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## Supplementary appendix

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# The contribution of injecting drug use as a risk factor for Hepatitis C virus transmission globally, regionally, and at country level: a modelling study

## Supplementary materials

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**Model description and schematics**

This paper presents a model of country-level HCV transmission, incorporating HCV transmission among people who inject drugs (PWID) and the general population (non-PWID). The HCV transmission model is stratified into nine disease and treatment strata (Supplementary figure 1), with each of these then stratified by seven age and injecting status strata (Supplementary figure 2). This makes up 63 model compartments in total.

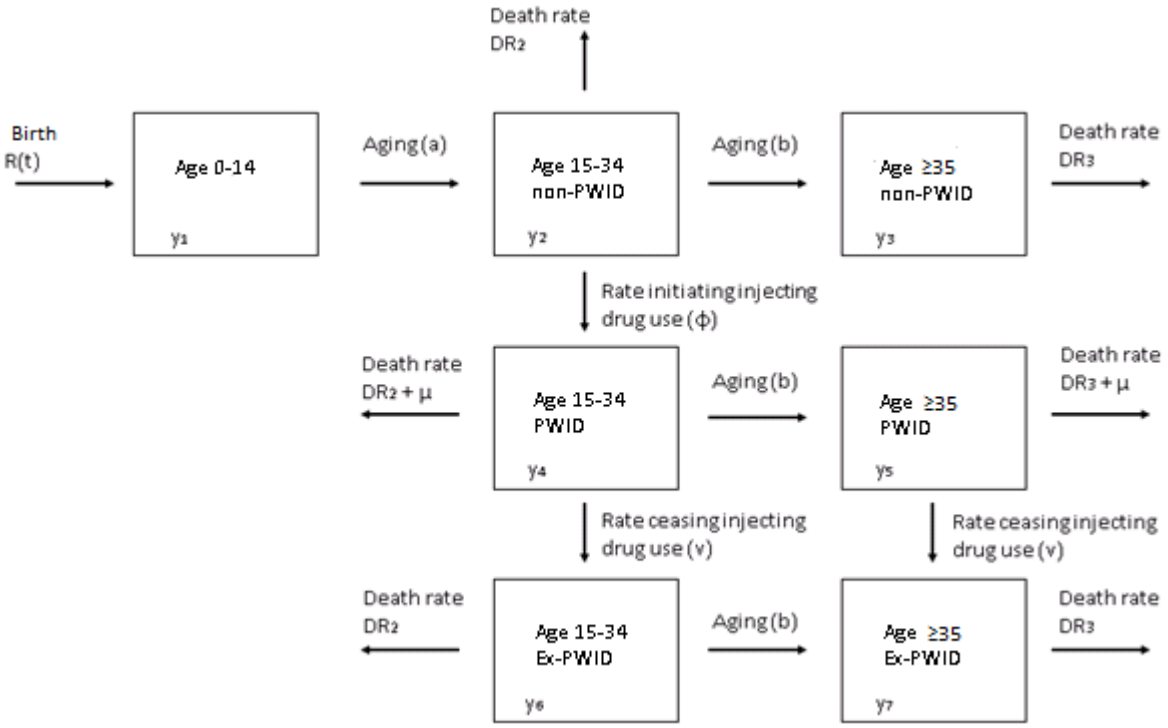
Within the disease state model component, most individuals enter as susceptible individuals (S), from which they can then become infected and transition to the chronically infected state (I) at a per capita transmission rate, $(1-\delta)P$, for the general population (not people who inject drugs; PWID), which is increased for PWID to $(1-\delta)(P+\pi)$. P is the force of infection that acts on the whole population, $\pi$ is the additional force of infection that acts on PWID, and $\delta$ is the proportion of new infections that spontaneously clear their infection and so do not progress to chronic infection. Individuals who spontaneously clear infection remain susceptible to re-infection. A certain number of individuals, V(t), which is time varying, enter the model chronically infected due to vertical transmission, this is described in more detail below.

Once chronically infected, individuals progress through different infection and treatment states. Chronically infected individuals progress to the cirrhotic infected state (CI) at rate $\gamma$. Individuals that are cirrhotic infected (CI) can then progress to the decompensated cirrhosis infected state (DI) at rate $\chi$. Individuals in each of these infected groups (chronic [I], cirrhotic [CI], and decompensated [DI]) can receive HCV treatment (and move to the treatment [T], cirrhotic treatment [CT], or decompensated treatment groups [DT], respectively) at a per capita rate, denoted $\lambda$. This rate is based on historical treatment numbers which are carried forward. If treatment is successful, individuals achieve a sustained viral response (SVR – effective cure), where $\alpha$ is the proportion of people that achieve SVR following treatment, and $1/\omega$ is the length of treatment. Individuals achieving SVR transition from the treatment to their respective susceptible disease stage (susceptible [S], cirrhotic susceptible [CS], or decompensated susceptible groups [DS], depending on their disease stage when they were infected) at the rate $\alpha\omega$, where $\alpha$ is the proportion of people that achieve SVR following treatment, and $1/\omega$ is the length of the treatment cycle. However, some individuals that receive treatment fail to achieve SVR and move back to their prior infection disease stage at rate $(1-\alpha)\omega$, either chronic (I), cirrhotic (CI), or decompensated infected (DI) groups. We assume disease progression ceases for cured individuals whose HCV infection had not progressed to cirrhosis or later, while those with cirrhosis who are cured experience further disease progression at a slower rate (rate $\varepsilon$ – slower than $\chi$) compared to those not achieving SVR. There is a further additional liver-related mortality rate, $\mu_4$, for those in the decompensated infected (DI), decompensated treatment (DT), and decompensated susceptible groups (DS). Those in the susceptible, cirrhotic susceptible (CS) and decompensated susceptible groups (DS) can be re-infected and move to the chronically infected (I), cirrhotic infected (CI) and decompensated infected (DI) groups, respectively, at the same rate as for primary infection, but depending on their injecting drug use (IDU) status.

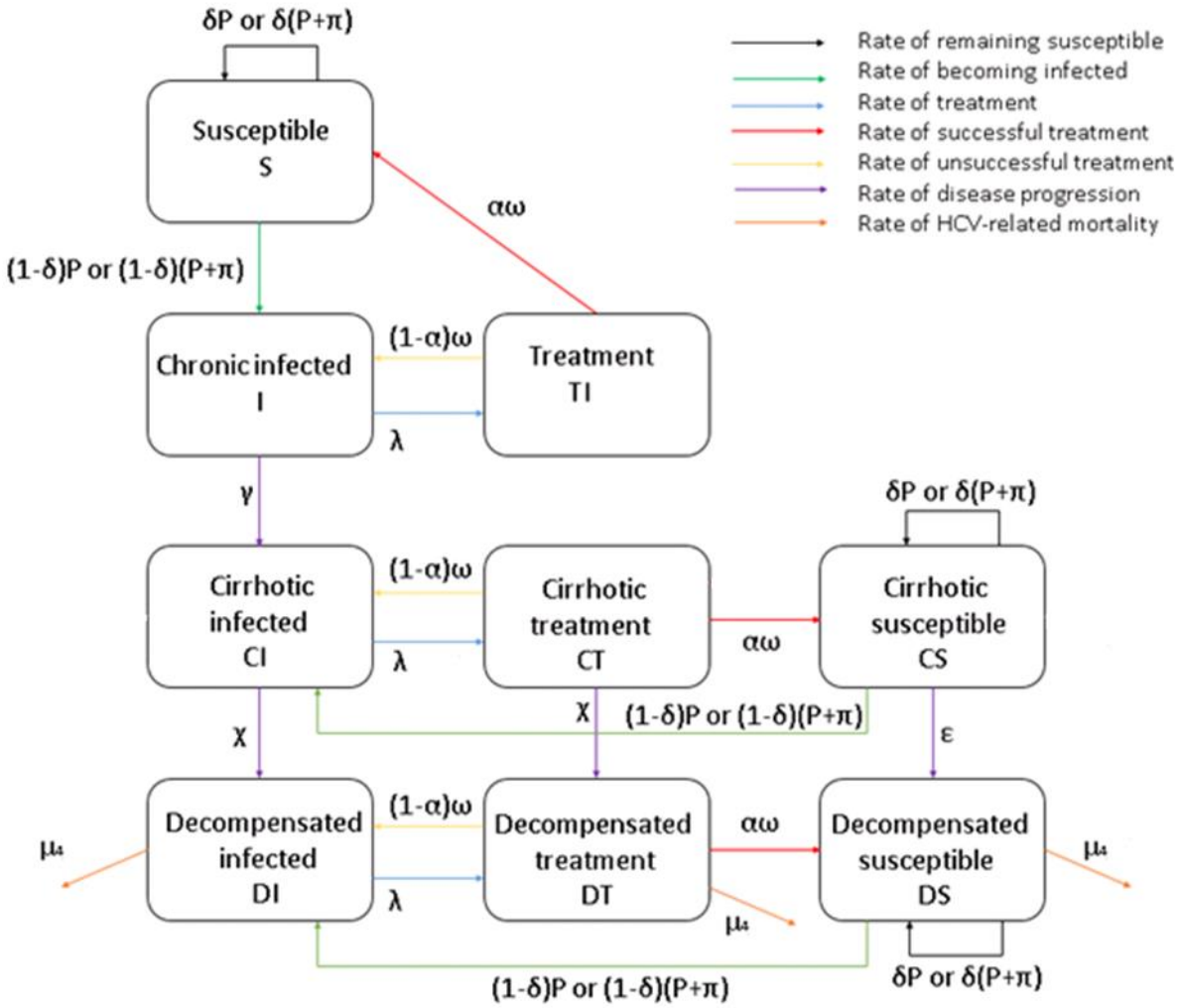
Individuals also transition through age and injecting model strata as shown in Supplementary Figure 1. Most individuals enter at a rate R(t) into the 0-14-year-old compartment as susceptible to infection (except those that enter as infected via vertical transmission). The rate R(t) is set to balance all non-HCV-related and non-drug related deaths ($DR_1$, $DR_2$ and $DR_3$ depending on age), while also allowing for population growth at a specified rate. Other than becoming infected, young individuals can age (at rate a) to become young adults that do not inject drugs – referred to in the diagram as non-PWID - (aged 15-34 years), from which they can age (at rate b) to becoming older adults that do not inject drugs (aged $\geqslant$35 years). Adults that do not inject drugs (aged 15-34 years) can also transition (at rate $\varphi$) to become PWID (current injectors). We assume that adults aged $\geqslant$35 do not start injecting drugs, however, can enter the currently injecting aged $\geqslant$35 category by ageing at rate b. This was based on data from a recent global meta-analysis that identified the average age of onset of injecting across studies to be 22, with the minimum average age of onset being 13 and maximum 39[1]. PWID inject for an average duration until they transition (at rate v) to become people who used to inject drugs (referred to in the diagram as ex-PWID). Young adults (age 15-34 years) that are PWID or used to inject drugs age to their respective older adult (aged $\geqslant$35 years) classes just as young adults that do not inject drugs do. All individuals

are subject to age category dependent death rates ($DR_1$, $DR_2$, $DR_3$, for those aged 0-14, 15-34, and ⩾35 years, respectively), with PWID also being subject to an additional drug-related death rate (μ).

**Supplementary Figure 1:** Schematic modelling how people move through the seven age and injecting stage groups. PWID denotes people who inject drugs.



**Supplementary Figure 2:** Schematic of how people move through the HCV stage model. Demographics other than disease related mortality are not shown for clarity.



**Supplementary Table 1:** Model parameters with sampled ranges. All rates and durations are in year time units. PWID denotes people who inject drugs. Triangular distributions are used where bounds are unspecified, due to the often-skewed sampling ranges used. Uniform bounds are used for parameters with greater uncertainty.

| Parameter | Parameter description | Point value and sampled range | Reference |
|---|---|---|---|
| a | The rate of aging from 0-14 to 15-34 | 1/15 | |
| b | The rate of aging from 15-34 to ≥35 | 1/20 | |
| $\delta$ | Proportion of individuals spontaneously clearing infection | Region specific (the percentage not advancing to viraemic infection) | Petruziello 2016[2] |
| $\gamma$ | The rate of progressing from chronic infection to cirrhosis | 0.037 (0.025-0.052) | Shepherd 2007[3] |
| $\chi$ | The rate of progressing from compensated cirrhosis to the decompensated cirrhosis if infected (or on treatment) | 0.0453 (0.0363-0.0566) | Hallager 2017[4] |
| $\varepsilon$ | The rate of progressing from cirrhosis to the decompensated cirrhosis if cured and susceptible | 0.01 (0.006-0.0165) | Hallager 2017[4] |
| $\mu_4$ | Additional death rate for an individual with decompensated cirrhosis | 0.13 [Beta distribution: alpha = 14.6, beta = 360.2] | Greive 2006 [5]; Shepherd 2007[3]; Wright 2003[6] |
| $\varphi$ | The initiation rate of becoming a person who currently injects drugs | Fitted to the proportion of adults that are PWID in data from systematic reviews | |
| v | The rate of ceasing injecting drugs | Sampled from a uniform distribution between region specific bounds | Degenhardt 2017[1] |
| $\mu$ | Additional mortality rate for people who currently inject drugs | High-income countries: 0.0217 (0.0192, 0.0247)<br>Low and middle-income countries: 0.0353 (0.0281, 0.0424) | Mathers 2013[7] |
| $\lambda$ | Treatment rate | Country-specific and varying with time. Treatment numbers in 2017 (when the data ends) are carried on until 2038, apart from in 2018 when an extra 50 infections are treated in specific groups for the intervention scenario. If the number of possible annual treatments exceeds the number infected, then a treatment rate of 0.95 is used | See historical treatment numbers section |
| $1/\omega$ | Duration of treatment | Until 2010: 48 weeks for Pegylated interferon. From 2011-2014: 24 weeks due to 1st wave DAAs. From 2015 onwards: 12 weeks due to 2nd wave DAAs | Palumbo 2011[8]; Brouard 2017[9]; WHO 2016[10] |
| $\alpha$ | Proportion achieving sustained virological response with HCV treatments | Until 2010: Uniform between 0.4-0.5 for Pegylated interferon. From 2011-2014: 0.65-0.75. From 2015 onwards: Uniform between 0.9-0.99 due to 2nd wave DAAs | Palumbo 2011[8]; Brouard 2017[9] Hezode 2017[11] |
| $q_1$ | Chance of vertical transmission of HCV RNA per birth among women with HCV RNA that are HIV negative | 0.058 (0.042, 0.078) | Benova 2014[12] |
| $q_2$ | Chance of vertical transmission of HCV RNA per birth among women with HCV RNA that are HIV positive | 0.108 (0.076, 0.152) | Benova 2014[12] |

Supplementary table 2 below contains parameters varying by region. See supplementary tables 7-9 for parameters that vary by country.

