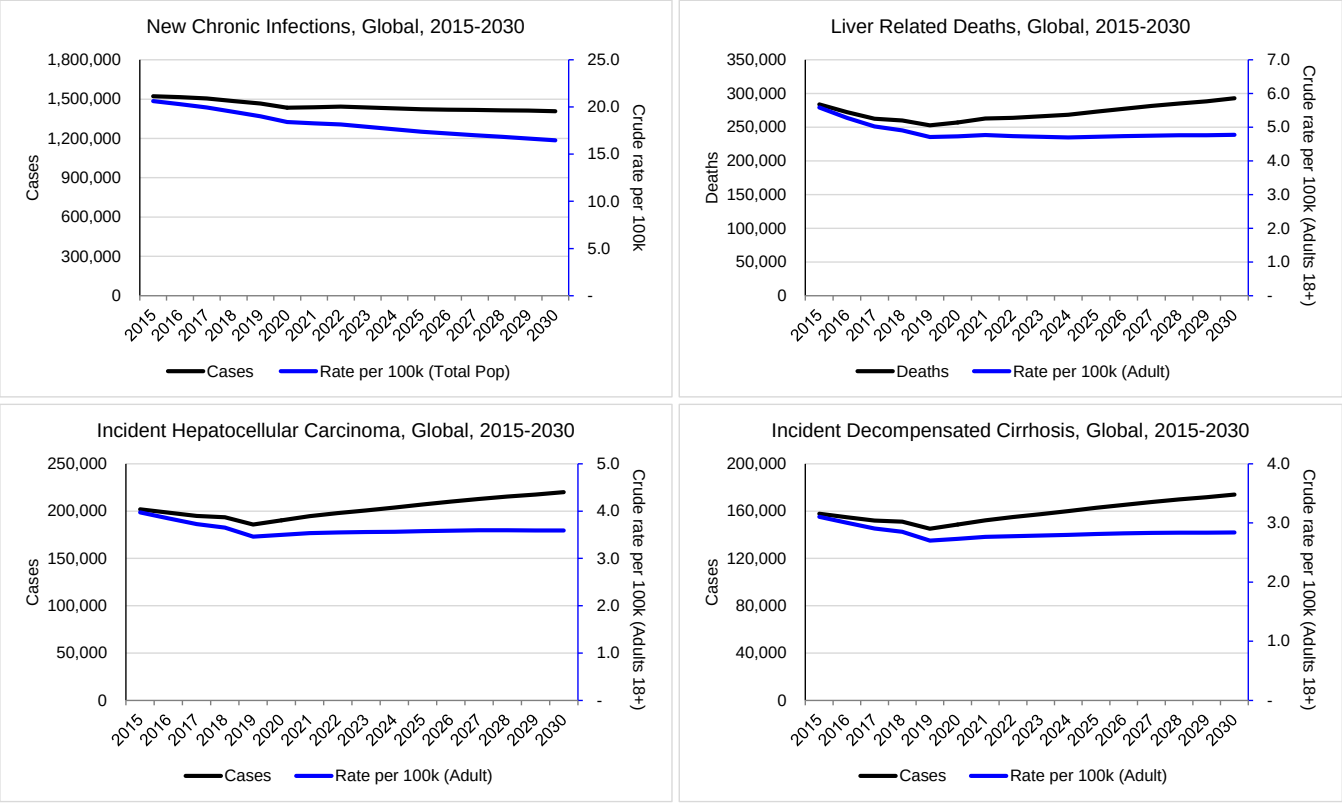


Figure 5. Global forecasts, 2015-2030 a) annual patients treated, with empirical and extrapolated data through 2020 as well global forecasts based on peak treatment in 2017 and revised forecasts based on country-level data through 2020; b) forecasted number and crude annual rate of new chronic infections, liver related deaths, hepatocellular carcinoma (HCC) and decompensated cirrhosis

a)



b)



The Polaris Observatory HCV Collaborators‡

Sarah Blach, Norah A Terrault, Frank Tacke, Ivane Gamkrelidze, Antonio Craxi, Junko Tanaka, Imam Waked, Gregory J Dore, Zaigham Abbas, Ayat R Abdallah, Maheeba Abdulla, Alessio Aghemo, Inka Aho, Ulus S Akarca, Abduljaleel M Alalwan, Marianne A Blomé, Said A Al-Busafi, Soo Aleman, Abdullah S Alghamdi, Waleed K Al-Hamoudi, ABDULRAHMAN A ALJUMAH, Khalid Al-Naamani, Yousif M AlSerkal, Altraif Ibrahim H, Anil C Anand, Motswedi Anderson, Monique I Andersson, Kostas Athanasakis, Oidov Baatarkhuu, Shokhista R Bakieva, Oscar A Beltran, Ziv Ben-Ari, Fernando Bessone, Olena Bidovanets, Mia J Biondi, Abdul Rahman N Bizri, Carlos E Brandão-Mello, Krestina Brigida, Kimberly A Brown, Robert S Brown, Jr, Philip Bruggmann, Maurizia R Brunetto, Dana Busschots, Maria Buti, Maia Butsashvili, Joaquin Cabezas, Chungman Chae, Viktorija Chaloska Ivanova, Henry Lik Yuen Chan, Hugo H C Cheinquer, Kent Jason Cheng, Myeong-Eun Cheon, Cheng-Hung Chien, Rong-Nan Chien, Gourdas Choudhuri, Peer Brehm Christensen, Wan-Long Chuang, Vladimir Chulanov, Laura E Cisneros, Barbara Coco, Fernando A Contreras, Markus Cornberg, Matthew E Cramp, Javier Crespo, Esther A Croes, Fuqiang Cui, Chris W Cunningham, Lucy Dagher Abou, Olav Dalgard, Doan Y Dao, Victor De Ledinghen, Moutaz F Derbala, Keshab Deuba, Karan Dhindsa, Samsuridjal Djauzi, Sylvia Drazilova, Ann-Sofi Duberg, Mohammed Elbadri, Manal H El-Sayed, Gamal Esmat, Chris Estes, Sameera Ezzat, Martti A Färkkilä, Laurent Ferradini, Maria Lucia G Ferraz, Paulo R A Ferreira, Tajana Filipec Kanizaj, Robert Flisiak, Sona Frankova, James Fung, Amiran Gamkrelidze, Edward J Gane, Virginia Garcia, Javier García-Samaniego, Manik Gemilyan, Jordan Genov, Liliana S Gheorghe, Pierre M Gholam, Adrian Goldis, Magnus Gottfredsson, Richard T Gray, Jason Grebely, Michael Gschwantler, Behzad Hajarizadeh, Saeed S Hamid, Waseem Hamoudi, Angelos Hatzakis, Margaret E Hellard, Sayed Himatt, Harald Hofer, Irena Hrstic, Bela Hunyady, Petr Husa, Azra Husic-Selimovic, Wasim S M Jafri, Martin Janicko, Naveed Janjua, Peter Jarcuska, Jerzy Jaroszewicz, Anna Jerkeman, Agita Jeruma, Jidong Jia, Jon G Jonasson, Martin Kåberg, Kelly D E Kaita, Kulpash S Kaliaskarova, Jia-Horng Kao, Omor T Kasymov, Angela Kelly-Hanku, Faryal Khamis, Jawad Khamis, Aamir G Khan, Lekey Khandu, Ibtissam Khoudri, Knut B Kielland, Do Young Kim, Nicolas Kodjoh, Loreta A Kondili, Mel Krajden, Henrik Bygum Krarup, Pavol Kristian, Jisoo A Kwon, Martin Lagging, Wim Laleman, Wai Cheung Lao, Daniel Lavanchy, Pablo Lázaro, Jeffrey V Lazarus, Alice U LEE, Mei-Hsuan Lee, Michael KK Li, Valentina Liakina, Young-Suk Lim, Arthur Löve, Boris Lukšić, Shepherd Mufudzi Machekera, Abraham O Malu, Rui T Marinho, Mojca Maticic, Hailemichael D Mekonnen, Maria Cássia Mendes-Correa, Nahum Mendez-Sanchez, Shahin Merat, Berhane Redae Meshesha, Håvard Midgard, Mike Mills, ROSMAWATI MOHAMED, Ellen Mooneyhan, Christophe Moreno, David H Muljono, Beat Müllhaupt, Erkin

Musabaev, Gaëtan Muyldermans, Yvonne Ayerki Nartey, Marcelo C M Naveira, Francesco Negro, Alexander V Nersesov, Van Thi Thuy Nguyen, Richard Njouom, Rénovat Ntagirabiri, Zuridin S Nurmatov, Solomon A Obekpa, Stephen Oguche, Sigurdur Olafsson, Janus P Ong, Ohene K Opare-Sem, Mauricio Orrego, Anne L Øvrehus, Calvin Q Pan, George V Papatheodoridis, Markus Peck-Radosavljevic, Mário G Pessoa, Richard O Phillips, Nikolay Pimenov, Dijana Plaseska-Karanfilska, Nishi N Prabdial-Sing, Pankaj Puri, Huma Qureshi, Aninda Rahman, Alnoor Ramji, Devin M Razavi-Shearer, Kathryn Razavi-Shearer, Ezequiel Ridruejo, Cielo Y Ríos-Hincapié, S M Shahriar Rizvi, Geert KMM Robaeys, Lewis R Roberts, Stuart K Roberts, Stephen D Ryder, Shakhlo Sadirova, Umar Saeed, Rifaat Safadi, Olga Sagalova, Sanaa S Said, Riina Salupere, Faisal M Sanai, Juan F Sanchez-Avila, Vivek A Saraswat, Christoph Sarrazin, Gulya Sarybayeva, Carole Seguin-Devaux, Ala I Sharara, Mahdi Sheikh, Abate B Shewaye, William Sievert, Kaarlo Simojoki, Marieta Y Simonova, Mark W Sonderup, C Wendy Spearman, Jan Sperl, Rudolf E Stauber, Catherine A M Stedman, Tung-Hung Su, Anita Suleiman, Vana Sypsa, Natalia Tamayo Antabak, Soek-Siam Tan, Tammo L Tergast, Prem H Thurairajah, Ieva Tolmane, Krzysztof Tomasiewicz, Maia Tsereteli, Benjamin S C Uzochukwu, David A M C Van De Vijver, Daniela K van Santen, Hans Van Vlierberghe, Berend Van Welzen, Thomas Vanwolleghem, Patricia Vélez-Möller, Federico Guillermo Villamil, Adriana Vince, Yasir Waheed, Lai Wei, Nina Weis, Vincent W-S Wong, Cesar G Yaghi, Kakharman Yesmembetov, Ayman Yosry, Man-Fung Yuen, Evy Yunihastuti, Stefan Zeuzem, Eli Zuckerman, Homie A Razavi