**Supplementary table 2:** Parameters that vary by global burden of disease (GBD) region. Only regions from countries in the analysis are included. Parameters were varied from triangular distributions due to the often-skewed nature of the data.

| GBD region | Viraemic rates[1] (Sampled bounds)[2] | Percentage of PWID that are female (95% CI)[3] | HIV prevalence among PWID (95% CI)[3] |
|---|---|---|---|
| **Central Asia** | 48.7% (45.2%, 52.2%) | 12.6% (9.7%, 15.6%) | 10.5% (8.6%, 12.5%) |
| **Eastern Europe** | 69.6% (66.1%, 73.1%) | 25.4% (22.0%, 28.6%) | 24.7% (15.6%, 33.9%) |
| **Australasia** | 74.8% (71.3%, 78.3%) | 33.4% (31.0%, 35.6%) | 1.1% (0.8%, 1.4%) |
| **East and South East Asia** | 63.6% (60.1%, 67.1%) | 20.8% (16.1%, 25.4%) | 15.2% (9.9%, 20.4%) |
| **South Asia** | 78.5% (75.0%, 82.0%) | 3.1% (2.1%, 4.1%) | 19.4% (15.0%, 23.8%) |
| **North America** | 75.7% (72.2%, 79.2%) | 30.0% (28.5%, 31.5%) | 9.0% (7.0%, 11.1%) |
| **Western Europe** | 71.0% (67.5%, 74.5%) | 28.6% (12.7%, 44.4%) | 4.5% (3.2%, 6.0%) |
| **Sub Saharan Africa** | 70.5% (67.0%, 74.0%) | 11.6% (7.8%, 15.6%) | 18.3% (11.3%, 25.4%) |
| **Latin America** | 74.0% (70.5%, 77.5%) | 13.0% (5.0%, 21.3%) | 35.7% (15.0%, 56.6%) |
| **Middle East and North Africa** | 68.8% (65.3%, 72.3%) | 3.5% (2.5%, 5.2%) | 3.6% (1.5%, 6.2%) |

PWID: People who inject drugs; CI: Confidence Intervals

[1]Petruzziello et al. Global epidemiology of hepatitis C virus infection: An up-date of the distribution and circulation of hepatitis C virus genotypes. 2016[2].

[2]Micallef et al. Spontaneous viral clearance following acute hepatitis C infection: a systematic review of longitudinal studies. 2006[13]. Note: as no bounds were available in the Petruzziello paper, bound sizes of 3.5% were taken to give the same magnitude as those from Micallef et al.

[3]Degenhardt et al. Global prevalence of injecting drug use and sociodemographic characteristics and prevalence of HIV, HBV, and HCV in people who inject drugs: a multistage systematic review. Lancet Glob Health 2017[1].

**Model calibration**

Countries were considered for inclusion in the model that had data on the population proportion of PWID, HCV prevalence for PWID and HCV prevalence for the general population. For the general population, HCV prevalence estimates were taken from Blach 2017[14], and if not available for a particular country then values were taken from Gower 2014, Hope 2014, Riou 2015, and Lavanchy 2011[15-18] (in that order). For HCV prevalence among PWID, estimates were taken from Degenhardt 2017[1], and where not available were taken from Hope 2014[16] and Aceijas 2007[19], prioritising in that order. The estimates for the population proportion of adults that are PWID were taken from Degenhardt 2017[1], and when estimates were unavailable for a particular country were then taken from Mathers 2008, Hope 2014, Mumtaz 2014, Aceijas 2007, and Reid 2009[16,19-22] (in that order). If an interval bound was missing, then ±33% of the point estimate was used instead. In the few instances when an interval bound was the same as the point estimate then the bound was increased or decreased by 0.001 to avoid sampling errors. Territories, as opposed to countries (eg. England, rather than the UK) were omitted. The year of the estimate was recorded. Where the estimate was recorded over multiple years the model was calibrated to the middle year of the range, eg. a serosurvey recorded from 2004-2008 would be taken as 2006. Some reviews, but not all, performed grading of the estimates. The system of grading was not the same across all reviews. Supplementary table 8 includes the grades, when assigned, for each estimate, and the footnote contains an overview of the grading systems used.

Data were available on the population proportion of PWID, and HCV prevalence for PWID and the general population for 91 countries. Three countries were excluded. For Côte d'Ivoire and the Maldives the HCV prevalence among PWID was unrealistically low, 1.8% and 0.7% respectively, which is lower than that of the general population. Other estimates were not available, so these two countries were omitted. For Syria, where the PWID HCV prevalence was 3.3%, the situation was similar, however, another estimate for this parameter was available (60.5%) from Nelson et al[23], and was used instead so Syria was included in the analysis. Seychelles was also omitted from the model (in the absence of other data) as the number of infections among current PWID was higher than among the general population, due to a high estimate of the prevalence of injecting from Degenhardt et al, 2.3%[1], and a low general population HCV estimate from Lavanchy, 0.3%[18], which together are mathematically incompatible. The prevalence data by country are shown in supplementary table 8. The model was calibrated to the data for these 88 countries.

From 1990 onwards, a four-step calibration method using different sub-models (described at the end of the calibration section), was used to calibrate the overall model for each country. These four sub-models were used to ease the fitting process. Supplementary table 3 shows the parameters that were fitted by each of the four sub-models. At each step, required model parameters were randomly sampled from their uncertainty bounds, as was data used to calibrate the sub-model, and then other unknown model parameters were estimated through fitting the sub-model to the calibration data using the Matlab function lsqnonlin. For each sampled parameter set, it was not always possible to fit the sub-models to the sampled calibration data (e.g. to the prevalence of HCV in the general population), and so these model runs were rejected. A 33% tolerance was allowed in fitting the model to a specific quantity (to match the uncertainty applied around parameters without bounds). We sampled parameter sets until 1000 full model fits were produced for each country. The step-by-step process of calibrating the model is described in detail below.

**Supplementary table 3:** Parameters fit by each of the four sub-models

| Sub-model | Country-specific parameters fitted |
|---|---|
| **1** | Population growth rates between 1990 and 2015 |
| **2** | Age-specific death rates |
| **3** | The rate individuals initiate injecting |
| **4** | HCV transmission rates for the general population and PWID |

Firstly, a simple population growth sub-model (sub-model 1) was used to calculate the average population growth rate (A) that gave the change in each countries total population size between 1990 and 2015, calibrating to population size estimates from UN datasets[24] (supplementary table 4 summarises data sources). Once the growth rate has been calibrated, if the projected population size in 2015 was not within 33% of the sampled value, then the run was rejected. After 2015, the country-specific UN predicted growth rates for 5-year intervals from 2015 up until 2040 were used.

Following this, the population growth sub-model was extended to incorporate three age classes (0-14, 15-34, and ≥35 years, $x_1, x_2$ and $x_3$ respectively [sub-model 2]). The model includes aging between these classes (a for aging from 0-14 to 15-34, and b for aging from 15-34 to ≥35), births and population growth (both included within R(t)) in to the 0-14 age group, and age-dependent, country-specific death rates ($DR_1$, $DR_2$, $DR_3$ for those aged 0-14, 15-34, and ≥35, respectively), taken from the UN[24], so that the model could be calibrated to data on the population age distribution for each country in 2015. R(t) balances age-related mortality, while allowing for a specified rate of population growth. Sub-model 2 assumed the same level of population growth as estimated by sub-model 1, with all age-dependent deaths being balanced by additional births such that sub-model 2 has the same overall population dynamics as sub-model 1. This model was used to obtain age specific death rates ($DR_1$, $DR_2$, $DR_3$) to calibrate the model to the UN estimated population age distribution for each country in 2015. The death rates for the youngest age group (0-14 years), $DR_1$, were estimated from 2015 data from the UN[24], while the death rates for the older age groups (15-34 years, $DR_2$, and ≥35 years, $DR_3$) were fitted to give the UN estimated population age distribution for each country in 2015, allowing for 20% accuracy in the proportion in each age group. For the fitting, lower bounds were specified for the 15-34-year age-group mortality rate ($DR_2$) as 80% of the 15-34-year-old death rate taken from the UN population data, whilst the lower bound for the ≥35-year age group ($DR_3$) was specified as 0.0202 to equate to 49.4 years life expectancy (1/0.0202=49.4), which was deemed the upper limit for life expectancy for those aged 35 years (taken from Japan). The upper bounds were each set very high at 0.5.

Sub-model 2 was then extended to include PWID, to give sub-model 3, shown in supplementary figure 1. As with the full model, sub-model 3 includes compartments for current injectors aged 15-34 and age ≥35, and ex-injectors aged 15-34 and ⩾35. Sub-model 3 is similar to sub-model 2 in that people enter and leave the model in the same way – entering through recruitment (birth) in the 0-14 age group and leaving the model from any compartment due to age specific death rates. However, in addition, current injectors have an additional high or low/middle-income country specific drug-related death rate, μ, obtained from Mathers et al. WHO Bulletin 2013[7] – these were used instead of regional estimates, as not all regions had IDU death rate information available. Sub-model 3 used the parameter sets that successfully fitted the population growth and age distribution sampled data in sub-models 1 and 2. For each parameter set, the rate that individuals initiate injecting, φ, from the young adult age group (15-34 years) was calibrated to give the sampled number of PWID in each country in 2015, obtained from the distribution range from Degenhardt et al[1] - within 33% accuracy. Each of these parameter sets also incorporated a sampled rate that PWID aged 15-34 and ⩾35 cease injecting and transition into the corresponding people who used to inject drugs age class (v). This is parameterised using country-specific estimates for the duration of current injecting taken from Degenhardt et al and presented in supplementary table 8[1].

The model parameter sets that successfully fitted sub-model 3 for each country were then used within the full model, which additionally includes HCV disease transmission and progression as described in the model description section, see supplementary figure 2. The fourth step fitted the HCV transmission rates for the general population and PWID to give the prevalence of HCV amongst PWID and the general population (within 33% accuracy), which were both sampled from uncertainty distributions.

The population proportion of PWID among adults was assumed to be stable between 1990 and the year of the estimate, except for Sub-Saharan African and Eastern European countries where in 1990 it was assumed to be 25% of the value in the study year, due to evidence suggesting injecting drug use in these regions expanded later than in other settings[25,26]. An analysis was performed to test the effect of removing the assumption of later IDU

epidemics in Sub-Saharan Africa and Eastern Europe, the results of which can be seen in supplementary table 11 alongside the results of the other sensitivity analyses.

**Supplementary table 4:** Data source summary

| **Data** | **Source** |
|---|---|
| Population sizes and growth rate | United Nations[24] |
| Age distributions | United Nations[24] |
| Fertility rates | United Nations[24] |
| Age-group specific mortality rates | United Nations[24] |
| HIV prevalences for women aged 15-24* | World Bank[27] |
| Proportion of adults (aged ≥15) that are PWID | Degenhardt et al[1] and other reviews where necessary, see supplementary table 8 |
| HCV antibody prevalence among PWID | Degenhardt et al[1] and other reviews where necessary, see supplementary table 8 |
| HCV antibody prevalence among the general population** | Blach et al[14] and other reviews where necessary, see supplementary table 8 |
| Region-specific viraemic rates amongst sero-positive individuals to estimate chronic infection | Petruziello et al[2] |
| Duration of injecting*** | Degenhardt et al[1] |
| Injecting drug use by gender | Degenhardt et al[1] |
| HIV prevalence among PWID | Degenhardt et al[1] |
| Historical treatment numbers | Various, see supplementary table 9 |

*Used to proxy HIV prevalence among women of childbearing age, assumed to be 15-34 years old in our model

**Only USA, Egypt, and France have two "robust surveys"[14] (large, national surveys with very similar methodology), with these data being used to model their HCV epidemic dynamics

***Taken from data on the current duration of injecting, with wide uncertainty bounds being applied (-50%, +100%) to account for uncertainty in how this parameter relates to total duration of injecting

**Model equations for sub-models used in calibration**

**Sub-model 1: Population growth**

$$\frac{dN}{dt} = AN$$

Where A is the population growth rate, and N is the population size.

**Sub-model 2: Age distributions**

The model equations for the total population ($x_i$, for i=1, 2 and 3) in each of three age groups (0-14 for i=1, 15-34 for i=2, and ⩾35 years for i=3) are given below:

$$\frac{dx_1}{dt} = R(t) - (DR_1 + a)x_1$$

$$\frac{dx_2}{dt} = ax_1 - (DR_2 + b)x_2$$

$$\frac{dx_3}{dt} = bx_2 - DR_3x_3$$

Where the recruitment rate $R(t)$ is set to balance all non-HCV and drug related deaths and also incorporates the growth rate A from sub-model 1 as follows:

$R(t) = AN + DR_1x_1 + DR_2x_2 + DR_3x_3$ where $N, x_1, x_2$ and $x_3$ all vary with time.

**Sub-model 3: Prevalence of injecting drug use**

Risk-group equations, for $y_1, \ldots, y_7$ – the 0-14 group, the 15-34 people who do not inject drugs group, the ⩾35 people who do not inject drugs group, the 15-34 PWID group, the ⩾35 PWID group, the 15-34 people who used to inject drugs group, and the ⩾35 people who used to inject drugs group:

$$\frac{dy_1}{dt} = R(t) - (DR_1 + a)y_1$$

$$\frac{dy_2}{dt} = ay_1 - (DR_2 + \phi + b)y_2$$

$$\frac{dy_3}{dt} = by_2 - DR_3y_3$$

$$\frac{dy_4}{dt} = \phi y_2 - (DR_2 + \mu + v + b)y_4$$

$$\frac{dy_5}{dt} = by_4 - (DR_3 + \mu + v)y_5$$

$$\frac{dy_6}{dt} = vy_4 - (DR_2 + b)y_6$$

$$\frac{dy_7}{dt} = by_6 + vy_5 - DR_3y_7$$

where $R(t) = AN + DR_1y_1 + DR_2y_2 + DR_3y_3 + DR_2y_4 + DR_3y_5 + DR_2y_6 + DR_3y_7$

**Full model equations**

Subscripts 1-7 indicate the age and injecting group: 1 for aged 0-14, 2 for aged 15-34 people who do not inject drugs (non-PWID), 3 for aged ⩾35 people who do not inject drugs (non-PWID), 4 for aged 15-34 PWID, 5 for aged ⩾35 PWID, 6 for aged 15-34 people who used to inject drugs (ex-PWID), 7 for aged ⩾35 people who used to inject drugs (ex-PWID).

**Aged 0-14:**

(1) $\frac{dS_1}{dt} = R(t) + \alpha\omega TI_1 - P(1-\delta)S_1 - (DR_1 + a)S_1$

(2) $\frac{dI_1}{dt} = V(t) + (1-\alpha)\omega TI_1 + P(1-\delta)S_1 + V(t) - (DR_1 + \lambda + \gamma + a)I_1$

(3) $\frac{dTI_1}{dt} = \lambda I_1 - (DR_1 + \omega + a)TI_1$

(4) $\frac{dCI_1}{dt} = (1-\alpha)\omega CT_1 + \gamma I_1 + P(1-\delta)CS_1 - (DR_1 + \lambda + \chi + a)CI_1$

(5) $\frac{dCT_1}{dt} = \lambda CI_1 - (DR_1 + \chi + \omega + a)CT_1$

(6) $\frac{dCS_1}{dt} = \alpha\omega CT_1 - P(1-\delta)CS_1 - (DR_1 + \varepsilon + a)CS_1$

(7) $\frac{dDI_1}{dt} = (1-\alpha)\omega DT_1 + \chi CI_1 + P(1-\delta)DS_1 - (DR_1 + \mu_4 + \lambda + a)DI_1$

(8) $\frac{dDT_1}{dt} = \lambda DI_1 + \chi CT_1 - (DR_1 + \mu_4 + \omega + a)DT_1$

(9) $\frac{dDS_1}{dt} = \alpha\omega DT_1 + \varepsilon CS_1 - P(1-\delta)DS_1 - (DR_1 + \mu_4 + a)DS_1$

**Aged 15-34, non-PWID:**

(10) $\frac{dS_2}{dt} = aS_1 + \alpha\omega TI_2 - P(1-\delta)S_2 - (DR_2 + \phi + b)S_2$

(11) $\frac{dI_2}{dt} = aI_1 + (1-\alpha)\omega TI_2 + P(1-\delta)S_2 - (DR_2 + \gamma + \phi + \lambda + b)I_2$

(12) $\frac{dTI_2}{dt} = aTI_1 + \lambda I_2 - (DR_2 + \phi + \omega + b)TI_2$

(13) $\frac{dCI_2}{dt} = aCI_1 + (1-\alpha)\omega CT_2 + \gamma I_2 + P(1-\delta)CS_2 - (DR_2 + \chi + \lambda + \phi + b)CI_2$

(14) $\frac{dCT_2}{dt} = aCT_1 + \lambda CI_2 - (DR_2 + \chi + \phi + \omega + b)CT_2$

(15) $\frac{dCS_2}{dt} = aCS_1 + \alpha\omega CT_2 - P(1-\delta)CS_2 - (DR_2 + \varepsilon + \phi + b)CS_2$

(16) $\frac{dDI_2}{dt} = aDI_1 + (1-\alpha)\omega DT_2 + \chi CI_2 + P(1-\delta)DS_2 - (DR_2 + \mu_4 + \phi + \lambda + b)DI_2$

(17) $\frac{dDT_2}{dt} = aDT_1 + \chi CT_2 + \lambda DI_2 - (DR_2 + \mu_4 + \phi + \omega + b)DT_2$

(18) $\frac{dDS_2}{dt} = aDS_1 + \alpha\omega DT_2 + \varepsilon CS_2 - P(1-\delta)DS_2 - (DR_2 + \mu_4 + \phi + b)DS_2$

**Aged 35+, non-PWID:**

(19) $\frac{dS_3}{dt} = bS_2 + \alpha\omega TI_3 - P(1-\delta)S_3 - DR_3S_3$

(20) $\frac{dI_3}{dt} = bI_2 + (1-\alpha)\omega TI_3 + P(1-\delta)S_3 - (DR_3 + \gamma + \lambda)I_3$

(21) $\frac{dTI_3}{dt} = bTI_2 + \lambda I_3 - (DR_3 + \omega)TI_3$

(22) $\frac{dCI_3}{dt} = bCI_2 + (1-\alpha)\omega CT_3 + \gamma I_3 + P(1-\delta)CS_3 - (DR_3 + \chi + \lambda)CI_3$

(23) $\frac{dCT_3}{dt} = bCT_2 + \lambda CI_3 - (DR_3 + \omega + \chi)CT_3$

(24) $\frac{dCS_3}{dt} = bCS_2 + \alpha\omega CT_3 - P(1-\delta)CS_3 - (DR_3 + \varepsilon)CS_3$

(25) $\frac{dDI_3}{dt} = bDI_2 + (1-\alpha)\omega DT_3 + \chi CI_3 + P(1-\delta)DS_3 - (DR_3 + \mu_4 + \lambda)DI_3$

(26) $\frac{dDT_3}{dt} = bDT_2 + \lambda DI_3 + \chi CT_3 - (DR_3 + \mu_4 + \omega)DT_3$

(27) $\frac{dDS_3}{dt} = bDS_2 + \alpha\omega DT_3 + \varepsilon CS_3 - P(1-\delta)DS_3 - (DR_3 + \mu_4)DS_3$

**Aged 15-34 PWID:**

(28) $\frac{dS_4}{dt} = \phi S_2 + \alpha\omega TI_4 - (P + \pi)(1-\delta)S_4 - (DR_2 + \mu + v + b)S_4$

(29) $\frac{dI_4}{dt} = \phi I_2 + (1-\alpha)\omega TI_4 + (P + \pi)(1-\delta)S_4 - (DR_2 + \mu + \gamma + \lambda + v + b)I_4$

(30) $\frac{dTI_4}{dt} = \phi TI_2 + \lambda I_4 - (DR_2 + \mu + \omega + v + b)TI_4$

(31) $\frac{dCI_4}{dt} = \phi CI_2 + (1-\alpha)\omega CT_4 + \gamma I_4 + (P + \pi)(1-\delta)CS_4 - (DR_2 + \mu + \chi + \lambda + v + .b)CI_4$

(32) $\frac{dCT_4}{dt} = \phi CT_2 + \lambda CI_4 - (DR_2 + \mu + \omega + \chi + v + b)CT_4$

(33) $\frac{dCS_4}{dt} = \phi CS_2 + \alpha\omega CT_4 - (P + \pi)(1-\delta)CS_4 - (DR_2 + \mu + \varepsilon + v + b)CS_4$

(34) $\frac{dDI_4}{dt} = \phi DI_2 + (1-\alpha)\omega DT_4 + \chi CI_4 + (P + \pi)(1-\delta)DS_4 - (DR_2 + \mu + \mu_4 + \lambda + v + b)DI_4$

(35) $\frac{dDT_4}{dt} = \phi DT_2 + \chi CT_4 + \lambda DI_4 - (DR_2 + \mu + \mu_4 + \omega + v + b)DT_4$

(36) $\frac{dDS_4}{dt} = \phi DS_2 + \alpha\omega DT_4 + \varepsilon CS_4 - (P + \pi)(1-\delta)DS_4 - (DR_2 + \mu + \mu_4 + v + b)DS_4$

**Aged 35+ PWID:**

(37) $\frac{dS_5}{dt} = bS_4 + \alpha\omega TI_5 - (P + \pi)(1-\delta)S_5 - (DR_3 + \mu + v)S_5$

(38) $\frac{dI_5}{dt} = bI_4 + (1-\alpha)\omega TI_5 + (P + \pi)(1-\delta)S_5 - (DR_3 + \mu + \gamma + \lambda + v)I_5$

(39) $\frac{dTI_5}{dt} = bTI_4 + \lambda I_5 - (DR_3 + \mu + \omega + v)TI_5$

(40) $\frac{dCI_5}{dt} = bCI_4 + (1-\alpha)\omega CT_5 + \gamma I_5 + (P + \pi)(1-\delta)CS_5 - (DR_3 + \mu + \chi + \lambda + v)CI_5$

(41) $\frac{dCT_5}{dt} = bCT_4 + \lambda CI_5 - (DR_3 + \mu + \omega + \chi + v)CT_5$

(42) $\frac{dCS_5}{dt} = bCS_4 + \alpha\omega CT_5 - (P + \pi)(1-\delta)CS_5 - (DR_3 + \mu + \varepsilon + v)CS_5$

(43) $\frac{dDI_5}{dt} = bDI_4 + (1-\alpha)\omega DT_5 + \chi CI_5 + (P + \pi)(1-\delta)DS_5 - (DR_3 + \mu + \mu_4 + \lambda + v)DI_5$

(44) $\frac{dDT_5}{dt} = bDT_4 + \chi CT_5 + \lambda DI_5 - (DR_3 + \mu + \mu_4 + \omega + v)DT_5$

(45) $\frac{dDS_5}{dt} = bDS_4 + \alpha\omega DT_5 + \varepsilon CS_5 - (P + \pi)(1-\delta)DS_5 - (DR_3 + \mu + \mu_4 + v)DS_5$

**Aged 15-34 ex-PWID:**

(46) $\frac{dS_6}{dt} = vS_4 + \alpha\omega TI_6 - P(1-\delta)S_6 - (DR_2 + b)S_6$

(47) $\frac{dI_6}{dt} = vI_4 + (1-\alpha)\omega TI_6 + P(1-\delta)S_6 - (DR_2 + \gamma + \lambda + b)I_6$

(48) $\frac{dTI_6}{dt} = vTI_4 + \lambda I_6 - (DR_2 + \omega + b)TI_6$

(49) $\frac{dCI_6}{dt} = vCI_4 + (1-\alpha)\omega CT_6 + \gamma I_6 + P(1-\delta)CS_6 - (DR_2 + \chi + \lambda + b)CI_6$

(50) $\frac{dCT_6}{dt} = vCT_4 + \lambda CI_6 - (DR_2 + \chi + \omega + b)CT_6$

(51) $\frac{dCS_6}{dt} = vCS_4 + \alpha\omega CT_6 - P(1-\delta)CS_6 - (DR_2 + \varepsilon + b)CS_6$

(52) $\frac{dDI_6}{dt} = vDI_4 + (1-\alpha)\omega DT_6 + \chi CI_6 + P(1-\delta)DS_6 - (DR_2 + \mu_4 + \lambda + b)DI_6$

(53) $\frac{dDT_6}{dt} = vDT_4 + \lambda DI_6 + \chi CT_6 - (DR_2 + \mu_4 + \omega + b)DT_6$

(54) $\frac{dDS_6}{dt} = vDS_4 + \alpha\omega DT_6 + \varepsilon CS_6 - P(1-\delta)DS_6 - (DR_2 + \mu_4 + b)DS_6$

**Aged 35+ ex-PWID:**

(55) $\frac{dS_7}{dt} = bS_6 + \alpha\omega TI_7 + vS_5 - P(1-\delta)S_7 - DR_3S_7$

(56) $\frac{dI_7}{dt} = bI_6 + (1-\alpha)\omega TI_7 + vI_5 + P(1-\delta)S_7 - (DR_3 + \gamma + \lambda)I_7$