Affiliations

Center for Disease Analysis Foundation, Lafayette, Colorado, United States (S Blach MHS, CPH, I Gamkrelidze BA, K Dhindsa BA, C Estes MPH, CPH, E Mooneyhan MPH, M Naveira MD, MPH, MDMa, D Razavi-Shearer MPHc, K Razavi-Shearer MPH, H Razavi PhD MBA); Medicine, University of Southern California, Los Angeles, United States (N Terrault MD, MPH); Department of Hepatology & Gastroenterology, Charité Universitätsmedizin Berlin, Berlin, Germany (F Tacke MD, PhD); PROMISE, University of Palermo, Palermo, Italy (A Craxi MD, PhD, Full Professor of Internal Medicine and Gastroenterology); Epidemiology, Infectious Disease Control and Prevention, Hiroshima University, Hiroshima, Japan (J Tanaka PhD); Hepatology, National Liver Institute, Shebeen El Kom, Egypt (I Waked MB, BCh, MSc, MD, FRCP); The Kirby Institute, UNSW Sydney, Sydney, Australia (G Dore BSc, MBBS, MPH, PhD, R Gray BSc(Hons), PhD, J Grebely PhD, B Hajarizadeh, A Kelly-Hanku, J Kwon PhD); Hepatogastroenterology, Dr. Ziauddin University Hospital, KARACHI, Pakistan (Z Abbas FCPS, FRCP); Medicine, The Aga Khan University Hospital, Karachi, Pakistan (Z Abbas FCPS, FRCP);

Epidemiology and preventive medicine, National liver institute, Shebin Elkom, Egypt (A Abdallah MD); Family and community medicine, college of medicine, Taibah university, Almadinah, Saudi Arabia (A Abdallah MD); Internal medicine, SMC, Manama, Bahrain (M Abdulla MD, MRCP); Internal Medicine, Ibn ALNafees Hospital, Manama, Bahrain (M Abdulla MD, MRCP); Department of Biomedical Sciences, Humanitas University, Pieve Emanuele, Italy (A Aghemo MD, PhD); Gastroenterology, Humanitas Research Hospital IRCCS, Rozzano, Italy (A Aghemo MD, PhD); Infectious Diseases, Helsinki University Hospital, Helsinki, Finland (I Aho); Gastroenterology, Ege University, Izmir, Turkey (U Akarca); King Abdullah International Medical Research Center, Riyadh, Saudi Arabia (A ALALWAN MD); King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia (A ALALWAN MD); Clinical Infection Medicine, Department of Translational Medicine, Lund University, Malmö Sweden (M Blomé MD PhD); Department of Medicine, College of Medicine and Health Sciences, Sultan Qaboos University, AlKhoudh, Sultanate of Oman (S Al-Busafi MD, FRCPC); Medicine, Sultan Qaboos University Hospital, AlKhoudh, Oman (S Al-Busafi MD, FRCPC); Department of Infectious Diseases, Karolinska University Hospital, and department of Medicine Huddinge, Karolinska Institutet (S Aleman MD, PhD); Gastroenterology Unit/Medical Department, King Fahad General Hospital, Jeddah, Saudi Arabia (A Alghamdi MD); Medicine, King Saud University, Riyadh, Saudi Arabia (W Al-Hamoudi MD); Liver transplantation, King Faisal Specialist hospital, Riyadh, Saudi Arabia (W Al-Hamoudi MD); Medicine, Dar Al Uloom University, Riyadh, Saudi Arabia (A Aljumah MD, MPH, ABIM, FRCPI); Internal Medicine, Division of Gastroenterology and Hepatology, Armed Forces Hospital, Muscat, Oman (K Al-Naamani Bsc, MD, FRCPC, FRCP(Edin)); Emirates Health Services, Dubai, UAE (Y AlSerkal Specialist Gastroenterologist); Hepatology Division - Hepatobiliary Sciences and Organ Transplant Center, Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia (I Altraif FRCP); King Abdullah International Medical Research Center, Riyadh, Saudi Arabia (I Altraif FRCP); King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia (I Altraif FRCP); Gastroenterology & Hepatology, Kalinga Institute of Medical Sciences, Bhubaneswar, India (A Anand MD, DM); Gastroenterology & Hepatology, Armed Forces Medical Services, New Delhi (A Anand MD, DM); Laboratory, Botswana Harvard AIDS Institute Partnership, Gaborone, Botswana (M Anderson PhD); Nuffield Department of Clinical Laboratory Science, Radcliffe Department of Medicine, University of Oxford, Oxford, United Kingdom (M Andersson); Division of Medical Virology, University of Stellenbosch, Cape Town, South Africa (M Andersson); Department of Public Health Policy, University of West Attica, Athens, Greece (K Athanasakis PhD); Infectious Diseases, Mongolian National University of Medical Sciences, Ulaanbaatar, Mongolia (O Baatarkhuu MD, PhD); Mongolian Association for the Study of Liver Diseases,

Ulaanbaatar, Mongolia (O Baatarkhuu MD, PhD); Research Institute of Virology of MoH of Republic of Uzbekistan, Tashkent city, Uzbekistan (S Bakieva MD, K Brigida MD, E Musabaev MD PhD, S Sadirova PhD); Bogota DC, Asociacion Colombiana de Hepatologia, Bogota DC, Colombia (O Beltran Gastroenterologist hepatologist, MD); Bogota DC, Fundacion Cardioinfantil - Liver transplant group, Bogota, Colombia (O Beltran Gastroenterologist hepatologist, MD); Liver Diseases Center, Sheba Medical Center, Ramat Gan, Israel (Z Ben-Ari Prof); Sackler School of Medicine, Tel-Aviv University, Tel-Aviv, Israel (Z Ben-Ari Prof); Facultad de Medicina, University of Rosario School of Medicine, Rosario, Argentina (F Bessone MDF); Gastroenterology and Hepatology Department, Hospital Provincial del Centenario, Rosario, Argentina (F Bessone MDF); Viral Hepatitis and Opioid Dependency Department, Public Health Center of the Ministry of Health of Ukraine, Kyiv, Ukraine (O Bidovanets); Toronto Centre for Liver Disease, University Health Network, Toronto, Canada (M Biondi PhD, NP-PHC); Internal Medicine, American University of Beirut Medical Center, Beirut, Lebanon (A R Bizri MD, MSc, FRCP, A Sharara MD); Internal Medicine & Gastroenterology, University of Rio de Janeiro, Rio de Janeiro, Brazil (C Brandão-Mello MD, PHD); Clinica de Doenças do Fígado, Rio de Janeiro, Brazil (C Brandão-Mello MD, PHD); Department of Medicine, Henry Ford Hospital, Detroit, United States (KB); Medicine, Weill Cornell Medicine, New York, United States (R Brown, Jr MD, MPH); Arud Centre for Addiction Medicine, Zürich, Switzerland (P Bruggmann MD); Swiss Hepatitis, Zurich, Switzerland (P Bruggmann MD); Institute for Primary Care, University Hospital, Zurich, Switzerland (P Bruggmann MD); Clinical and Experimental Medicine, University of Pisa, Pisa, Italy (M Brunetto MD); Integrated Department of Medical Specialties, University Hospital of Pisa, Pisa, Italy (M Brunetto MD); Faculty of Health and Life Sciences, Hasselt University, Hasselt, Belgium (D Busschots); Department of Gastroenterology and Hepatology, Ziekenhuis Oost-Limburg, Genk, Belgium (D Busschots); Liver Unit, Hospital Universitari Vall d Hebron and CIBEREHD del INsituto Carlos III. Universidad Autonoma de Barcelona, Barcelona, Spain (M Buti Professor); Health Research Union, Tbilisi, Georgia (M Butsashvili); Gastroenterology and Hepatology Department, Marques de Valdecilla University Hospital, Santander, Spain (J Cabezas MD, J Crespo MD, PhD, Professor); Clinical and Translational Research in Digestive Diseases, IDIVAL, Santander, Spain (J Cabezas MD, J Crespo MD, PhD, Professor); Division of Infectious Disease Control, Korea Disease Control and Prevention Agency, Osong, Korea, Republic of (C Chae MPH, BPharm); University Clinic of Gastroenterology and Hepatology, Medical Faculty, Skopje, North Macedonia (V. Chaloska Ivanova, Professor of Gastroenterology); Department of Internal Medicine, Union Hospital, Hong Kong, Hong Kong (H L Y Chan MD); Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong, Hong Kong (H L Y Chan MD); Internal Medicine -