(57) $\frac{dTI_7}{dt} = bTI_6 + vTI_5 + \lambda I_7 - (DR_3 + \omega)TI_7$

(58) $\frac{dCI_7}{dt} = bCI_6 + (1-\alpha)\omega CT_7 + \gamma I_7 + vCI_5 + P(1-\delta)CS_7 - (DR_3 + \chi + \lambda)CI_7$

(59) $\frac{dCT_7}{dt} = bCT_6 + vCT_5 + \lambda CI_7 - (DR_3 + \chi + \omega)CT_7$

(60) $\frac{dCS_7}{dt} = bCS_6 + \alpha\omega CT_7 + vCS_5 - P(1-\delta)CS_7 - (DR_3 + \varepsilon)CS_7$

(61) $\frac{dDI_7}{dt} = bDI_6 + (1-\alpha)\omega DT_7 + \chi CI_7 + vDI_5 + P(1-\delta)DS_7 - (DR_3 + \mu_4 + \lambda)DI_7$

(62) $\frac{dDT_7}{dt} = bDT_6 + vDT_5 + \lambda DI_7 + \chi CT_7 - (DR_3 + \mu_4 + \omega)DT_7$

(63) $\frac{dDS_7}{dt} = bDS_6 + \alpha\omega DT_7 + vDS_5 + \varepsilon CS_7 - P(1-\delta)DS_7 - (DR_3 + \mu_4)DS_7$

Where the birth rate R(t) is set to balance all non-HCV related and non-drug related deaths while also incorporating the time-varying population growth rate A, and time-varying population size N, as follows:

$$R(t) = AN + DR_1Y_1 + DR_2(Y_2 + Y_4 + Y_6) + DR_3(Y_3 + Y_5 + Y_7) - V(t)$$

where for each age group $i$ defined by sub-model 3 we define

$$Y_i = S_i + I_i + TI_i + CI_i + CT_i + CS_i + DI_i + DT_i + DS_i$$

and V(t) is the number of chronically infected births due to vertical transmission. To calculate this, vertical transmission rates for HCV, varying by whether a woman is HIV-coinfected or not (HIV prevalences for women aged 15-24 taken from the World Bank[27]), are multiplied by the estimated number of HCV-infected women aged 15-34 years in each of the four possible combinations of ever/never being PWID, and being HIV-coinfected or not, see supplementary table 4. These are then summed and multiplied by the region-specific fertility rate (the average number of childbirths a woman of childbearing age will have) divided by 20 (giving the births per year in the 15-34 age category) to produce the estimated number of HCV infected births each year. Although some births will occur among women of other ages, most will occur in this age group and so we associate all the births to this group. Fertility was assumed to be the same between female PWID and non-injectors.

V(t) is defined: $V(t) = (e_3q_2 + e_4q_1 + e_5q_2 + e_6q_1)\frac{F}{20}$

where parameter definitions are given in supplementary table 4.

**Supplementary table 5:** Calculations for the vertical transmission rate

| **Term** | **Description** |
|---|---|
| $e_1 = (I_2 + CI_2 + DI_2)/2$ | The number of HCV infected women aged 15-34 years old that have never been PWID* |
| $e_2 = (I_4 + CI_4 + DI_4 + I_6 + CI_6 + DI_6)R_F$ where $R_F$ is the region-specific percentage of PWID that are female | The number of HCV infected women aged 15-34 years old that have ever been PWID |
| $e_3 = e_1 C_H$ where $C_H$ is the country-specific HIV prevalence for young women (aged 15-24) | The number of HCV infected women aged 15-34 years old that have never been PWID that are coinfected with HIV |
| $e_4 = e_2 R_H$ where $R_H$ is the region-specific HIV prevalence among PWID | The number of HCV infected women aged 15-34 years old that have ever been PWID that are coinfected with HIV |
| $e_5 = e_1 - e_3$ | The number of HCV infected women aged 15-34 years old that have never been PWID that are not coinfected with HIV |
| $e_6 = e_2 - e_4$ | The number of HCV infected women aged 15-34 years old that have ever been PWID that are not coinfected with HIV |
| $q_1$ | Probability of vertical transmission of HCV RNA confirmed infection per birth among women with HCV RNA that are HIV negative. |
| $q_2$ | Probability of vertical transmission of HCV RNA confirmed infection per birth among women with HCV RNA that are HIV negative. |

*The distribution of HCV among people that have never injected drugs is assumed to be even between men and women

For the different forces of infection, we have:

Size of total population:

$$N = \sum_{i=1}^{7} S_i + I_i + TI_i + CI_i + CT_i + CS_i + DI_i + DT_i + DS_i$$

Size of the PWID population:

$$N_I = \sum_{i=4}^{5} S_i + I_i + TI_i + CI_i + CT_i + CS_i + DI_i + DT_i + DS_i$$

The proportion of the population that are infected:

$$\xi = (I_1 + CI_1 + DI_1 + I_2 + CI_2 + DI_2 + I_3 + CI_3 + DI_3 + I_4 + CI_4 + DI_4 + I_5 + CI_5 + DI_5 + I_6 + CI_6 + DI_6 + I_7 + CI_7 + DI_7)/N$$

The force of infection for the whole population:

$$P = \beta\xi$$

where $\beta$ is the transmission rate in the general population. The additional force of infection which acts on PWID is given by:

$$\pi_y = \theta(I_4 + I_5 + CI_4 + CI_5 + DI_4 + DI_5)/N_I$$

where $\theta$ is the additional transmission rate due to injecting. The transmission rate in the general population ($\beta$) and PWID population (θ), are found by solving the model equations (1-63) and calibrating the prevalence of chronic HCV amongst PWID and the general population in the model to the PWID and general population chronic HCV prevalence from the data, respectively. See the model calibration section.

**Further model information**

Of note, we assume no transient increase in transmission risk during the acute phase of infection because viral load data suggests no evidence for a peak in HCV viremia during acute infection (except for those that subsequently clear their infection). Therefore, early viral load levels should not affect transmission and so have not been included within the model. Please see "Patterns of Hepatitis C Virus RNA Levels during Acute Infection: The InC3 Study" by Hajarizadeh et al for more information[28].

In this model we use a mass action deterministic model that does not account for the social network of PWID across which HCV would transmit. Although we acknowledge that network models can better represent transmission dynamics among PWID (if sufficient data exists to parameterise them) and the impact of interventions, when both types of model are parameterised and calibrated to the same HCV prevalence data (with the same population turnover parameters) the resulting incidence projections from a mass action model will closely match those of the network model[29-32].

**HCV epidemic trajectory assumptions**

To determine the trajectory of country-level epidemics, it is important to assess both whether there is evidence for changes in HCV prevalence or incidence over time, but also whether there have been any important changes in the prevalence or frequency of important risk behaviours or interventions. The evidence for changes in both is described below.

**Changes in HCV risk behaviours**

HCV is transmitted through several known risk behaviours, principally unscreened blood donations, unsafe medical injections, and injecting drug use. When attempting to understand the trajectory of an HCV epidemic, changes in risk via these different transmission routes must be considered. Evidence suggests the risk of receiving an HCV-infected blood transfusion has decreased over time following the introduction of blood donation safety guidelines and improved screening practices. with some estimates for developing countries suggesting a decline from 1/50 transfusions in the late 1980s to 1/200000 transfusions in 2000[33]. However, this same review from 2006 states that such a decline had not occurred for many low and middle income countries by the early 2000s[33]. Since then, a 2016 WHO report stated that 174 of 180 countries report a policy of testing all blood for HCV[34], an improvement from 107 out of 148 in 2006[35]. The UK introduced screening guidelines for HCV in 1991[36], whereas many countries in the South Asia region (which has the highest number of infections) introduced such guidelines in the early 2000s[37], whilst guideline introductions tended to be later in Africa, for example 2005 in Ethiopia[38], and 2006 in Nigeria[39]. The introduction of these guidelines has brought progress, although in many countries blood donation safety could still be improved[40].

Similarly to the reduction seen in the transmission risk for blood transfusions, the HCV transmission risk due to unsafe medical injections has also decreased since 2000[41], which followed an emphasis on preventing re-use of syringes led by the Safe Injection Global Network (SIGN)[42]. Using population surveys, injection safety assessments and published studies, Pepin et al found that the re-use of injection devices fell from 39.8% of all syringes in 2000, to 5.5% in 2010[43]. Subsequently, using a mass action model and these estimates, Pepin et al estimated that between these years there was an 83% reduction in new HCV infections transmitted through medical injections, although there was heterogeneity in the sources of data used for the two time points[41]. To calculate this, Pepin et al used HCV prevalence data from a study by Hanafiah et al, which was perhaps the first study to estimate the trajectory of the HCV epidemic at the regional and global level, and is discussed below[44].

The main interventions for reducing HCV transmission among people who inject drugs (PWID), a group with particularly high prevalence and incidence of HCV[1], are needle and syringe programmes and opioid substitution therapy[45]. Larney et al performed a systematic review of the number of countries implementing these interventions and found an increase from 2010 to 2017 for both; from 81 to 93 countries for needle and syringe programmes, and from 70 to 86 countries for opioid substitution therapy[46]. Theoretically this would indicate a reduction in HCV transmission risk for PWID, however, the review notes that the coverage of these interventions is generally too poor to prevent HCV epidemics among PWID.

Aside from the already discussed interventions, there is not enough evidence for the effectiveness of other interventions to reduce HCV transmission risk, especially community-based risks, which are wide ranging and uncertain[47-49].

**Changes in HCV epidemic data**

The gold standard measure for assessing changes in an epidemic trajectory is observing changes in the incidence of infection over time. However, incidence estimates are rare even amongst PWID, for whom infections are more common, and so we generally must rely on changes in HCV prevalence over time for determining whether HCV epidemics are expanding or in decline. Several studies have done this for HCV, which are described below.

As mentioned above, Hanafiah et al undertook a systematic review and meta-analysis of general population HCV prevalence estimates (excluding grey literature and non-English language studies), splitting studies

performed before and after 1997 as early (ascribed to 1990) and late (ascribed to 2005), and estimated the HCV epidemic trajectories by comparing these pooled prevalence estimates[44]. In this study, global anti-HCV prevalence increased from 2.3% to 2.8% between 1990 and 2005. These trajectories varied by region, but for most there was no statistical change in HCV prevalence between the time points. Such a method for determining a change in prevalence is limited by heterogeneity between the studies included in each time point (1990 and 2005) and is particularly sensitive to these differences at regional levels where the same countries may not contribute data for both time points. Notably a study could be included in the estimate for 2005 if it occurred in 1998, which was before blood donation safety guidelines were introduced in many countries, and before the reduction in the re-use of medical injections[33,43].

The Global Burden of Disease study modelled changes in the burden of disease due to HCV between 1990 and 2013 and found an increase in deaths and life years lost. However, they did not present how HCV prevalence had changed between these time points[50]. Importantly, mortality can still increase with a stable or decreasing epidemic and so these projections are not useful for understanding the overall epidemic dynamics.

Recently, Blach et al. modelled and presented the change in viremic HCV prevalence globally and by region between 1980 to 2015, based on changes in age-specific HCV prevalence over time[14]. Globally, they estimated the total number of viremic infections to be around 36 million in 1980, which increased to around 71 million by 2000 and then remained steady until 2015. When accounting for the increasing global population this means an increase from around 0.8% viremic HCV prevalence in 1980, to around 1.2% in 2000, decreasing to around 1.0% by 2015. These numbers were estimated approximately off published graphs as the exact numbers were not made available (UN global population numbers were used as the denominator). These HCV epidemic trajectories vary by region (after accounting for population changes), with decreases in most regions from 1990 onwards, but with increases estimated in Eastern Europe, Australasia, and South and Central Asia. Estimations of the prevalence changes by region from the paper by Blach et al. are shown in supplementary table 6 (regional populations were taken from the Global Burden of Disease study). The regional numbers were not made explicitly available in their paper and the estimates could not be accurately obtained from the regional graphs. Additionally, the uncertainty around these estimates was not given. The analysis by Blach et al. used a Markov model starting from 1950 when there is assumed to be negligible HCV infections, with the epidemic increasing from then. However, there is uncertainty in these modelled HCV prevalence trends. Many countries in the analysis only have one data point on HCV prevalence, making it hard to determine trajectory. Additionally, for some countries, expert opinion, which is generally considered the lowest grade of evidence[51], is relied on for determining how the epidemics may be evolving rather than data. More generally, there is a lack of data feeding into the model for less recent time-points, with less robust data available in more recent years, meaning there is uncertainty regarding the trajectory of the epidemic used in the model. Only Egypt[52,53], France[54,55], and the USA[56,57] have two HCV prevalence surveys for the general population that were described as robust by Blach et al[14] – all of which suggested a decreasing trend. Only two other countries (China and Thailand) had multiple surveys, but they were not considered robust enough (possibly regarding comparability between survey methods) by Blach et al, although they also suggested a decreasing trend of prevalence.

**Supplementary table 6:** Regional changes in viraemic prevalence from 1990 to 2015, estimated from Blach et al.[14] using Global Burden of Disease regional categories and population sizes

| Region | Viraemic population (millions) | | Total population (millions) | | Viraemic prevalence | | |
|---|---|---|---|---|---|---|---|
| | 1990 | 2015 | 1990 | 2015 | 1990 | 2015 | Annual Change |
| Asia, Central | 1.1 | 3.3 | 68.8 | 87.0 | 1.6% | 3.8% | 5.49% |
| Asia, East | 10.8 | 10.5 | 1194.9 | 1432.9 | 0.9% | 0.7% | -0.76% |
| Asia Pacific, High Income | 3.1 | 1.2 | 168.9 | 182.9 | 1.8% | 0.7% | -2.57% |
| Asia, South | 9 | 15.3 | 1103.9 | 1691.0 | 0.8% | 0.9% | 0.44% |
| Asia, Southeast | 3.1 | 4.7 | 461.5 | 651.0 | 0.7% | 0.7% | 0.30% |
| Australasia | 0.1 | 0.2 | 20.4 | 28.9 | 0.5% | 0.7% | 1.65% |
| Caribbean | 0.2 | 0.3 | 35.8 | 45.3 | 0.6% | 0.7% | 0.74% |
| Europe, Central | 0.7 | 1.2 | 123.1 | 116.7 | 0.6% | 1.0% | 3.24% |
| Europe, Eastern | 3.5 | 6.7 | 221.2 | 215.0 | 1.6% | 3.1% | 3.88% |
| Europe, Western | 2.1 | 2.3 | 381.3 | 433.6 | 0.6% | 0.5% | -0.15% |
| Latin America, Andean | 0.3 | 0.4 | 39.0 | 58.3 | 0.8% | 0.7% | -0.44% |
| Latin America, Central | 1.1 | 1.3 | 169.0 | 251.8 | 0.7% | 0.5% | -0.83% |
| Latin America, Southern | 0.4 | 0.4 | 49.0 | 64.8 | 0.8% | 0.6% | -0.98% |
| Latin America, Tropical | 1.9 | 1.9 | 154.8 | 214.5 | 1.2% | 0.9% | -1.11% |
| North America, High Income | 3.5 | 3.1 | 277.7 | 359.9 | 1.3% | 0.9% | -1.27% |
| North Africa/Middle East | 8 | 8.5 | 336.1 | 566.2 | 2.4% | 1.5% | -1.48% |
| Oceania | 0.1 | 0.1 | 6.6 | 11.0 | 1.5% | 0.9% | -1.59% |
| Sub-Saharan Africa, Central | 2.4 | 2.3 | 53.1 | 114.8 | 4.5% | 2.0% | -2.23% |
| Sub-Saharan Africa, East | 1.3 | 2.1 | 186.1 | 377.0 | 0.7% | 0.6% | -0.81% |
| Sub-Saharan Africa, Southern | 0.6 | 0.6 | 53.4 | 77.4 | 1.1% | 0.8% | -1.24% |
| Sub-Saharan Africa, West | 3 | 5.1 | 198.7 | 391.1 | 1.5% | 1.3% | -0.55% |

Regarding the trajectory of the HCV epidemics among PWID, data were available from the latest review by Degenhardt et al[1]. Prevalence estimates from surveys among PWID were compared across time for each region, and overall. For most regions there was insufficient power to look at trends over time, and for others no change over time was detected. For East and South East Asia and North America, a decreasing trend was detected. For East and South East Asia, the change in prevalence was driven by studies in China, when China was omitted there was no reduction in prevalence in East and South East Asia. However, China itself is vast and heterogeneous, and the studies were across various regions of China – only one was national, so the decrease seen is not necessarily a robust assumption. Data from the Degenhardt review suggests there is evidence for a decrease in HCV prevalence among PWID in North America. However, conflicting evidence from the US (which makes up 90% of the population of North America) show acute incident cases are increasing, as reviewed by Shiffman[58,59], suggesting an increasing epidemic in this setting. The data in the Degenhardt review are mostly from studies before this recent upturn in infections in the US, so this is investigated in sensitivity analyses (see supplementary table 11).

**Conclusions for the HCV epidemic assumptions**

In summary, evidence suggests levels of transmission risk due to blood transfusions[33] and re-use of medical injections[41] have decreased since 2000, with Blach et al's review[14] and modelling also suggesting that the global prevalence of infection has decreased by around 17% from 2000 to 2015. Conversely, HCV prevalence was stable or may have increased slightly up to the early 2000s (based on Blach[14] and Hanafiah[44]), although there is greater uncertainty about the trajectory of the epidemic at this time. Accounting for this evidence on decreases in risk behaviours and HCV prevalence, the most likely scenario is that the global HCV epidemic is decreasing

slowly, with possible variations by region, although there is not robust evidence to calculate these regional changes. For our model, we assume a slow decrease in the general population HCV epidemic over time. This was accounted for by seeding the initial modelled HCV prevalence (1990) in the setting as higher than the prevalence estimate we are fitting to, with the model then calibrating a force of infection to result in a decreasing HCV epidemic to fit the estimate for the general population HCV prevalence. Specifically, the HCV prevalence in the general population in 1990 was seeded as 1.13% (17% decline over 15 years) higher for each year between 1990 and when the general population HCV prevalence estimate was available for each country. For example, if the estimate was taken from 2005, 15 years after 1990, then the seeded HCV prevalence was set to be (100+(1.13*15))=116.95% of the 2005 value. However, due to the poor data used in making this assumption we assumed large uncertainty bounds around this estimate of decreases between 0% and 1.5% per year, and examined in a sensitivity analyses how our results would vary if we assumed a stable HCV epidemic. We also investigate regional variations in annual change in HCV prevalence in a sensitivity analysis where the annual regional changes in supplementary table 6 were included in the analysis using the same method as described above. Results of all sensitivity analyses are shown in supplementary tables 11-13.

For, Egypt[52,53], France[54,55]and USA[56,57], where multiple robust and comparable surveys exist, a separate method is used, see the next section. The available information about the trajectory of the HCV epidemic among PWID shows great uncertainty, due to this we assumed the epidemic among PWID to be stable, but this assumption is also tested in our model using sensitivity analyses that assume a decrease in HCV prevalence among PWID at the same rate as in the general population. Sensitivity analyses are presented in supplementary table 11.

**Alternative model structure for Egypt, France, and USA**

The extra information from the multiple surveys on the direction of the general population HCV epidemic for Egypt[52,53], France[54,55], and USA[56,57] was incorporated into the modelling for these countries by using a slightly different calibration technique to other countries.

For Egypt, the two anti-HCV survey values used were 14.7% (14.1%, 15.4%) in 2008 and 10.0% (9.5%, 10.5%) in 2015, whilst for France the values were 1.05% (0.75%, 1.34%) in 1994 and 0.84% (0.65, 1.10%) in 2004, and 1.8% (1.5%, 2.3%) for 1994 and 1.3% (1.2%, 1.5%) in 2010 for the USA. For each of these three countries the model was calibrated to the first survey value (in the year of the general population survey) to produce a general population transmission rate. The general population transmission rate was then adjusted by multiplying it by a random number between 0 and 1 from the year of the first survey onwards. Runs were accepted if the general population chronic HCV prevalence was within 33% of the 2$^{nd}$ survey sampled HCV prevalence estimate, as well as 33% within the PWID HCV prevalence estimate.

Supplementary figure 3 shows the successful model fits for these three countries as well as model fits for three example countries (Afghanistan, Albania, Argentina) that did not use this method.

**Detailed data issues**

For countries where only a point estimate of the population proportion of PWID among adults, HCV in the general population, or HCV amongst people who inject drugs, was available, bounds were created by adding and subtracting 33% from the point estimate.

Note that an updated estimate for the population proportion of PWID in Canada is taken from Grebely 2018[60] instead of Degenhardt 2017[1] – both papers are based on data from the same systematic review but this data point is updated. For Spain and Netherlands, the population proportion of PWID, 0.03%, appeared low for Western European countries. For these countries, the PWID prevalence estimates were investigated further using information on the number of PWID on OST. For Netherlands, the total number of people on OST was very low[61] so the estimate of 0.03% was accepted. For Spain, a 2011 estimate suggested 15,000 OST admission for people with heroin dependence, which was combined with a back-calculation based on 60% of PWID reporting being on OST[62]. This method gave an updated estimate of 25,000 PWID, and an updated population proportion of PWID of 0.075% for Spain. Bounds of ±33% were added to this point estimate.

For Cyprus, Estonia, FYR Macedonia, Iceland, Luxembourg, Malta, Montenegro, and Slovenia, the UN does not have detailed enough information about age-specific general population death rates for 2010-15. This is because numbers of deaths are rounded to the nearest 1000, meaning for some countries with a low number of deaths the mortality rate appears to be 0 for some age categories in this period, or more recent time periods in general. For these countries, estimates for death rates were taken from other nearby countries that appear to have similar death rates for previous time periods and age categories – Greece, Latvia, Greece, Sweden, France, Italy, Serbia, and Austria were used, respectively.

For Turkmenistan's estimate of HCV among PWID from Aceijas 2007[19], only the bounds (46.2%, 75.0%) were available so the mid-point was taken (60.6%). For Finland's estimate of HCV among the general population from Blach 2017[14], the mid-point (0.5%) does not fit within the given bounds (0.6%, 0.9%), so the midpoint (0.7%) was taken from Gower 2014 instead. For several general population HCV estimates from Blach 2017[14], one or both of the lower or upper bounds do not fit around the point estimate so were replaced by ±20% of the point estimate. This was for Colombia and Luxembourg (both upper), Thailand (lower), and Saudi Arabia (both). For Pakistan's general population HCV estimate from Blach 2017[14], the bounds did not fit around the estimate so were instead taken from the national survey[63]. National survey data were also used for Georgia's general population HCV prevalence estimate (the same source used in Blach 2017)[64].

The injecting duration estimates for Afghanistan (2.8 years), and Turkey (3 years), appeared low so these were adjusted to their respective regional estimates, 6.4 years and 7.8 years, respectively, with the lower estimates being used as the lower bound to the sampling interval, while the upper bound of the sampling interval was estimated by multiplying the higher estimates by 2, as was the procedure for other countries.

**Supplementary table 7:** Sampled population sizes, age distributions, mortality rates by age-group, fertility rates, and HIV prevalences for women aged 15-24 by country, taken from the UN Department of Economic and Social Affairs and the World Bank

| Country | Population (1000s) | | 1990 age distributions (proportions) | | | 2015 age distributions (proportions) | | | Mortality rates 2015, age: | | Fertility rates 2015 (lifetime births per woman) | Female (15-24) HIV % 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 2015 | 0-14 | 15-34 | 35+ | 0-14 | 15-34 | 35+ | 0-14 | 15-34 | | |
| Afghanistan | 12249 | 32526 | 0.48 | 0.32 | 0.20 | 0.44 | 0.35 | 0.21 | 0.00857 | 0.00288 | 5.26 | 0.10 |
| Albania | 3281 | 2925 | 0.33 | 0.36 | 0.31 | 0.18 | 0.30 | 0.52 | 0.00114 | 0.00068 | 1.71 | 0.10 |
| Argentina | 32729 | 43416 | 0.31 | 0.30 | 0.39 | 0.25 | 0.31 | 0.44 | 0.00128 | 0.00089 | 2.34 | 0.10 |
| Armenia | 3538 | 3018 | 0.30 | 0.35 | 0.35 | 0.18 | 0.32 | 0.49 | 0.00108 | 0.00062 | 1.65 | 0.10 |
| Australia | 17041 | 23970 | 0.22 | 0.33 | 0.45 | 0.19 | 0.28 | 0.53 | 0.00040 | 0.00045 | 1.88 | 0.10 |
| Austria | 7724 | 8542 | 0.17 | 0.31 | 0.52 | 0.14 | 0.25 | 0.61 | 0.00033 | 0.00038 | 1.45 | 0.00 |
| Azerbaijan | 7243 | 9753 | 0.33 | 0.37 | 0.30 | 0.22 | 0.35 | 0.43 | 0.00430 | 0.00081 | 2.10 | 0.10 |
| Bangladesh | 106189 | 160995 | 0.42 | 0.35 | 0.23 | 0.29 | 0.37 | 0.34 | 0.00327 | 0.00097 | 2.22 | 0.10 |
| Belarus | 10216 | 9496 | 0.23 | 0.30 | 0.47 | 0.16 | 0.27 | 0.56 | 0.00052 | 0.00161 | 1.64 | 0.20 |
| Belgium | 10006 | 11301 | 0.18 | 0.30 | 0.52 | 0.17 | 0.24 | 0.59 | 0.00031 | 0.00051 | 1.78 | 0.00 |
| Bosnia | 4463 | 3810 | 0.24 | 0.35 | 0.41 | 0.13 | 0.27 | 0.59 | 0.00078 | 0.00058 | 1.31 | 0.00 |
| Brazil | 149352 | 207846 | 0.35 | 0.36 | 0.29 | 0.23 | 0.33 | 0.44 | 0.00179 | 0.00141 | 1.78 | 0.20 |
| Bulgaria | 8841 | 7149 | 0.20 | 0.27 | 0.52 | 0.14 | 0.23 | 0.63 | 0.00079 | 0.00084 | 1.51 | 0.10 |
| Canada | 27690 | 35942 | 0.21 | 0.33 | 0.46 | 0.16 | 0.27 | 0.57 | 0.00045 | 0.00048 | 1.61 | 0.00 |
| China | 1172442 | 1376048 | 0.29 | 0.38 | 0.33 | 0.17 | 0.30 | 0.53 | 0.00116 | 0.00065 | 1.60 | 0.00 |
| Croatia | 4776 | 4242 | 0.20 | 0.29 | 0.51 | 0.15 | 0.24 | 0.61 | 0.00032 | 0.00058 | 1.49 | 0.10 |
| Cyprus | 767 | 1165 | 0.25 | 0.33 | 0.42 | 0.17 | 0.32 | 0.51 | 0.00025 | 0.00056 | 1.38 | 0.00 |
| Czech Republic | 10341 | 10544 | 0.22 | 0.28 | 0.50 | 0.15 | 0.24 | 0.61 | 0.00025 | 0.00064 | 1.48 | 0.10 |
| Denmark | 5141 | 5668 | 0.17 | 0.30 | 0.53 | 0.17 | 0.25 | 0.58 | 0.00021 | 0.00043 | 1.73 | 0.00 |
| Egypt | 57412 | 91507 | 0.41 | 0.32 | 0.27 | 0.33 | 0.34 | 0.32 | 0.00218 | 0.00091 | 3.38 | 0.10 |
| Estonia | 1565 | 1311 | 0.22 | 0.29 | 0.49 | 0.16 | 0.25 | 0.59 | 0.00068 | 0.00123 | 1.59 | 0.00 |
| Finland | 4996 | 5504 | 0.19 | 0.28 | 0.52 | 0.16 | 0.24 | 0.59 | 0.00022 | 0.00059 | 1.77 | 0.00 |
| France | 56957 | 64395 | 0.20 | 0.30 | 0.50 | 0.18 | 0.24 | 0.58 | 0.00032 | 0.00046 | 1.98 | 0.10 |
| FYROM | 1996 | 2079 | 0.26 | 0.33 | 0.41 | 0.17 | 0.30 | 0.54 | 0.00057 | 0.00056 | 1.50 | 0.10 |
| Georgia | 5410 | 3998 | 0.25 | 0.31 | 0.44 | 0.17 | 0.29 | 0.53 | 0.00144 | 0.00086 | 2.00 | 0.10 |
| Germany | 79116 | 80687 | 0.16 | 0.30 | 0.54 | 0.13 | 0.23 | 0.64 | 0.00031 | 0.00037 | 1.43 | 0.00 |
| Ghana | 14628 | 27411 | 0.44 | 0.34 | 0.22 | 0.39 | 0.35 | 0.26 | 0.00754 | 0.00331 | 4.18 | 1.00 |