Gastroenterology and Hepatology Division, Hospital de Clinicas de Porto Alegre (HCPA), Porto Alegre, Brazil (H Cheinquer MD, PhD); Maxwell School of Citizenship and Public Affairs, Social Science Department, Syracuse University, Syracuse, NY, United States (K J Cheng MA); Division of infectious Disease control, Korea Disease control and prevention agency, Seoul, Korea, Republic of (M-E Cheon Doctor); Division of Hepato-Gastroenterology, Chang Gung Memorial Hospital Keelung Branch, Keelung, Taiwan (C-H Chien MD, MS); Community Medicine Research Center, Chang Gung Memorial Hospital Keelung branch, Keelung, Taiwan (C-H Chien MD, MS); Chang Gung Memorial Hospital and University, Taoyuan, Taiwan (R-N Chien); Chairman, Department of Gastroenterology and Hepatology, Fortis Memorial Research Institute, Gurgaon, India (G Choudhuri MD, DM, FACG, FAMS, FRCPI); Department of Medicine, Vivekanand Polyclinic and Institute of Medical Sciences, Lucknow, Lucknow, India (G Choudhuri MD, DM, FACG, FAMS, FRCPI); Department of Infectious Diseases, Odense University Hospital, Odense, Denmark (P B Christensen PhD); Department of Clinical Research, University of Southern Denmark, Odense, Denmark (P B Christensen PhD); Hepatobiliary Division, Department of Internal Medicine, Kaohsiung Medical University Hospital, Kaohsiung Medical University, Kaohsiung, Taiwan (W-L Chuang MD, PhD); National Medical Research Center of Phthisiopulmonology & Infectious Diseases, Moscow (V Chulanov MD, PhD); Sechenov University, Moscow (V Chulanov MD, PhD); Sirius University of Science and Technology, Sochy, Russia (V Chulanov MD, PhD); Hepatology, Hospital Christus Muguerza Alta Especialidad, Monterrey Nuevo León, Mexico (L Cisneros MD, PhD, Gastroenterology, Hepatology); Private Practice, Edificio Médico de Especialistas Hidalgo No 2532 Col Obispado ZIP 64060 office 103-C, Monterrey, Mexico (L Cisneros MD, PhD, Gastroenterology, Hepatology); Hepatology Research, Investigaciones Médicas Cisneros SC, Monterrey, Mexico (L Cisneros MD, PhD, Gastroenterology, Hepatology); Asociaciòn Mexicana de Hepatologia, Ciudad de Mèxico, Mexico (L Cisneros MD, PhD, Gastroenterology, Hepatology); Hepatology Unit, Azienda Ospedaliero-Universitaria Pisana, Pisa, Italy (B Coco); Medicine, Universidad Nacional Pedro Henriquez Urena, Santo Domingo, Dominican Republic (F Contreras MD); Hepatology, Centro de Gastroenterologia Avanzada, Santo Domingo, Dominican Republic (F Contreras MD); Department of Gastroenterology, Hepatology, and Endocrinology, Hannover Medical School, Hannover, Germany (M Cornberg MD); Centre for Individualised Infection Medicine (CiiM), Hannover, Germany (M Cornberg MD); South West Liver Unit, University Hospitals Plymouth NHS Trust, Plymouth, United Kingdom (M Cramp MB, BS, MD, FRCP); Hepatology Research Group, Peninsula Medical School, University of Plymouth, Plymouth, United Kingdom (M Cramp MB, BS, MD, FRCP); School of Medicine, University of Cantabria, Santander, Spain (J Crespo MD, PhD, Professor); Depts of Drugs and

Tobacco Control, Trimbos Institute, Utrecht, Netherlands (E Croes MD, PhD); School of Public Health, Peking University (F Cui); Research Centre for Hauora & Health, Massey University, Wellington, New Zealand (C Cunningham PhD); Gastroenterologia, Centro Medico Docente La Trinidad, Caracas, Venezuela (L Dagher Abou MD); Hepatologia, Policlinica Metropolitana, Caracas, Venezuela (L Dagher Abou MD); Department of Infectious Diseases, Akershus University Hospital, Lørenskog, Norway (O Dalgard MD); Institute of Clinical Medicine, University of Oslo, Oslo, Norway (O Dalgard MD); Internal Medicine, Johns Hopkins University School of Medicine, Baltimore, United States (D Dao MD); CHU Bordeaux (V De Ledinghen MD PhD); Gastroenterology and Hepatology, Hamad Medical Corporation, Doha, Qatar (M Derbala PhD, MD); Department of Medicine Gastroenterology and Hepatology, Weill Cornell Medicine - Qatar, Doha, Qatar (M Derbala PhD, MD); Strategic Information Unit, National Centre for AIDS & STD Control/ Global Fund Programs, Kathmandu, Nepal (K Deuba PhD, MPH); Department of Global Public Health, Karolinska Institutet, Stockholm, Sweden (K Deuba PhD, MPH); Internal medicine, Faculty of Medicine University of Indonesia/Ciptomangunkusumo Hospital Jakarta, Jakarta, Indonesia (S Djauzi MD, PhD, E Yunihastuti MD, PhD); 2nd Dept of Internal Medicine, PJ Safarik University, Faculty of Medicine and L Pasteur University Hospital, Kosice, Slovakia (S Drazilova MD, M Janicko MD, PhD, P Jarcuska MD, PhD); Department of Infectious Diseases, Faculty of Medicine and Health, Örebro University (A-S Duberg MD, PhD, Associate professor); Gastroenterology Department, Hamad Medical Corporation, Doha, Qatar (M Elbadri MD); Department of Pediatrics, Ain Shams University, Cairo, Egypt (M El-Sayed MD, PhD); Endemic medicine department, Cairo University Hospitals, Cairo, Egypt (G Esmat); Epidemiology and Preventive Medicine Department, National Liver Institute, Menoufia University (S Ezzat MD); Abdominal Center, Helsinki University Hospital, Helsinki, Finland (M Färkkilä); FHI360, Phnom Penh, Cambodia (L Ferradini); Gastroenterology/Hepatology, Federal University of Sao Paulo, São Paulo, Brazil (M L Ferraz MD, PhD); Division of Infectious Disease, Federal University of São Paulo, São Paulo, Brazil (P Ferreira MD, PhD); Department of gastroenterology, University hospital Merkur, School of Medicine, University of Zagreb, Zagreb, Croatia (T Filipec Kanizaj MD, PhD); Department of Infectious Diseases and Hepatology, Medical University of Białystok, Białystok, Poland (R Flisiak Prof); Department of Hepatogastroenterology, Institute for Clinical and Experimental Medicine, Prague, Czechia (S Frankova PhD, J Sperl); Medicine, The University of Hong Kong, Hong Kong, Hong Kong (J Fung MBChB, MD, FRACP, FHKCP, FHKAM, FAASLD); Director general, National Center for Disease Control and Public Health, Tbilisi, Georgia (A Gamkrelidze PhD); New Zealand Liver Transplant Unit, Auckland City Hospital, Auckland, New Zealand (E Gane MBChB, MD); Department of Medicine, University of Auckland, Auckland, New Zealand (E

Gane MBChB, MD); New Zealand Clinical Research, University of Auckland, Auckland, New Zealand (E Gane MBChB, MD); Gastroenterology Professor at Universidad Autonoma de Santo Domingo / Doctor at Centro Endoscopico Digestivo Integral / Retire doctor from the Health Ministry in the Dominican Republic, Santo Domingo, Dominican Republic (V Garcia); Liver Unit, Hospital Universitario La Paz. CIBERehd. IdiPAZ, Madrid, Spain (J García-Samaniego MD; PhD); Gastroenterology and Hepatology, Yerevan State Medical University, Yerevan, Armenia (M Gemilyan MD, MPH); Clinic of Gastroenterology, University Hospital Tsaritsa Yoanna - ISUL, Medical University - Sofia, Sofia, Bulgaria (J Genov MD, PhD); Gastroenterology & Hepatology, Carol Davila University of Medicine & Pharmacy, Bucharest, Romania (L Gheorghe MD, PhD); Gastroenterology & Hepatology, Fundeni Clinical Institute, Bucharest, Romania (L Gheorghe MD, PhD); Medicine, Case Western Reserve University School of Medicine, Cleveland, United States (P Gholam MD); Infectious diseases, Landspitali University Hospital, Reykjavík, Iceland (M Gottfredsson MD, PhD, FACP); Faculty of Medicine, University of Iceland, Reykjavík, Iceland (M Gottfredsson MD, PhD, FACP); Department of Internal Medicine IV, Klinik Ottakring, Vienna, Austria (M Gschwantler MD); Medicine, Aga Khan University, Karachi, Pakistan (S Hamid MBBS, FRCP); MOH, Royal Hospital, Amman, Jordan (W Hamoudi MD); Hygiene, Epidemiology and Medical Statistics, National and Kapodistrian University of Athens, Medical School, Athens, Greece (A Hatzakis MD, PhD); Hellenic Scientific Society for the Study of AIDS, Sexually Transmitted and Emerging Diseases, Athens, Greece (A Hatzakis MD, PhD); Burnet Institute, Melbourne Australia (M Hellard PhD); Public Health, Ministry of Public Health, Doha, Qatar (S Himatt); Department of Internal Medicine I, Klinikum Wels-Grieskirchen, Wels, Austria (H Hofer MD); Department of Gastroenterology, General Hospital Pula, Pula, Croatia (I Hrstic PhD); School of Medicine, University of Rijeka, Rijeka, Croatia (I Hrstic PhD); University of Pula, Pula, Croatia (I Hrstic PhD); Dept. Gastroenterology, Somogy Megyei Kaposi Mor Oktato Korhaz, Kaposvar, Hungary (B Hunyady MD, PhD, DSc); First Dept Internal Medicine, University of Pecs, Pecs, Hungary (B Hunyady MD, PhD, DSc); Department of Infectious Diseases, University Hospital Brno, Brno, Czechia (P Husa MD, PhD); Department of Infectious Diseases, Faculty of Medicine, Masaryk University Brno, Brno, Czechia (P Husa MD, PhD); Gastroenterohepatology Department, University General Hospital "Prim.dr Abdulah Nakaš", Sarajevo, Bosnia and Herzegovina (A Husic-Selimovic); Medicine (Hepatology Gastroenterology), Aga Khan University, Karachi, Pakistan (W Jafri MD, MRCP(Uk), FRCP, FACP, FACG, MACG); Medicine, Hepatology, South City Hospital, Karachi, Pakistan (W Jafri MD, MRCP(Uk), FRCP, FACP, FACG, MACG); BC Centre for Disease Control, Vancouver, Canada (N Janjua); Department of Infectious Diseases and Hepatology, Medical University of Silesia, Katowice, Poland (J Jaroszewicz MD, PhD);