| Country | Population (1000s) | | 1990 age distributions (proportions) | | | 2015 age distributions (proportions) | | | Mortality rates 2015, age: | | Fertility rates 2015 (lifetime births per woman) | Female (15-24) HIV % 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 2015 | 0-14 | 15-34 | 35+ | 0-14 | 15-34 | 35+ | 0-14 | 15-34 | | |
| Greece | 10248 | 10955 | 0.20 | 0.30 | 0.50 | 0.15 | 0.23 | 0.63 | 0.00025 | 0.00056 | 1.34 | 0.00 |
| Hungary | 10377 | 9856 | 0.20 | 0.27 | 0.52 | 0.15 | 0.25 | 0.61 | 0.00042 | 0.00057 | 1.33 | 0.00 |
| Iceland | 255 | 331 | 0.25 | 0.33 | 0.42 | 0.20 | 0.28 | 0.52 | 0.00024 | 0.00049 | 1.98 | 0.00 |
| India | 870129 | 1311049 | 0.38 | 0.34 | 0.28 | 0.29 | 0.35 | 0.36 | 0.00423 | 0.00176 | 2.44 | 0.10 |
| Indonesia | 181437 | 257563 | 0.36 | 0.37 | 0.27 | 0.28 | 0.33 | 0.39 | 0.00258 | 0.00159 | 2.45 | 0.20 |
| Iran | 56226 | 79108 | 0.45 | 0.32 | 0.23 | 0.24 | 0.39 | 0.37 | 0.00145 | 0.00086 | 1.75 | 0.10 |
| Ireland | 3569 | 4688 | 0.28 | 0.31 | 0.41 | 0.22 | 0.25 | 0.53 | 0.00020 | 0.00068 | 2.00 | 0.10 |
| Israel | 4500 | 8066 | 0.31 | 0.32 | 0.37 | 0.28 | 0.29 | 0.43 | 0.00036 | 0.00035 | 3.04 | 0.00 |
| Italy | 57125 | 59796 | 0.16 | 0.31 | 0.53 | 0.14 | 0.20 | 0.66 | 0.00022 | 0.00036 | 1.43 | 0.10 |
| Japan | 124513 | 126575 | 0.18 | 0.28 | 0.53 | 0.13 | 0.21 | 0.66 | 0.00026 | 0.00044 | 1.41 | 0.00 |
| Kazakhstan | 16539 | 17624 | 0.31 | 0.34 | 0.34 | 0.27 | 0.32 | 0.41 | 0.00157 | 0.00172 | 2.70 | 0.10 |
| Kenya | 23402 | 46052 | 0.49 | 0.33 | 0.18 | 0.42 | 0.36 | 0.22 | 0.00774 | 0.00418 | 4.10 | 3.50 |
| Kyrgyzstan | 4373 | 5941 | 0.37 | 0.34 | 0.28 | 0.31 | 0.36 | 0.33 | 0.00214 | 0.00113 | 3.12 | 0.10 |
| Latvia | 2664 | 1971 | 0.21 | 0.29 | 0.49 | 0.15 | 0.25 | 0.60 | 0.00068 | 0.00124 | 1.50 | 0.30 |
| Lebanon | 2703 | 5851 | 0.34 | 0.34 | 0.31 | 0.24 | 0.37 | 0.39 | 0.00071 | 0.00037 | 1.72 | 0.10 |
| Libya | 4437 | 6279 | 0.42 | 0.35 | 0.23 | 0.30 | 0.33 | 0.37 | 0.00235 | 0.00135 | 2.40 | 0.00 |
| Lithuania | 3696 | 2880 | 0.23 | 0.31 | 0.46 | 0.15 | 0.25 | 0.60 | 0.00048 | 0.00138 | 1.59 | 0.10 |
| Luxembourg | 382 | 568 | 0.17 | 0.30 | 0.52 | 0.16 | 0.27 | 0.56 | 0.00032 | 0.00046 | 1.55 | 0.00 |
| Madagascar | 11599 | 24234 | 0.46 | 0.33 | 0.21 | 0.42 | 0.35 | 0.24 | 0.00531 | 0.00251 | 4.40 | 0.10 |
| Malaysia | 18038 | 30331 | 0.37 | 0.36 | 0.27 | 0.25 | 0.37 | 0.38 | 0.00073 | 0.00083 | 2.11 | 0.10 |
| Malta | 364 | 429 | 0.23 | 0.30 | 0.47 | 0.14 | 0.27 | 0.59 | 0.00022 | 0.00036 | 1.41 | 0.10 |
| Mauritius | 1056 | 1276 | 0.29 | 0.39 | 0.32 | 0.19 | 0.30 | 0.50 | 0.00081 | 0.00103 | 1.49 | 0.00 |
| Mexico | 85355 | 127016 | 0.39 | 0.36 | 0.25 | 0.28 | 0.34 | 0.38 | 0.00181 | 0.00100 | 2.29 | 0.10 |
| Moldova | 4364 | 4070 | 0.28 | 0.31 | 0.41 | 0.16 | 0.33 | 0.51 | 0.00094 | 0.00088 | 1.27 | 0.20 |
| Montenegro | 615 | 627 | 0.25 | 0.33 | 0.42 | 0.18 | 0.28 | 0.54 | 0.00069 | 0.00061 | 1.71 | 0.20 |
| Morocco | 24879 | 34377 | 0.40 | 0.36 | 0.24 | 0.27 | 0.34 | 0.38 | 0.00250 | 0.00056 | 2.60 | 0.10 |
| Mozambique | 13248 | 27978 | 0.47 | 0.31 | 0.22 | 0.45 | 0.33 | 0.21 | 0.00964 | 0.00629 | 5.45 | 4.60 |
| Myanmar | 40626 | 53899 | 0.38 | 0.36 | 0.27 | 0.28 | 0.34 | 0.39 | 0.00465 | 0.00205 | 2.30 | 0.30 |
| Nepal | 18749 | 28511 | 0.42 | 0.32 | 0.25 | 0.33 | 0.36 | 0.32 | 0.00299 | 0.00132 | 2.32 | 0.10 |
| Netherlands | 14965 | 16924 | 0.18 | 0.33 | 0.49 | 0.17 | 0.24 | 0.60 | 0.00029 | 0.00030 | 1.73 | 0.10 |
| New Zealand | 3398 | 4529 | 0.23 | 0.33 | 0.44 | 0.20 | 0.26 | 0.53 | 0.00044 | 0.00067 | 2.04 | 0.00 |

| Country | Population (1000s) | | 1990 age distributions (proportions) | | | 2015 age distributions (proportions) | | | Mortality rates 2015, age: | | Fertility rates 2015 (lifetime births per woman) | Female (15-24) HIV % 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 2015 | 0-14 | 15-34 | 35+ | 0-14 | 15-34 | 35+ | 0-14 | 15-34 | | |
| Nigeria | 95270 | 182203 | 0.45 | 0.32 | 0.23 | 0.44 | 0.33 | 0.23 | 0.01295 | 0.00609 | 5.74 | 1.60 |
| Norway | 4247 | 5212 | 0.19 | 0.30 | 0.51 | 0.18 | 0.27 | 0.55 | 0.00021 | 0.00058 | 1.82 | 0.00 |
| Pakistan | 107678 | 188927 | 0.43 | 0.32 | 0.25 | 0.35 | 0.36 | 0.29 | 0.00751 | 0.00135 | 3.72 | 0.10 |
| Philippines | 61947 | 100700 | 0.41 | 0.36 | 0.24 | 0.32 | 0.35 | 0.33 | 0.00252 | 0.00155 | 3.05 | 0.10 |
| Poland | 37954 | 38267 | 0.25 | 0.30 | 0.45 | 0.15 | 0.28 | 0.57 | 0.00046 | 0.00072 | 1.33 | 0.00 |
| Portugal | 9953 | 10352 | 0.21 | 0.31 | 0.49 | 0.14 | 0.22 | 0.64 | 0.00027 | 0.00043 | 1.28 | 0.00 |
| Romania | 23489 | 19512 | 0.24 | 0.30 | 0.46 | 0.16 | 0.23 | 0.61 | 0.00092 | 0.00075 | 1.48 | 0.10 |
| Russia | 147558 | 143456 | 0.23 | 0.30 | 0.47 | 0.17 | 0.28 | 0.56 | 0.00095 | 0.00252 | 1.70 | 0.00 |
| Saudi Arabia | 16327 | 31557 | 0.42 | 0.37 | 0.22 | 0.26 | 0.34 | 0.40 | 0.00149 | 0.00078 | 2.72 | 0.10 |
| Senegal | 7556 | 15127 | 0.47 | 0.32 | 0.22 | 0.44 | 0.34 | 0.22 | 0.00514 | 0.00213 | 5.00 | 0.10 |
| Serbia | 9518 | 8850 | 0.24 | 0.29 | 0.47 | 0.16 | 0.26 | 0.58 | 0.00069 | 0.00061 | 1.59 | 0.10 |
| Slovakia | 5288 | 5426 | 0.25 | 0.31 | 0.44 | 0.15 | 0.28 | 0.57 | 0.00049 | 0.00066 | 1.39 | 0.10 |
| Slovenia | 2006 | 2068 | 0.21 | 0.31 | 0.49 | 0.15 | 0.23 | 0.62 | 0.00430 | 0.00081 | 1.58 | 0.10 |
| Spain | 39304 | 46122 | 0.20 | 0.32 | 0.48 | 0.15 | 0.21 | 0.64 | 0.00029 | 0.00035 | 1.33 | 0.10 |
| Sweden | 8567 | 9777 | 0.18 | 0.27 | 0.55 | 0.17 | 0.25 | 0.57 | 0.00024 | 0.00049 | 1.90 | 0.10 |
| Switzerland | 6675 | 8298 | 0.17 | 0.30 | 0.53 | 0.15 | 0.25 | 0.60 | 0.00033 | 0.00038 | 1.53 | 0.00 |
| Syria | 12446 | 18735 | 0.47 | 0.34 | 0.19 | 0.38 | 0.34 | 0.28 | 0.00356 | 0.00082 | 3.10 | 0.00 |
| Taiwan | 20312 | 23486 | 0.27 | 0.37 | 0.36 | 0.14 | 0.28 | 0.58 | 0.00043 | 0.00069 | 1.11 | 0.00 |
| Tajikistan | 5283 | 8483 | 0.44 | 0.33 | 0.23 | 0.35 | 0.37 | 0.28 | 0.00481 | 0.00101 | 3.50 | 0.10 |
| Tanzania | 25460 | 53471 | 0.46 | 0.33 | 0.21 | 0.45 | 0.33 | 0.22 | 0.00521 | 0.00315 | 5.24 | 2.30 |
| Thailand | 56582 | 67959 | 0.30 | 0.38 | 0.31 | 0.18 | 0.27 | 0.55 | 0.00130 | 0.00188 | 1.53 | 0.20 |
| Tunisia | 8233 | 11274 | 0.37 | 0.35 | 0.28 | 0.24 | 0.33 | 0.43 | 0.00172 | 0.00059 | 2.25 | 0.10 |
| Turkey | 53921 | 78271 | 0.36 | 0.35 | 0.30 | 0.26 | 0.33 | 0.42 | 0.00178 | 0.00125 | 2.12 | 0.00 |
| Turkmenistan | 3684 | 5563 | 0.41 | 0.36 | 0.24 | 0.30 | 0.36 | 0.34 | 0.00484 | 0.00151 | 3.00 | 0.00 |
| UK | 57179 | 64714 | 0.19 | 0.30 | 0.51 | 0.18 | 0.26 | 0.56 | 0.00056 | 0.00129 | 1.88 | 0.00 |
| Ukraine | 51462 | 44822 | 0.21 | 0.28 | 0.50 | 0.15 | 0.27 | 0.58 | 0.00069 | 0.00069 | 1.49 | 0.60 |
| Uruguay | 3110 | 3433 | 0.26 | 0.30 | 0.44 | 0.21 | 0.29 | 0.50 | 0.00109 | 0.00081 | 2.04 | 0.10 |
| USA | 252500 | 321774 | 0.22 | 0.32 | 0.46 | 0.19 | 0.27 | 0.54 | 0.00055 | 0.00083 | 1.88 | 0.00 |
| Uzbekistan | 20461 | 29892 | 0.41 | 0.35 | 0.24 | 0.29 | 0.37 | 0.34 | 0.00469 | 0.00133 | 2.38 | 0.00 |
| Viet Nam | 68208 | 93448 | 0.37 | 0.36 | 0.26 | 0.23 | 0.35 | 0.42 | 0.00207 | 0.00116 | 1.96 | 0.10 |

**Data quality**

Supplementary table 8 shows the data estimates for the HCV prevalence among the general population and PWID, and the estimates for the population proportion of PWID among adults. Also presented in supplementary table 8 are the estimate source, year, and the data grades taken from the literature. These data grades were available from Blach et al 2017, Gower et al 2014, Degenhardt et al 2017, Grebely et al 2018, and Mathers et al 2008[1,14,15,20,65]. The Blach and Gower papers used the same system to produce a grade for data quality, whilst the Degenhardt and Grebely papers used the same system as each other, and the Mathers paper used a similar system. These grading systems are described below briefly; the original papers describe them in more detail.