Clinical Infection Medicine, Department of Translational Medicine, Lund University, Malmö, Sweden (A Jerkeman MD, PhD); Department of Infectious Diseases, Skåne University Hospital, Malmö, Sweden (A Jerkeman MD, PhD); Riga East University hospital, Riga, Latvia (A Jeruma MD); Riga Stradins University, Riga, Latvia (A Jeruma MD); Liver Research Center, Beijing Friendship Hospital, Capital Medical University, Beijing, Mainland, China, Mainland (J Jia MD, PhD); Department of Pathology, Landspitali - University Hospital, Reykjavik, Iceland (J Jonasson MD, DipMRCPath); Faculty of Medicine, University of Iceland, Reykjavik, Iceland (J Jonasson MD, DipMRCPath); Department of Medicine Huddinge, Division of Infection and Dermatology, Karolinska Institutet, Karolinska University Hospital Huddinge, Sweden, Karolinska Institutet, Stockholm, Sweden (M Kåberg PhD); Section of Hepatology, Department of Internal Medicine, University of Manitoba, Winnipeg, Canada (K Kaita MD, FRCPC); Hepatitis Research Center, National Taiwan University Hospital, Taipei, Taiwan (J-H Kao MD, PhD, FAASLD); Scientific and Production Centre for Preventive Medicine of the Ministry of Health and Social Development of the Kyrgyz Republic, Bishkek, Kyrgyzstan (O Kasymov Doctor of Medical Sciences); Papua New Guinea Institute of Medical Research, Goroka, Papua New Guinea (A Kelly-Hanku); Infectious Diseases, Royal Hospital, Muscat, Oman (F Khamis MD); SMC, Manama, Bahrain (J Khamis MD MRCP(UK) MRCP Gastroenterology and Hepatology); Gastroenterology & Hepatology, Lady Reading Hospital, Peshawar, Pakistan (A Khan MSc(G), FRCP, FRCPEd, FACG, AGAF); National HIV, Hepatitis and STIs Control Program, Department of Public Health, Ministry of Health, Royal Govt. of Bhutan. (L Khandu MPH, BSc); Directorate of Epidemiology and Disease Control, Ministry of Health, Rabat, Morocco (K PhD); Norwegian National Advisory Unit on Concurrent Substance Abuse and Mental Health Disorders (NKROP), Innlandet Hospital Trust, Norway (K Kielland MD, PhD); Internal Medicine, Yonsei University College of Medicine, Seoul, Korea, Republic of (D Y Kim MD); Faculté des Sciences de la Santé, Université d'Abomey Calavi, Cotonou, Benin (N Kodjoh Docteur en Médecine Diplôme d'Etudes Spéciales des Maladies de l'Appareil Digestif Professeur d'Hépato-gastroentérologie); National Center for Global Health, Istituto Superiore di Sanità, Rome, Italy (L A Kondili MD, PhD); British Columbia Centre for Disease Control, Vancouver, Canada (M Krajden MD, FRCPC); Dept of Pathology and Laboratory Medicine, University of British Columbia, Vancouver, Canada (M Krajden MD, FRCPC); Department of Molecular Diagnostics, Aalborg University Hospital, Aalborg, Denmark (H Krarup MD, PhD); Department of Infectology and Travel Medicine, Pavol Jozef Safarik University, Faculty of Medicine, Košice, Slovakia (P Kristian Md, PhD); Department of Infectology and Travel Medicine, L. Pasteur University Hospital, Košice, Slovakia (P Kristian Md, PhD); Department of Infectious Diseases / Virology, Institute of Biomedicine, Sahlgrenska Academy, University of Gothenburg, Gothenburg,

Sweden (M Lagging MD, PhD); Department of Clinical Microbiology, Sahlgrenska University Hospital, Region Västra Götaland, Gothenburg, Sweden (M Lagging MD, PhD); Department of Gastroenterology and Hepatology, University Hospitals Leuven, LEUVEN, Belgium (W Laleman MD, PhD); Department of Medicine, Pamela Youde Nethersole Eastern Hospital, Hong Kong, China (W C Lao MBBS (HK), FRCP, FHKAM); consultant independent (D Lavanchy MD, MHEM); Health Services Research, Independent Health Services Researcher, Madrid, Spain (P Lázaro MD, PhD, MBA); Barcelona Institute for Global Health (ISGlobal), Hospital Clínic, University of Barcelona, Barcelona, Spain (J V Lazarus PhD, MIH, MA); Concord Repatriation General Hospital, University of Sydney, Concord 2139, NSW, Australia (A Lee MBBS, FRACP, PhD); Institute of Clinical Medicine, National Yang Ming Chiao Tung University, Taipei, Taiwan (M-H Lee PhD); Department of Medicine and Geriatrics, Tuen Mun Hospital, Tuen Mun, Hong Kong (M Li MBBS FRCP); Clinic of Gastroenterology, Nephrourology and Surgery, Faculty of Medicine, Vilnius University, Vilnius, Lithuania (V Liakina Ass Prof); Department of Chemistry and Bioengineering, Faculty of Fundamental Sciences, Vilnius Gediminas Technical University (VILNIUS TECH), Vilnius, Lithuania (V Liakina Ass Prof); Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea, Republic of (Y-S Lim); Virology, Landspitali- University of Iceland, Reykjavik, Iceland (A Löve MD, PhD); Clinical Department of Infectious Diseases, University of Split, School of Medicine, Clinical Hospital Center Split, Split, Croatia (B Lukšić MD, PhD); World Vision International, Port Moresby, Papua New Guinea (S Machekera MBChB, MSc, MBA); DEPARTMENT OF MEDICINE, Adoose Specialist Hospital, Makurdi, Nigeria (A Malu MBBS, MD, FMCP, FWACP, Cert Gastroenterol (BPMF)); Medicine, Benue State University, Makurdi, Nigeria (A Malu MBBS, MD, FMCP, FWACP, Cert Gastroenterol (BPMF)); Medicine, Federal Medical Centre, Makurdi, Nigeria (A Malu MBBS, MD, FMCP, FWACP, Cert Gastroenterol (BPMF)); Head of Department of Gastroenterology and Hepatology, Hospital Santa Maria, Medical School of Lisbon, Director of National Program for Viral Hepatitis, Ministry of Health, Lisboa, Portugal (R Marinho MD, PhD, Director of National Program for Viral Hepatitis, Ministry of Health); Clinic for Infectious Diseases and Febrile Illnesses, University Medical Centre Ljubljana, Ljubljana, Slovenia (M Maticic Specialist of infectious diseases and specialist in internal medicine); Faculty of Medicine, University of Ljubljana, Ljubljana, Slovenia (M Maticic Specialist of infectious diseases and specialist in internal medicine); Internal Medicine, St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia (H Mekonnen MD, PhD); Gastroenterology (H Mekonnen MD, PhD); Department of Infectious Diseases, School of Medicine, University of São Paulo, São Paulo, SP, Br, Sao Paulo, Brazil (M C Mendes-Correa MD, PhD); Instituto de Medicina Tropical, School of Medicine, Sao Paulo University, SAO PAULO,

Brazil (M C Mendes-Correa MD, PhD); Liver Research Unit, Medica Sur Clinic & Foundation., Mexico City, Mexico (N Mendez-Sanchez MD, MSc, PhD); Faculty of Medicine., National Autonomous University of Mexico, Mexico City, Mexico (N Mendez-Sanchez MD, MSc, PhD); Digestive Diseases Research Institute, Tehran University of Medical sciences, Tehran, Iran (S Merat, M Sheikh MD, PhD); Minimal Invasive surgery, St. Paul Hospital Millenium Medical College, Addis Ababa, Ethiopia (B R Meshesha MD, PhD); Health Service Quality Directorate, MoH, Addis Ababa, Ethiopia (B R Meshesha MD, PhD); Department of Gastroenterology, Oslo University Hospital, Oslo, Norway (H Midgard MD PhD); Medicine, The University of the West Indies, Mona, Kingston, Jamaica (M Mills MBBS, DM, FACG, FRCP, FACP); Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia (R Mohamed MBBS, MRCP, MD); Department of Gastroenterology, Hepatopancreatology and Digestive oncology, CUB Hôpital Erasme, Brussels, Université Libre de Bruxelles, Belgium (C Moreno MD, PhD); Hepatitis Unit, Eijkman Institute for Molecular Biology, Jakarta, Indonesia (D Muljono MD, PhD); Faculty of Medicine, Hasanuddin University, Makassar, Indonesia (D Muljono MD, PhD); Honorary Professor, Faculty of Medicine and Health, University of Sydney, Sydney - NSW, Australia (D Muljono MD, PhD); Department of Gastroenterology and Hepatology, University Hospital Zurich, Zurich, Switzerland (B Müllhaupt MD); Epidemiology of infectious diseases, Sciensano, Brussels, Belgium (G Muyldermans PhD); Department of Medical Epidemiology and Biostatistics, Karolinska Institute, Stockholm, Sweden (Y Nartey MBChB MSc MPhil); Gastroenterology and hepatology, University Hospitals of Geneva, Geneva, Switzerland (F Negro MD); Clinical pathology, University Hospitals of Geneva, Geneva, Switzerland (F Negro MD); Gastroenterology, Asfendiyarov Kazakh National Medical University, Almaty, Kazakhstan (A Nersesov MD, DSci); HIV, Viral Hepatitis, STI, World Health Organization, Country Office in Viet Nam, Hanoi, Vietnam (V T Nguyen MD, MSc, PhD); Department of Virology, Centre Pasteur of Cameroon, Yaounde, Cameroon (R Njouom PhD); Hepato-Gastroenterology, CHU Kamenge, University Of Burundi, Bujumbura, Burundi (R Ntagirabiri MD, PhD); Hepato-Gastroenterology, Medical-Clinic CEMADIF, Bujumbura, Burundi (R Ntagirabiri MD, PhD); Republican Scientific Practical Center of Viral Infections Control, Scientific and Production Association "Preventive Medicine", Bishkek, Kyrgyzstan (Z Nurmatov Doctor of Medicine); Internal Medicine, Benue State University Teaching Hospital, Makurdi, Nigeria (S Obekpa MBBS); Paediatrics, University of Jos, Jos, Nigeria (S Oguche BM BCh, FMCPaed); Department of Gastroenterology and Hepatology, Landspitali - National University Hospital of Iceland, Reykjavik, Iceland (S Olafsson MD, FACP); University of the Philippines College of Medicine, Manila, Philippines (J Ong MD, MPH); Medicine, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana (O Opare-Sem BMedSci, MBChB FACP, FRCP);

Gastroenterología y Hepatología, Clínica Las Americas AUNA y Clínica Las Vegas Quiron, Medellín, Colombia (M Orrego MD); Department for Infectious Diseases, Odense University Hospital, Odense, Denmark (A Øvrehus MD, PhD); Division of Gastroenterology and Hepatology, Department of Medicine, NYU Langone Health, NYU Grossman School of Medicine, New York, United States (C Pan MD, FAASLD, MACP); Department of Gastroenterology, Medical School, National and Kapodistrian University of Athens, Athens, Greece (G Papatheodoridis MD, PhD); Innere Medizin & Gastroenterologie (IMuG), Klinikum Klagenfurt am Wörthersee, Klagenfurt am Wörthersee, Austria (M Peck-Radosavljevic MD, MBA); External Teaching / Klinik Innere Medizin III, Medizinische Universität Wien, Vienna, Austria (M Peck-Radosavljevic MD, MBA); Division of Gastroenterology and Hepatology, Hospital das Clínicas, University of São Paulo School of Medicine, São Paulo, Brazil (MG Pessoa MD, PhD); Medicine, Kumasi Centre for Collaborative Research & Kwame Nkrumah University of Science and Technology, Kumasi, Ghana (R Phillips MD, PhD, FWACP); National Medical Research Center of Phthisiopulmonology & Infectious Diseases, Moscow, Russia (N Pimenov); Research Centre for Genetic Engineering and Biotechnology "Georgi D. Efremov", Macedonian Academy of Sciences and Arts, Skopje, North Macedonia (D Plaseska-Karanfilska MD, PhD); Centre for Vaccines and Immunology, National Institute for Communicable Diseases, Johannesburg, South Africa (N Prabdial-Sing PhD); Department of Virology, University of Witwatersrand, Johannesburg, South Africa (N Prabdial-Sing PhD); Gastroenterology & Hepatology, Fortis Escorts Hospital, New Delhi, India (P Puri MD, DNB, DM (Gastroenterology), FRCP (Edin), FRCP (London)); Pankaj Puri, New Delhi (P Puri MD, DNB, DM (Gastroenterology), FRCP (Edin), FRCP (London)); Viral Hepatitis Control Program, CDC, DGHS, MOHFW, Dhaka, Bangladesh (A Rahman Masters of Epidemiology); Medicine, University Of British Columbia, Vancouver, Canada (A Ramji MD FRCP(C)); Hepatology Section, Department of Medicine., Centro de Educación Médica e Investigaciones Clínicas Norberto Quirno “CEMIC”., Ciudad Autónoma de Buenos Aires, Argentina (E Ridruejo MD); Dirección de Promoción y Prevención, Ministerio de Salud y Protección Social, Bogotá, Colombia (C Ríos-Hincapié MD MPH); Disease Control, Communicable Disease Control, Directorate General of Health Services, Dhaka, Bangladesh (S M S Rizvi MD, MBBS); Faculty of Health and Life Sciences, Hasselt University, Diepenbeek, Belgium (G Robaeys Dr); Division of Gastroenterology and Hepatology, Mayo Clinic, Rochester, MN, United States (L Roberts MB ChB, PhD); Gastroenterology, The Alfred, Melbourne, Australia (S Roberts MD, MBBS, MPH, FRACP, FAASLD, AGAF); Central Clinical School, Monash University, Melbourne, Australia (S Roberts MD, MBBS, MPH, FRACP, FAASLD, AGAF); Hepatology, NIHR Nottingham Biomedical research Centre, Nottingham University Hospitals NHS Trust, Nottingham, United Kingdom (S Ryder MD); Research and

Development, Islamabad Diagnostic Center Pakistan, Islamabad, Pakistan (U Saeed PhD); Biological Production Division, National Institute of Health Pakistan, Islamabad, Pakistan (U Saeed PhD); The Liver Unit, Hadassah Medical Organization, Jerusalem, Israel (R Safadi Full Professor, Director of the Liver Unit); The Liver Unit, Holy Family Hospital, Nazareth, Israel (R Safadi Full Professor, Director of the Liver Unit); O. Sagalova, MD (O Sagalova MD); Internal Medicine, State University of Zanzibar, Zanzibar, Tanzania (S Said MD, MMED (Internal Medicine)); Department of Gastroenterology, Tartu University Hospital, Tartu, Estonia (R Salupere MD, PhD); Department of Internal Medicine, University of Tartu, Tartu, Estonia (R Salupere MD, PhD); Gastroenterology, King Abdulaziz Medical City, Jeddah, Saudi Arabia (F Sanai); Escuela de Medicina y Ciencias de la Salud, Tecnologico de Monterrey, Monterrey, Mexico (J F Sanchez-Avila MD); Professor Vivek Saraswat Department of Gastroenterology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, LUCKNOW, India (V Saraswat MD (Medicine) DM (Gastroenterology) FACG); Medizinische Klinik 2, St. Josefs-Hospital, Wiesbaden, Germany (C Sarrazin MD); Medizinische Klinik 1, Goethe-University, Frankfurt am Main, Germany (C Sarrazin MD); Department of Science and International Cooperation, Kazakh Science Center of Dermatology and Infectious Diseases, Almaty, Kazakhstan (G Sarybayeva PhD); Department of Infection and Immunity (C Seguin-Devaux PhD); Digestive Diseases Research Institute (DDRI), Tehran University of Medical Sciences, Tehran, Iran (M Sheikh MD, PhD); Gastroenterology and Hepatology division, Internal Medicine department, Addis Ababa University, Addis Ababa, Ethiopia (A Shewaye Professor of Medicine and Gastroenterologist, Hepatologist); Gastroenterology and Hepatology, Monash Health, Clayton, Australia (W Sievert MD, FRACP); CEO and Medical Director, A-clinic Ltd, Finland Addiction professor of Practice, University of Helsinki, Finland (K Simojoki Specialist license in Public Health Medicine, Specialist in Addiction medicine); Gastroenterology, HPB Surgery and Transplantology, Military Medical Academy, Sofia, Bulgaria (M Simonova); Division of Hepatology, University of Cape Town, Cape Town, South Africa (M Sonderup BPharm, MBChB FCP(SA), MMED FRCP(London)); Department of Medicine, University of Cape Town, Cape Town, South Africa (M Sonderup BPharm, MBChB FCP(SA), MMED FRCP(London)); Division of Hepatology, Department of Medicine, Faculty of Health Sciences, University of Cape Town (C W Spearman MBChB, PhD); Department of Internal Medicine, Division of Gastroenterology and Hepatology, Medical University of Graz, Graz, Austria (R E Stauber MD); Gastroenterology Department, Christchurch Hospital, Christchurch, New Zealand (C Stedman MBChB, FRACP, PhD); Medicine, University of Otago Christchurch, Christchurch, New Zealand (C Stedman MBChB, FRACP, PhD); Department of Internal Medicine, National Taiwan University Hospital, Taipei, Taiwan (T-H Su MD, PhD); Sector HIV/STI/Hepatitis C, Disease Control