For HCV prevalence among the general population, Blach et al 2017 and Gower et al 2014 initially scored studies on a scale of 0-10, based on a combined score of generalizability, sample size, and year of the analysis. The generalizability score (0-10) was assigned based on geographic scope and the population type. The sample size score (0-10) was the log of the sample size, capped at 10. The analysis year score was given as 6 for 2000-3, 8 for 2004-10, and 10 for those after 2010. The overall score was calculated as the sum of 0.6 multiplied by the generalizability score, 0.2 multiplied by the sample size score, and 0.2 multiplied by the year score. The 0-10 overall scores were then converted to produce a data quality scale of (lowest to highest) 1-3; where 0.0<4.0 became a score of 1, 4.0<8.0 became 2, and 8.0<10.0 became 3. Modelling studies were scored as 2, whilst studies without a formal assessment were given a score of 1.

For HCV prevalence among PWID, Degenhardt et al 2017 and Grebely et al 2018 assigned a grade from U to A (lowest to highest: U, D2, D1, C, B2, B1, A). Estimates were graded as follows: U – estimate with methodology unknown; D2 – self-report; D1 – registration or notification data; C – single-site seroprevalence study with one sample type (eg. treatment or outreach sample); B2 – single-site seroprevalence study with multiple sample types; B1 – multi-site seroprevalence study with one sample type; A – multi-site seroprevalence study with at least two sample types.

For data on the population proportion of PWID among adults, the Degenhardt and Grebely papers graded estimates (lowest to highest: D2, D1, C, B, A3, A2, A1) as follows: D2 – other estimates with unknown methodology; D1 – official government estimate with methodology unknown; C – expert judgement with method by which estimate was obtained known; Delphi method or other consensus estimate; government registrations of drug users; B – general population household survey; A3 – network scale-up method; A2 – indirect prevalence estimation methods; A1 – multi-parameter evidence synthesis. Mathers et al 2008, used the same method but for the estimate grade but grouped A3, A2, and A1 together as A.

For general population HCV prevalence, 14 (16%) country estimates were scored as 3, 34 (39%) were scored 2, and 28 (32%) were scored 1, whilst 12 (14%) country estimates did not come from reviews with scores. For PWID HCV prevalence estimates, 22 (25%) had at least one estimate of A (eg. if they were scored “A; B1” then A was taken), 48 (55%) had a grade of B (47 B1), and 16 (18%) were graded C or lower, whilst 2 (2%) countries did not have scores. For the proportion of the population that are PWID, 49 (56%) of country estimates were graded A, 5 (6%) were given B, and 14 (16%) were given a grade of C or lower. There were 14 (23%) countries that did not have graded estimates. Most ungraded estimates are from reviews with less clear methodology so would likely receive low scores.

**Supplementary table 8:** Country-level sampled ranges for antibody prevalence of HCV among the general population and people who inject drugs (PWID), as well as the population proportion of PWID among adults, and the estimate source, year, and grades, where available. Countries listed in green have moderate to good quality data estimates for all of the prevalence of HCV among the general population (graded as 2 or above), the prevalence of HCV among PWID (graded as B or above) and the population proportion of adults that are PWID (graded as B or above), whilst countries listed in orange have two of these estimates graded as moderate to good quality, and countries listed in red have one or less. Sources are given in the footnote.

| | Prevalence of HCV among general population | | | | Prevalence of HCV among PWID | | | | Population proportion of PWID | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Estimate (Estimate range) | Year | Grade | Source | Estimate (Estimate range) | Year | Grade | Source | Estimate (Estimate range) | Year | Grade | Source |
| Afghanistan | 1.10% (0.40%, 1.92%) | 2007 | 2 | 1 | 37.8% (27.5%, 48.1%) | 2012 | A; B1; C | 6 | 0.80% (0.50%, 1.09%) | 2012 | A2 | 6 |
| Albania | 3.00% (2.01%, 3.99%) | 2008 | NA | 2 | 34.0% (27.5%, 41.0%) | 2011 | B1 | 6 | 0.42% (0.28%, 0.56%) | 2008 | NA | 2 |
| Argentina | 1.50% (0.32%, 2.00%) | 2007 | 1 | 1 | 54.6% (51.1%, 58.1%) | 2001 | B1 | 6 | 0.29% (0.29%, 0.30%) | 1999 | D1 | 6 |
| Armenia | 4.00% (2.68%, 5.32%) | 2010 | NA | 3 | 42.7% (29.3%, 56.1%) | 2012 | B1 | 6 | 0.62% (0.41%, 1.35%) | 2010 | A2 | 6 |
| Australia | 1.30% (1.20%, 1.85%) | 2012 | 2 | 1 | 53.5% (50.2%, 56.9%) | 2014 | B1 | 6 | 0.60% (0.43%, 0.76%) | 2016 | A | 6 |
| Austria | 0.50% (0.10%, 0.70%) | 2008 | 1 | 1 | 60.9% (54.8%, 67.0%) | 2012 | A; B1: C | 6 | 0.32% (0.22%, 0.42%) | 2000 | A | 6 |
| Azerbaijan | 3.70% (2.48%, 4.92%) | 2010 | 2 | 1 | 62.1% (47.1%, 77.2%) | 2012 | B2 | 6 | 0.61% (0.49%, 0.74%) | 2011 | A2 | 6 |
| Bangladesh | 1.26% (0.20%, 2.23%) | 2010 | 1 | 4 | 33.9% (22.4%, 45.4%) | 2013 | A; C | 6 | 0.07% (0.06%, 0.07%) | 2016 | A2 | 6 |
| Belarus | 1.26% (0.86%, 2.85%) | 2006 | 1 | 4 | 58.3% (43.3%, 73.3%) | 2015 | B1 | 6 | 0.59% (0.22%, 0.96%) | 2015 | A2 | 6 |
| Belgium | 0.87% (0.12%, 1.10%) | 1994 | 1 | 1 | 58.4% (47.0%, 69.7%) | 2014 | B1; C | 6 | 0.35% (0.24%, 0.49%) | 2014 | A2 | 6 |
| Bosnia | 0.10% (0.07%, 0.13%) | 2008 | NA | 2 | 39.9% (27.5%, 52.4%) | 2014 | B1; C | 6 | 0.17% (0.11%, 0.23%) | 2008 | NA | 2 |
| Brazil | 1.38% (1.12%, 1.64%) | 2007 | 3 | 1 | 63.9% (60.5%, 67.3%) | 2001 | B1 | 6 | 0.67% (0.51%, 0.87%) | 2003 | D1 | 6 |
| Bulgaria | 1.50% (0.70%, 2.43%) | 2012 | 1 | 1 | 68.7% (64.3%, 73.0%) | 2014 | A | 6 | 0.38% (0.30%, 0.45%) | 2005 | A | 6 |
| Canada | 0.96% (0.61%, 1.34%) | 2011 | 2 | 1 | 70.6% (60.1%, 93.9%) | 2014 | A; B1 | 6 | 0.39% (0.31%, 0.47%) | 2004 | B | 9 |
| China | 1.21% (0.93%, 1.49%) | 2015 | 2 | 1 | 43.1% (27.5%, 58.6%) | 2015 | A; B1; C | 6 | 0.25% (0.19%, 0.31%) | 2005 | A | 6 |
| Croatia | 0.90% (0.50%, 1.40%) | 2011 | 2 | 1 | 36.7% (28.1%, 45.3%) | 2015 | B1 | 6 | 0.23% (0.18%, 0.29%) | 2015 | A2 | 6 |
| Cyprus | 0.56% (0.45%, 1.87%) | 2001 | 1 | 4 | 49.7% (44.4%, 55.0%) | 2014 | A; B1 | 6 | 0.08% (0.04%, 0.12%) | 2014 | A2 | 6 |
| Czech Republic | 0.57% (0.20%, 0.70%) | 2012 | 1 | 1 | 18.3% (14.5%, 22.1%) | 2015 | B1 | 6 | 0.64% (0.61%, 0.67%) | 2014 | A2 | 6 |
| Denmark | 0.63% (0.48%, 0.72%) | 2007 | 2 | 1 | 42.6% (36.1%, 49.1%) | 2011 | B1 | 6 | 0.45% (0.35%, 0.52%) | 2009 | A2 | 6 |
| Egypt | 10.00% (9.50%, 10.50%) | 2015 | 3 | 13 | 49.4% (35.8%, 63.0%) | 1995 | C | 6 | 0.21% (0.13%, 0.28%) | 2005 | NA | 10 |
| Estonia | 1.97% (1.50%, 2.00%) | 2013 | 1 | 1 | 79.2% (67.4%, 91.0%) | 2014 | B1; C | 6 | 0.94% (0.69%, 1.73%) | 2009 | A2 | 6 |
| Finland | 0.68% (0.60%, 0.90%) | 2013 | 1 | 4 | 73.7% (69.9%, 77.2%) | 2014 | B1 | 6 | 0.46% (0.41%, 0.67%) | 2012 | D2 | 6 |
| France | 0.84% (0.45%, 1.10%) | 2004 | 3 | 14 | 64.0% (60.8%, 67.0%) | 2011 | A | 6 | 0.20% (0.16%, 0.23%) | 2011 | D2 | 6 |