Division, Ministry of Health Malaysia, Putrajaya, Malaysia (A Suleiman, MD, MPH, EIP, FAMM); Department of Hygiene, Epidemiology and Medical Statistics, Medical School, National and Kapodistrian University of Athens, Athens, Greece (V Sypsa PhD); Operations, Medecins Sans Frontieres - MSF, Maputo, Mozambique (N Tamayo Antabak MD, MIH); Hepatology, Selayang Hospital, Batu Caves, Selangor, Malaysia (S-S Tan BA, MB, BCh, BAO, MRCP); Hannover Medical School, Department of Hepatology, Endocrinology and Gastroenterology (T Tergast); Yong Loo Lin School of Medicine, National University Hospital, Singapore (P Thurairajah PhD); Hepatology Department, Riga East University Hospital, Latvian Center of Infectious Diseases, Rīga, Latvia (I Tolmane Head of Hepatology Department); Faculty of Medicine, University of Latvia, Rīga, Latvia (I Tolmane Head of Hepatology Department); Department of Infectious Diseases, Medical University of Lublin, Poland (K Tomasiewicz PhD); Head of Department HIV/AIDS, Hepatitis, STI & TB National Center for Disease Control and Public Health, Tbilisi, Georgia (M Tsereteli PhD); Department of Community Medicine, University of Nigeria Nsukka (Enugu campus); Viroscience, Erasmus MC, Rotterdam, Netherlands (D Van De Vijver PharmD PhD); Public Health Service of Amsterdam and Burnet Institute (D Van Santen PhD); Dept of Gastroenterology and Hepatology, Ghent University Hospital, Gent, Belgium/ (H Van Vlierberghe MD, PhD); Internal Medicine & Infectious Diseases, University Medical Center Utrecht, Utrecht, Netherlands (B Van Welzen MD, PhD); Laboratory of Experimental Medicine and Pediatrics and Viral Hepatitis Prevention Board, University of Antwerp, Antwerp, Belgium (T Vanwolleghem MD, PhD); Gastroenterology and Hepatology, University Hospital Antwerp, Belgium (T Vanwolleghem MD, PhD); Facultad de Ciencias Médicas, Universidad de San Carlos de Guatemala, Guatemala, Guatemala (V MPH); Liver Transplantation Unit, Buenos Aires British Hospital, Buenos Aires, Argentina (F Villamil MD, FAASLD); Medical School University of Zagreb, University Hospital of Infectious Diseases, Zagreb, Croatia (A Vince PhD, full professor of medicine, specialty Infectious Diseases); Foundation University Medical College, Foundation University Islamabad, Islamabad, Pakistan (Y Waheed PhD); Hepatopancreatobiliary Center, Beijing Tsinghua Changgung Hospital, Tsinghua University, Beijing, China (L Wei Doctor); Department of Infectious Diseases, Copenhagen University Hospital - Hvidovre, Hvidovre, Denmark (N Weis MD, PhD); Department of Clinical Medicine, Faculty of Health and Medicine Sciences, University of Copenhagen, Copenhagen, Denmark (N Weis MD, PhD); Department of Medicine and Therapeutics, The Chinese University of Hong Kong, Hong Kong, Hong Kong (V Wong MD); State Key Laboratory of Digestive Disease, The Chinese University of Hong Kong, Hong Kong, China (V Wong MD); Hepato-Gastroenterology, Hotel Dieu de France University Hospital, Beirut, Lebanon (C Yaghi MD Masters in Medical Education Leadership); Gastroenterology, Université Saint

Joseph, Faculty of Medicine, Beirut, Lebanon (C Yaghi MD Masters in Medical Education Leadership); Gastroenterology, hepatology, hepatobiliary surgery and liver transplantation, NNOC, Nur-Sultan, Kazakhstan (K Yesmembetov); Department of medicine III, University clinic Aachen, Aachen, Germany (K Yesmembetov); Endemic Diseases, Faculty of Medicine Cairo University, Cairo, Egypt (A Yosry Doctorate degree); Department of Medicine and State Key Laboratory of Liver Research, Queen Mary Hospital, The University of Hong Kong, Hong Kong (M-F Yuen MBBS, MD, PhD, DSc); Department of Medicine, University Hospital, Frankfurt, Germany (S Zeuzem MD); Liver Unit, Carmel Medical Center, Faculty of Medicine, Technion, Haifa, Israel (E Zuckerman Professor of Medicine)

1 Evolution of country/territory HCV prevalence estimates (beginning of 2020)

2 Change in viremic HCV infections from 2015 to 2020

3 Cumulative and annual cascade of care from 2015 through the beginning of 2020

4 Cumulative number of patients initiated on treatment from 2015 through the end of 2019

5 Global forecasts, 2015-2030

Global prevalence of viremic HCV

Table 1. Modeled HCV viremic prevalence and number of viremic infections for 110 countries with approved or estimated models (all ages, 0+), beginning of years 2015 and 2020.

Region/Country/Territory	**Viremic Prevalence in 2015[i,ii] (95% UI)**	**Viremic Population (000) in 2015[i,ii] (95% UI)**	**Viremic Prevalence in 2020[i,ii] (95% UI)**	**Viremic Population (000) in 2020[i,ii] (95% UI)**
Asia Pacific, High Income				
Japan	0.7% (0.6%-0.9%)	1,028 (829-1,240)	0.4% (0.4%-0.5%)	562 (453-678)
Korea, Republic of	0.3% (0.2%-0.4%)	142 (115-190)	0.2% (0.1%-0.2%)	90 (73-120)
Asia, Central				
Armenia	2.4% (2.1%-3.5%)	72 (62-104)	2.2% (1.9%-3.1%)	64 (56-93)
Azerbaijan	1.9% (1.2%-2.3%)	179 (115-223)	1.9% (1.2%-2.3%)	190 (121-235)
Georgia	3.7% (3.6%-4.3%)	150 (148-177)	2.4% (2.4%-2.8%)	96 (95-113)
Kazakhstan	2.1% (1.7%-2.3%)	366 (310-415)	1.9% (1.6%-2.2%)	359 (304-407)
Kyrgyzstan	2.7% (2.3%-4.3%)	160 (137-260)	2.6% (2.2%-4.1%)	167 (142-270)
Mongolia	6.4% (5.7%-10.3%)	198 (177-317)	4.2% (3.8%-6.8%)	139 (124-223)
Tajikistan	2.8% (2.2%-3.3%)	243 (187-280)	2.7% (2.0%-3.1%)	254 (195-293)
Uzbekistan	3.1% (2.4%-3.7%)	959 (767-1,150)	3.0% (2.4%-3.6%)	1,004 (804-1,205)
Asia, East				
China, Mainland	0.7% (0.5%-0.9%)	10,023 (7,692-12,353)	0.7% (0.5%-0.8%)	9,487 (7,281-11,693)
Hong Kong	0.3% (0.1%-0.4%)	18 (5-28)	0.2% (0.1%-0.4%)	17 (4-27)
Taiwan	1.9% (1.6%-5.6%)	458 (402-1,383)	1.4% (1.2%-4.1%)	322 (283-974)
Asia, South				
India	0.5% (0.4%-1.2%)	6,427 (5,224-15,671)	0.4% (0.4%-1.1%)	6,137 (4,988-14,963)
Pakistan	3.6% (2.8%-4.9%)	7,213 (5,702-9,767)	3.3% (2.6%-4.5%)	7,395 (5,846-10,012)
Asia, Southeast				
Cambodia	1.3% (0.5%-3.3%)	207 (82-524)	1.1% (0.5%-2.9%)	190 (75-482)
Indonesia	0.5% (0.1%-1.0%)	1,302 (186-2,595)	0.5% (0.1%-1.0%)	1,364 (195-2,721)
Malaysia	0.4% (0.3%-1.6%)	135 (107-508)	0.4% (0.3%-1.5%)	127 (100-477)

Region/Country/Territory	**Viremic Prevalence in 2015[i,ii] (95% UI)**	**Viremic Population (000) in 2015[i,ii] (95% UI)**	**Viremic Prevalence in 2020[i,ii] (95% UI)**	**Viremic Population (000) in 2020[i,ii] (95% UI)**
Philippines	0.4% (0.2%-1.3%)	451 (223-1,350)	0.4% (0.2%-1.2%)	439 (217-1,314)
Thailand	0.6% (0.5%-0.8%)	381 (346-576)	0.5% (0.5%-0.8%)	378 (343-571)
Viet Nam	1.0% (0.8%-1.4%)	947 (786-1,275)	0.9% (0.8%-1.3%)	914 (759-1,231)
Australasia				
Australia	0.8% (0.7%-0.8%)	193 (174-207)	0.5% (0.4%-0.5%)	119 (108-128)
New Zealand	1.1% (0.6%-1.5%)	50 (27-72)	0.9% (0.5%-1.3%)	43 (23-62)
Caribbean				
Cuba	0.5% (0.1%-1.2%)	57 (16-142)	0.5% (0.1%-1.2%)	55 (15-138)
Dominican Republic	0.7% (0.5%-1.6%)	70 (49-168)	0.6% (0.4%-1.4%)	65 (46-157)
Puerto Rico	1.2% (0.7%-2.2%)	41 (22-72)	1.4% (0.8%-2.6%)	41 (23-74)
Europe, Central				
Bulgaria	1.3% (0.6%-2.0%)	93 (43-143)	1.2% (0.6%-1.9%)	86 (40-132)
Croatia	0.5% (0.5%-0.8%)	21 (20-33)	0.5% (0.4%-0.7%)	19 (18-29)
Czechia	0.5% (0.2%-0.6%)	53 (21-67)	0.5% (0.2%-0.6%)	55 (22-69)
Hungary	0.3% (0.3%-0.7%)	32 (24-73)	0.3% (0.2%-0.7%)	29 (22-65)
Poland	0.5% (0.3%-0.6%)	188 (129-249)	0.4% (0.3%-0.5%)	157 (108-208)
Romania	2.5% (2.4%-3.0%)	504 (479-601)	2.3% (2.2%-2.7%)	437 (415-521)
Slovakia	0.2% (0.2%-1.4%)	13 (8-78)	0.2% (0.1%-1.4%)	12 (8-74)
Slovenia	0.2% (0.1%-0.2%)	4 (3-5)	0.1% (0.1%-0.2%)	3 (2-4)
Europe, Eastern				
Estonia	1.5% (1.1%-1.8%)	20 (15-24)	1.2% (0.9%-1.4%)	16 (12-19)
Latvia	2.1% (1.5%-2.8%)	40 (28-55)	2.0% (1.4%-2.8%)	38 (27-53)
Lithuania	1.1% (0.7%-1.5%)	32 (20-45)	1.0% (0.6%-1.4%)	28 (17-39)
Russia	2.9% (1.8%-3.3%)	4,179 (2,568-4,828)	2.9% (1.8%-3.4%)	4,255 (2,614-4,915)
Ukraine	3.2% (2.6%-4.2%)	1,443 (1,172-1,893)	3.1% (2.5%-4.0%)	1,342 (1,089-1,760)

Region/Country/Territory	**Viremic Prevalence in 2015[i,ii] (95% UI)**	**Viremic Population (000) in 2015[i,ii] (95% UI)**	**Viremic Prevalence in 2020[i,ii] (95% UI)**	**Viremic Population (000) in 2020[i,ii] (95% UI)**
Europe, Western				
Austria	0.3% (0.1%-0.4%)	25 (5-39)	0.2% (0.0%-0.3%)	15 (3-23)
Belgium	0.3% (0.2%-0.6%)	31 (22-77)	0.2% (0.1%-0.5%)	24 (17-59)
Denmark	0.2% (0.2%-0.3%)	11 (10-16)	0.1% (0.1%-0.2%)	7 (6-10)
Finland	0.4% (0.3%-0.5%)	22 (17-28)	0.3% (0.3%-0.4%)	19 (15-25)
France	0.3% (0.2%-0.3%)	183 (143-234)	0.2% (0.1%-0.2%)	112 (88-143)
Germany	0.3% (0.2%-0.5%)	254 (152-457)	0.2% (0.1%-0.4%)	189 (113-340)
Greece	1.0% (0.7%-1.3%)	106 (75-136)	0.9% (0.7%-1.2%)	96 (68-123)
Iceland	0.2% (0.2%-0.3%)	0.7 (0.6-0.9)	0.1% (0.1%-0.1%)	0.3 (0.2-0.3)
Ireland	0.6% (0.4%-1.1%)	30 (20-51)	0.6% (0.4%-0.9%)	27 (18-46)
Israel	0.9% (0.6%-1.3%)	73 (47-111)	0.7% (0.5%-1.1%)	61 (39-91)
Italy	1.4% (0.6%-2.0%)	888 (388-1,298)	1.0% (0.4%-1.4%)	577 (252-843)
Luxembourg	0.9% (0.5%-1.1%)	5 (3-6)	0.8% (0.4%-0.9%)	5 (3-6)
Malta	0.3% (0.2%-0.6%)	1.2 (1.1-2.6)	0.2% (0.2%-0.4%)	0.9 (0.8-1.9)
Netherlands	0.1% (0.0%-0.2%)	20 (8-34)	0.1% (0.0%-0.1%)	14 (5-24)
Norway	0.3% (0.2%-0.5%)	14 (9-29)	0.1% (0.1%-0.3%)	7 (4-14)
Portugal	0.5% (0.5%-0.8%)	61 (55-92)	0.4% (0.4%-0.6%)	42 (38-64)
Spain	0.3% (0.2%-1.3%)	201 (112-742)	0.1% (0.1%-0.4%)	56 (31-205)
Sweden	0.4% (0.3%-0.5%)	41 (34-50)	0.3% (0.2%-0.3%)	26 (22-31)
Switzerland	0.5% (0.5%-0.5%)	44 (40-47)	0.4% (0.3%-0.4%)	32 (29-35)
United Kingdom	0.3% (0.2%-0.4%)	177 (132-247)	0.2% (0.1%-0.3%)	127 (95-177)
Latin America, Andean				
Peru	0.5% (0.3%-0.5%)	161 (104-167)	0.5% (0.3%-0.5%)	157 (101-163)
Latin America, Central				

Region/Country/Territory	**Viremic Prevalence in 2015[i,ii] (95% UI)**	**Viremic Population (000) in 2015[i,ii] (95% UI)**	**Viremic Prevalence in 2020[i,ii] (95% UI)**	**Viremic Population (000) in 2020[i,ii] (95% UI)**
Colombia	0.7% (0.6%-1.0%)	335 (314-492)	0.6% (0.6%-0.9%)	320 (300-470)
El Salvador	0.3% (0.2%-0.3%)	17 (13-20)	0.2% (0.2%-0.3%)	16 (13-19)
Mexico	0.6% (0.6%-0.7%)	790 (718-862)	0.6% (0.5%-0.6%)	751 (683-820)
Panama	0.3% (0.3%-0.4%)	13 (10-17)	0.3% (0.3%-0.4%)	14 (11-18)
Venezuela	0.6% (0.4%-0.7%)	169 (134-217)	0.6% (0.5%-0.8%)	167 (133-215)
Latin America, Southern				
Argentina	0.8% (0.3%-1.9%)	348 (131-819)	0.7% (0.3%-1.6%)	316 (119-745)
Chile	0.2% (0.0%-0.3%)	37 (6-52)	0.2% (0.0%-0.2%)	33 (5-48)
Latin America, Tropical				
Brazil	0.3% (0.2%-0.4%)	724 (391-944)	0.3% (0.2%-0.4%)	604 (326-787)
North Africa/Middle East				
Afghanistan	0.5% (0.2%-0.9%)	192 (66-317)	0.5% (0.2%-0.9%)	203 (70-335)
Algeria	0.7% (0.2%-0.9%)	288 (80-373)	0.6% (0.2%-0.8%)	278 (77-360)
Bahrain	1.2% (0.7%-1.3%)	17 (10-19)	1.0% (0.6%-1.1%)	17 (10-19)
Egypt	3.3% (2.8%-3.9%)	3,932 (3,326-4,580)	0.5% (0.4%-0.6%)	531 (449-619)
Iran	0.3% (0.2%-0.3%)	201 (135-257)	0.2% (0.2%-0.3%)	207 (139-265)
Iraq	0.4% (0.2%-2.5%)	132 (75-905)	0.3% (0.2%-2.4%)	140 (79-958)
Jordan	0.3% (0.1%-0.3%)	26 (6-32)	0.3% (0.1%-0.3%)	27 (6-33)
Lebanon	0.1% (0.0%-0.4%)	8 (3-27)	0.1% (0.0%-0.4%)	8 (3-25)
Libya	1.2% (1.1%-1.3%)	77 (70-83)	1.0% (0.9%-1.0%)	65 (60-71)
Morocco	0.9% (0.7%-1.3%)	313 (259-454)	0.8% (0.7%-1.1%)	292 (241-422)
Oman	0.4% (0.3%-0.5%)	16 (14-20)	0.3% (0.3%-0.4%)	17 (14-20)
Qatar	1.3% (1.3%-1.6%)	35 (33-41)	1.3% (1.3%-1.6%)	39 (37-45)
Saudi Arabia	0.3% (0.3%-0.8%)	106 (85-270)	0.3% (0.2%-0.7%)	97 (78-245)

Region/Country/Territory	**Viremic Prevalence in 2015[i,ii] (95% UI)**	**Viremic Population (000) in 2015[i,ii] (95% UI)**	**Viremic Prevalence in 2020[i,ii] (95% UI)**	**Viremic Population (000) in 2020[i,ii] (95% UI)**
Syria	1.5% (0.6%-3.8%)	254 (106-651)	1.6% (0.7%-4.0%)	276 (116-708)
Tunisia	0.4% (0.3%-0.6%)	46 (36-63)	0.4% (0.3%-0.5%)	44 (35-61)
Turkey	0.3% (0.2%-1.3%)	282 (162-1,029)	0.3% (0.2%-1.0%)	242 (140-885)
United Arab Emirates	1.3% (0.1%-1.8%)	118 (7-160)	1.5% (0.1%-2.1%)	152 (9-206)
Yemen	1.0% (0.6%-1.2%)	272 (165-329)	0.9% (0.5%-1.1%)	266 (161-321)
North America, High Income				
Canada	0.6% (0.4%-0.8%)	228 (144-316)	0.4% (0.3%-0.6%)	156 (99-217)
United States	0.9% (0.7%-1.3%)	3,230 (2,307-4,337)	0.8% (0.5%-1.0%)	2,494 (1,781-3,349)
Oceania				
Fiji	0.1% (0.0%-0.5%)	0.7 (0.1-4.2)	0.1% (0.0%-0.5%)	0.7 (0.1-4.2)
Papua New Guinea	1.2% (0.7%-2.0%)	101 (58-162)	1.2% (0.7%-1.9%)	104 (60-167)
Sub-Saharan Africa, Central				
Central African Republic	0.3% (0.3%-0.9%)	16 (13-41)	0.3% (0.2%-0.8%)	15 (12-39)
Democratic Republic of the Congo	0.5% (0.2%-0.9%)	413 (138-735)	0.5% (0.2%-0.8%)	418 (139-744)
Gabon	5.2% (4.7%-5.7%)	103 (95-113)	4.7% (4.3%-5.2%)	104 (96-115)
Sub-Saharan Africa, East				
Burundi	4.0% (3.6%-30.4%)	421 (377-3,190)	3.5% (3.1%-26.4%)	415 (371-3,142)
Ethiopia	0.7% (0.4%-0.8%)	683 (407-814)	0.6% (0.4%-0.7%)	684 (408-815)
Kenya	0.9% (0.3%-1.4%)	431 (133-684)	0.9% (0.3%-1.4%)	482 (149-765)
Madagascar	0.5% (0.3%-1.5%)	122 (86-376)	0.4% (0.3%-1.3%)	116 (81-357)
Mozambique	0.9% (0.4%-1.2%)	249 (124-324)	0.8% (0.4%-1.0%)	247 (123-321)
Rwanda	1.6% (0.7%-2.0%)	188 (76-226)	1.4% (0.6%-1.7%)	183 (74-221)
Tanzania	0.2% (0.2%-0.2%)	103 (83-124)	0.2% (0.1%-0.2%)	101 (81-122)
Uganda	0.6% (0.5%-0.8%)	252 (202-303)	0.6% (0.5%-0.7%)	260 (208-312)
Sub-Saharan Africa, Southern				

Region/Country/Territory	**Viremic Prevalence in 2015[i,ii] (95% UI)**	**Viremic Population (000) in 2015[i,ii] (95% UI)**	**Viremic Prevalence in 2020[i,ii] (95% UI)**	**Viremic Population (000) in 2020[i,ii] (95% UI)**
South Africa	0.5% (0.4%-1.0%)	292 (226-572)	0.4% (0.3%-0.9%)	265 (205-519)
Sub-Saharan Africa, West				
Burkina Faso	1.5% (1.4%-1.7%)	271 (267-307)	1.4% (1.3%-1.5%)	285 (281-323)
Cameroon	0.8% (0.6%-1.0%)	192 (151-242)	0.7% (0.5%-0.8%)	173 (136-218)
Chad	1.1% (0.9%-1.4%)	156 (126-204)	0.9% (0.7%-1.2%)	147 (119-193)
Gambia	0.8% (0.4%-1.6%)	18 (8-35)	0.8% (0.3%-1.5%)	18 (8-35)
Ghana	1.5% (0.8%-3.8%)	412 (236-1,082)	1.4% (0.8%-3.7%)	432 (248-1,135)
Nigeria	0.7% (0.3%-1.2%)	1,352 (496-2,234)	0.7% (0.2%-1.1%)	1,362 (500-2,251)

[i] 2015 and 2020 beginning of year estimates are model output projections based on historic data.

[ii] Numerators (viremic infections) and denominators (population) include all ages, 0+

Table 2. Regional and global viremic prevalence (2015 and 2020) and annual cascade of care in 2020.

Regions	2015		2020			
	Viremic Prevalence (%) (95% UI)	Viremic HCV Infected, Millions (95% UI)	Viremic Prevalence (%) (95% UI)	Viremic HCV Infected, Millions (95% UI)	Total Diagnosed, Millions (%)[i]	Annual Treated, 000s (%)[ii]
Global Burden of Disease (GBD Regions						
Asia Pacific, High Income	0.7% (0.6%-0.7%)	1.2 (1.1-1.4)	0.4% (0.3%-0.4%)	0.7 (0.6-0.8)	0.5 (76%)	40.8 (6.1%)
Asia, Central	2.8% (2.6%-3.1%)	2.5 (2.3-2.7)	2.6% (2.4%-2.8%)	2.4 (2.3-2.7)	0.3 (13%)	25.8 (1.1%)
Asia, East	0.7% (0.6%-0.9%)	10.7 (9.1-12.7)	0.7% (0.6%-0.8%)	10.0 (8.6-11.9)	2.6 (26%)	114.3 (1.1%)
Asia, South	0.9% (0.8%-1.4%)	14.6 (13.3-24.3)	0.8% (0.7%-1.3%)	14.5 (13.2-24.2)	2.4 (17%)	89.6 (0.6%)
Asia, Southeast	0.6% (0.5%-0.9%)	3.9 (3.6-6.0)	0.6% (0.5%-0.9%)	3.9 (3.6-5.9)	0.5 (14%)	26.6 (0.7%)
Australasia	0.8% (0.6%-1.0%)	0.2 (0.2-0.3)	0.5% (0.4%-0.6%)	0.2 (0.1-0.2)	0.1 (87%)	9.1 (5.6%)
Caribbean	0.7% (0.4%-1.3%)	0.3 (0.2-0.6)	0.6% (0.4%-1.2%)	0.3 (0.2-0.6)	0.1 (33%)	0.7 (0.2%)
Europe, Central	0.9% (0.8%-1.2%)	1.1 (1.0-1.3)	0.8% (0.8%-1.0%)	0.9 (0.9-1.2)	0.2 (20%)	18.1 (1.9%)
Europe, Eastern	2.9% (2.3%-3.2%)	6.1 (4.9-6.6)	2.9% (2.3%-3.2%)	6.1 (4.9-6.6)	2.1 (34%)	20.5 (0.3%)
Europe, Western	0.5% (0.4%-0.6%)	2.2 (1.9-2.6)	0.3% (0.3%-0.4%)	1.4 (1.3-1.7)	0.7 (50%)	57.8 (4.0%)
Latin America, Andean	0.5% (0.2%-0.5%)	0.3 (0.1-0.3)	0.5% (0.2%-0.5%)	0.3 (0.1-0.3)	0.0 (11%)	1.8 (0.6%)
Latin America, Central	0.6% (0.6%-0.7%)	1.6 (1.4-1.7)	0.6% (0.5%-0.7%)	1.5 (1.4-1.7)	0.2 (12%)	3.7 (0.2%)
Latin America, Southern	0.6% (0.3%-1.1%)	0.4 (0.2-0.7)	0.5% (0.3%-1.0%)	0.4 (0.2-0.6)	0.0 (6%)	1.4 (0.4%)
Latin America, Tropical	0.4% (0.3%-0.4%)	0.7 (0.6-0.8)	0.3% (0.2%-0.3%)	0.6 (0.5-0.7)	0.1 (22%)	19.9 (3.2%)
North Africa/Middle East	1.2% (1.1%-1.4%)	6.6 (6.2-7.9)	0.5% (0.5%-0.6%)	3.2 (3.0-3.8)	1.1 (35%)	26.7 (0.8%)
North America, High Income	1.0% (0.8%-1.2%)	3.5 (2.8-4.2)	0.7% (0.6%-0.9%)	2.7 (2.1-3.2)	1.1 (41%)	153.1 (5.8%)
Oceania	1.1% (0.8%-3.8%)	0.1 (0.1-0.4)	1.1% (0.8%-3.6%)	0.1 (0.1-0.4)	0.0 (11%)	0.0 (0.0%)
Sub-Saharan Africa, Central	0.6% (0.4%-2.1%)	0.8 (0.4-2.5)	0.6% (0.3%-1.8%)	0.8 (0.4-2.5)	0.1 (13%)	0.0 (0.0%)
Sub-Saharan Africa, East	0.8% (0.7%-1.3%)	2.9 (2.6-4.7)	0.7% (0.6%-1.1%)	3.0 (2.7-4.8)	0.3 (10%)	26.3 (0.9%)
Sub-Saharan Africa, Southern	0.5% (0.3%-0.8%)	0.4 (0.2-0.6)	0.4% (0.3%-0.7%)	0.4 (0.2-0.5)	0.1 (22%)	0.1 (0.0%)
Sub-Saharan Africa, West	0.9% (0.7%-1.2%)	3.5 (2.6-4.7)	0.8% (0.6%-1.1%)	3.5 (2.6-4.7)	0.2 (7%)	4.3 (0.1%)

Regions	2015		2020			
	Viremic Prevalence (%) (95% UI)	Viremic HCV Infected, Millions (95% UI)	Viremic Prevalence (%) (95% UI)	Viremic HCV Infected, Millions (95% UI)	Total Diagnosed, Millions (%)[i]	Annual Treated, 000s (%)[ii]
World Health Organization (WHO) Regions						
African Region	0.8% (0.7%-1.2%)	7.8 (6.5-12.2)	0.7% (0.6%-1.1%)	7.8 (6.6-12.2)	0.8 (10%)	30.7 (0.4%)
Region of the Americas	0.7% (0.6%-0.8%)	6.8 (5.7-8.3)	0.6% (0.5%-0.7%)	5.7 (4.8-7.0)	1.6 (27%)	180.6 (3.1%)
Eastern Mediterranean Region	2.0% (1.7%-2.5%)	13.3 (11.4-16.5)	1.4% (1.2%-1.7%)	10.2 (8.7-12.6)	3.0 (30%)	75.1 (0.7%)
European Region	1.3% (1.1%-1.5%)	11.9 (9.8-13.5)	1.2% (1.0%-1.3%)	11.0 (9.0-12.5)	3.3 (30%)	122.4 (1.1%)
South-East Asia Region	0.5% (0.4%-1.2%)	9.7 (7.9-22.2)	0.5% (0.4%-1.1%)	9.5 (7.7-21.7)	0.8 (8%)	47.0 (0.5%)
Western Pacific Region	0.7% (0.6%-0.9%)	14.1 (12.0-17.7)	0.6% (0.6%-0.8%)	12.7 (10.8-16.0)	3.5 (28%)	184.8 (1.5%)
World Bank (WB) Income Groups						
Low Income	0.8% (0.8%-1.5%)	4.9 (4.6-8.8)	0.7% (0.7%-1.3%)	4.9 (4.6-8.9)	0.8 (16%)	28.2 (0.6%)
Lower-Middle Income	1.0% (0.9%-1.4%)	29.5 (27.4-44.8)	0.8% (0.7%-1.2%)	26.0 (24.1-39.5)	3.9 (15%)	144.5 (0.6%)
Upper-Middle Income	0.8% (0.7%-1.0%)	20.7 (17.5-24.2)	0.8% (0.6%-0.9%)	19.8 (16.7-23.1)	5.3 (27%)	159.5 (0.8%)
High Income	0.7% (0.6%-0.9%)	8.4 (7.7-10.7)	0.5% (0.5%-0.6%)	6.1 (5.6-7.7)	2.9 (47%)	308.2 (5.1%)
Total	**0.9% (0.8%-1.0%)**	**63.6 (61.8-75.8)**	**0.7% (0.7%-0.9%)**	**56.8 (55.2-67.8)**	**12.9 (23%)**	**640.6 (1.1%)**

[i] Proportion diagnosed was calculated as the number of total diagnosed divided by the viremic HCV infected in 2020; [ii] Proportion treated was calculated as the number of annual treated divided by the viremic HCV infected in 2020.