| Country | Prevalence of HCV among general population | | | | Prevalence of HCV among PWID | | | | Population proportion of PWID | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimate (Estimate range) | Year | Grade | Source | Estimate (Estimate range) | Year | Grade | Source | Estimate (Estimate range) | Year | Grade | Source |
| FYROM | 0.50% (0.34%, 0.67%) | 2008 | NA | 2 | 62.2% (59.4%, 64.9%) | 2013 | B1 | 6 | 0.16% (0.11%, 0.21%) | 2008 | NA | 2 |
| Georgia | 5.40% (4.51%, 6.32%) | 2015 | 3 | 17 | 69.1% (58.0%, 80.2%) | 2015 | B1; C | 6 | 4.19% (0.48%, 7.90%) | 2004 | C | 1 |
| Germany | 0.58% (0.30%, 0.90%) | 2012 | 1 | 1 | 65.0% (60.6%, 69.4%) | 2014 | B1 | 6 | 0.24% (0.03%, 0.45%) | 2000 | A | 6 |
| Ghana | 2.10% (1.20%, 5.50%) | 2014 | 2 | 1 | 40.1% (34.8%, 45.4%) | 2005 | B1 | 6 | 0.05% (0.03%, 0.07%) | 2008 | NA | 11 |
| Greece | 1.79% (0.50%, 2.61%) | 2011 | 3 | 1 | 65.7% (61.8%, 69.5%) | 2014 | A | 6 | 0.07% (0.06%, 0.09%) | 2014 | A2 | 6 |
| Hungary | 0.70% (0.40%, 2.70%) | 2014 | 1 | 1 | 46.4% (30.4%, 62.8%) | 2015 | A | 6 | 0.06% (0.03%, 0.08%) | 2005 | A | 6 |
| Iceland | 0.41% (0.33%, 0.48%) | 2013 | 2 | 1 | 63.0% (59.8%, 66.2%) | 1993 | C | 6 | 0.24% (0.16%, 0.32%) | 2008 | NA | 2 |
| India | 0.84% (0.50%, 1.50%) | 2013 | 1 | 1 | 40.0% (33.9%, 46.1%) | 2015 | B1; C | 6 | 0.02% (0.01%, 0.03%) | 2006 | A | 6 |
| Indonesia | 0.80% (0.10%, 1.70%) | 2007 | 3 | 1 | 89.2% (85.3%, 92.3%) | 2015 | C | 6 | 0.11% (0.09%, 0.13%) | 2012 | A2 | 6 |
| Iran | 0.50% (0.20%, 1.00%) | 2006 | 2 | 1 | 44.1% (28.2%, 59.9%) | 2014 | C; B1; A | 6 | 0.28% (0.19%, 0.37%) | 2013 | A3 | 6 |
| Ireland | 0.70% (0.67%, 1.60%) | 2010 | 2 | 1 | 74.6% (72.3%, 76.9%) | 2003 | C | 6 | 0.27% (0.20%, 0.33%) | 1996 | A | 6 |
| Israel | 1.96% (0.90%, 2.10%) | 2006 | 2 | 1 | 45.3% (38.1%, 52.6%) | 2010 | C | 6 | 0.41% (0.27%, 0.55%) | 2008 | NA | 2 |
| Italy | 2.43% (1.60%, 7.30%) | 2001 | 1 | 1 | 57.9% (52.5%, 63.3%) | 2014 | B1; C | 6 | 0.83% (0.57%, 1.14%) | 1996 | A | 6 |
| Japan | 0.98% (0.49%, 2.20%) | 2011 | 2 | 1 | 64.8% (55.0%, 74.5%) | 1994 | C | 6 | 0.47% (0.36%, 0.58%) | 2004 | D1 | 6 |
| Kazakhstan | 3.20% (1.30%, 4.26%) | 2010 | 2 | 1 | 58.8% (54.0%, 63.6%) | 2005 | C | 6 | 0.96% (0.64%, 1.42%) | 2006 | A | 6 |
| Kenya | 0.76% (0.20%, 1.01%) | 2007 | 2 | 1 | 16.4% (10.9%, 23.3%) | 2013 | C | 6 | 0.12% (0.03%, 0.20%) | 2012 | A2 | 6 |
| Kyrgyzstan | 2.45% (1.60%, 6.70%) | 2010 | 1 | 4 | 43.9% (40.6%, 47.2%) | 2013 | B1 | 6 | 0.74% (0.50%, 1.11%) | 2006 | A | 6 |
| Latvia | 2.40% (1.70%, 3.30%) | 2008 | 2 | 1 | 74.4% (67.6%, 81.2%) | 2014 | B1 | 6 | 0.92% (0.73%, 1.17%) | 2012 | A2 | 6 |
| Lebanon | 0.21% (0.11%, 0.70%) | 2011 | 2 | 1 | 23.4% (15.3%, 33.3%) | 2013 | C | 6 | 0.14% (0.09%, 0.19%) | 2005 | NA | 10 |
| Libya | 1.20% (1.10%, 1.30%) | 2005 | 3 | 1 | 94.5% (91.5%, 96.7%) | 2010 | B1 | 6 | 0.05% (0.01%, 0.10%) | 2001 | C | 6 |
| Lithuania | 1.96% (1.21%, 2.71%) | 2010 | 2 | 1 | 41.1% (38.1%, 44.2%) | 2014 | B1; C | 6 | 0.22% (0.12%, 0.34%) | 2006 | C | 6 |
| Luxembourg | 1.34% (0.56%, 1.61%) | 2006 | 1 | 1 | 81.3% (76.2%, 85.8%) | 2005 | A | 6 | 0.57% (0.45%, 0.69%) | 2009 | A1 | 6 |
| Madagascar | 1.20% (0.75%, 1.72%) | 2004 | 2 | 1 | 5.5% (2.1%, 9.0%) | 2012 | B1 | 6 | 0.12% (0.02%, 0.59%) | 2014 | A2 | 6 |
| Malaysia | 1.90% (0.30%, 7.70%) | 2011 | 2 | 1 | 67.1% (62.9%, 71.1%) | 2007 | B1 | 6 | 1.33% (1.11%, 1.56%) | 2002 | C | 6 |
| Malta | 0.36% (0.26%, 0.60%) | 2010 | 1 | 1 | 25.2% (13.1%, 37.3%) | 2014 | A | 6 | 0.26% (0.17%, 0.35%) | 2008 | NA | 2 |
| Mauritius | 2.10% (1.41%, 2.79%) | 2010 | NA | 3 | 97.1% (96.0%, 98.1%) | 2011 | B1 | 6 | 0.78% (0.39%, 1.54%) | 2014 | B1 | 6 |
| Mexico | 1.40% (1.10%, 1.60%) | 2000 | 3 | 1 | 95.3% (93.3%, 97.3%) | 2005 | A | 6 | 0.18% (0.12%, 0.25%) | 2011 | B | 6 |
| Moldova | 4.46% (2.30%, 4.46%) | 2010 | 1 | 4 | 50.1% (34.1%, 66.1%) | 2013 | B2 | 6 | 0.40% (0.25%, 0.54%) | 2008 | A3 | 6 |

| Country | Prevalence of HCV among general population | | | | Prevalence of HCV among PWID | | | | Population proportion of PWID | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimate (Estimate range) | Year | Grade | Source | Estimate (Estimate range) | Year | Grade | Source | Estimate (Estimate range) | Year | Grade | Source |
| Montenegro | 1.20% (0.80%, 1.60%) | 2008 | NA | 2 | 43.4% (39.8%, 47.1%) | 2008 | B1 | 6 | 0.40% (0.27%, 0.53%) | 2008 | NA | 2 |
| Morocco | 1.20% (1.10%, 1.93%) | 2008 | 2 | 1 | 53.9% (33.7%, 74.0%) | 2013 | B1 | 6 | 0.13% (0.07%, 0.20%) | 2013 | A2; B | 6 |
| Mozambique | 1.30% (0.10%, 6.90%) | 2011 | NA | 5 | 67.1% (62.9%, 71.2%) | 2014 | B1 | 6 | 0.20% (0.00%, 0.41%) | 2014 | A1; A2 | 6 |
| Myanmar | 1.69% (0.95%, 2.66%) | 2009 | 1 | 4 | 29.5% (26.9%, 32.2%) | 2010 | B1; C | 6 | 0.48% (0.32%, 0.65%) | 2014 | A2 | 6 |
| Nepal | 0.64% (0.43%, 0.85%) | 2010 | NA | 3 | 44.5% (30.8%, 58.2%) | 2015 | B1 | 6 | 0.20% (0.19%, 0.21%) | 2011 | A2 | 6 |
| Netherlands | 0.22% (0.07%, 0.37%) | 2009 | 2 | 1 | 55.3% (49.7%, 60.9%) | 2014 | A; B1 | 6 | 0.03% (0.02%, 0.04%) | 2001 | A | 6 |
| New Zealand | 1.43% (0.81%, 2.15%) | 2013 | 1 | 1 | 71.9% (63.2%, 80.6%) | 2015 | B1 | 6 | 0.73% (0.49%, 0.97%) | 2006 | B | 6 |
| Nigeria | 2.20% (2.10%, 2.50%) | 2012 | 2 | 1 | 5.8% (3.5%, 8.9%) | 2010 | C | 6 | 0.35% (0.23%, 0.47%) | 2008 | NA | 11 |
| Norway | 0.55% (0.45%, 0.70%) | 2012 | 1 | 1 | 64.8% (60.4%, 69.1%) | 2012 | A | 6 | 0.24% (0.21%, 0.29%) | 2013 | A2 | 6 |
| Pakistan | 4.80% (4.70%, 5.10%) | 2008 | 3 | 1 | 36.5% (5.1%, 79.1%) | 2013 | C; B1; A | 6 | 0.37% (0.32%, 0.42%) | 2011 | A3 | 6 |
| Philippines | 0.94% (0.33%, 2.00%) | 2003 | 2 | 1 | 35.2% (15.9%, 54.5%) | 2011 | B1 | 6 | 0.04% (0.03%, 0.05%) | 2011 | C | 6 |
| Poland | 0.86% (0.59%, 1.14%) | 2009 | 2 | 1 | 58.7% (55.1%, 66.2%) | 2005 | A | 6 | 0.27% (0.18%, 0.36%) | 2008 | NA | 2 |
| Portugal | 1.50% (0.47%, 2.87%) | 1995 | 1 | 1 | 87.7% (80.5%, 95.0%) | 2016 | B1 | 6 | 0.22% (0.19%, 0.25%) | 2012 | D2 | 6 |
| Romania | 3.23% (2.94%, 3.55%) | 2007 | 3 | 1 | 83.8% (80.6%, 87.1%) | 2009 | B1; C | 6 | 0.62% (0.46%, 0.84%) | 2014 | A2 | 6 |
| Russia | 4.10% (1.16%, 5.60%) | 2010 | 2 | 1 | 68.7% (59.6%, 77.9%) | 2012 | B1; B2 | 6 | 1.78% (0.94%, 2.71%) | 2007 | D1 | 6 |
| Saudi Arabia | 0.51% (0.41%, 0.61%) | 2011 | 1 | 1 | 77.8% (73.2%, 81.9%) | 2012 | C | 6 | 0.20% (0.13%, 0.27%) | 2005 | NA | 10 |
| Senegal | 1.00% (0.00%, 4.60%) | 2009 | NA | 5 | 39.3% (31.1%, 47.9%) | 2011 | B1 | 6 | 0.08% (0.05%, 0.11%) | 2008 | NA | 11 |
| Serbia | 0.50% (0.34%, 0.67%) | 2008 | NA | 2 | 25.9% (22.1%, 29.7%) | 2014 | B1 | 6 | 0.49% (0.41%, 0.58%) | 2016 | A2 | 6 |
| Slovakia | 1.40% (0.88%, 1.98%) | 2011 | 3 | 1 | 56.1% (35.6%, 76.7%) | 2014 | B1; C | 6 | 0.49% (0.35%, 0.89%) | 2006 | A | 6 |
| Slovenia | 0.40% (0.30%, 0.50%) | 2015 | 1 | 1 | 30.5% (26.4%, 34.5%) | 2014 | B1 | 6 | 0.42% (0.30%, 0.55%) | 2012 | C | 6 |
| Spain | 1.50% (0.40%, 2.64%) | 2012 | 2 | 1 | 71.0% (69.5%, 72.5%) | 2012 | B1 | 6 | 0.08% (0.05%, 0.10%) | 2011 | NA | 16 |
| Sweden | 0.56% (0.47%, 0.69%) | 2012 | 2 | 1 | 81.7% (79.6%, 83.6%) | 2014 | C | 6 | 0.13% (0.03%, 0.62%) | 2011 | A2 | 6 |
| Switzerland | 1.55% (0.80%, 1.75%) | 1998 | 2 | 1 | 74.6% (69.3%, 79.4%) | 2014 | B1 | 6 | 0.24% (0.19%, 0.29%) | 2006 | A2 | 6 |
| Syria | 2.80% (0.60%, 3.72%) | 2004 | 3 | 1 | 60.5% (40.5%, 80.5%) | 1999 | C | 7 | 0.07% (0.04%, 0.09%) | 2005 | NA | 10 |
| Taiwan | 3.28% (2.50%, 8.60%) | 2000 | 2 | 1 | 91.0% (89.5%, 92.4%) | 2011 | C | 6 | 0.30% (0.20%, 0.40%) | 2005 | NA | 8 |
| Tajikistan | 3.06% (1.10%, 6.70%) | 2010 | 1 | 4 | 61.3% (56.8%, 65.6%) | 2004 | B1 | 6 | 0.45% (0.30%, 0.66%) | 2006 | A | 6 |
| Tanzania | 2.70% (0.20%, 7.80%) | 2013 | NA | 5 | 27.7% (22.4%, 33.5%) | 2011 | A | 6 | 1.24% (0.72%, 1.76%) | 2012 | A2 | 6 |
| Thailand | 0.94% (0.75%, 3.66%) | 2014 | 2 | 1 | 88.5% (82.6%, 92.9%) | 2005 | C | 6 | 0.11% (0.03%, 0.18%) | 2013 | A3 | 6 |

| Country | Prevalence of HCV among general population | | | | Prevalence of HCV among PWID | | | | Population proportion of PWID | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimate (Estimate range) | Year | Grade | Source | Estimate (Estimate range) | Year | Grade | Source | Estimate (Estimate range) | Year | Grade | Source |
| Tunisia | 1.27% (0.20%, 1.70%) | 1996 | 2 | 1 | 29.1% (25.7%, 32.6%) | 2009 | B1 | 6 | 0.21% (0.14%, 0.29%) | 2005 | NA | 10 |
| Turkey | 0.95% (0.60%, 2.10%) | 2009 | 3 | 1 | 44.9% (41.7%, 48.2%) | 2015 | B1 | 6 | 0.42% (0.28%, 0.56%) | 2008 | NA | 2 |
| Turkmenistan | 5.55% (1.10%, 6.70%) | 2010 | 1 | 4 | 60.6% (46.2%, 75.0%) | 2005 | NA | 8 | 0.40% (0.27%, 0.53%) | 2008 | NA | 2 |
| UK | 0.50% (0.40%, 0.75%) | 2005 | 2 | 1 | 46.0% (36.8%, 55.2%) | 2008 | NA | 2 | 0.39% (0.38%, 0.42%) | 2005 | A | 12 |
| Ukraine | 3.58% (0.86%, 4.46%) | 2010 | 1 | 4 | 53.9% (49.2%, 58.7%) | 2015 | B1 | 6 | 0.97% (0.52%, 1.79%) | 2012 | A2 | 6 |
| Uruguay | 1.00% (0.67%, 1.33%) | 2010 | NA | 3 | 21.9% (19.0%, 24.8%) | 2003 | C | 6 | 0.30% (0.10%, 0.87%) | 2007 | B | 6 |
| USA | 1.30% (1.20%, 1.50%) | 2007 | 3 | 15 | 53.1% (38.1%, 68.0%) | 2016 | C; B2; A | 6 | 1.40% (0.57%, 1.88%) | 2007 | A2 | 6 |
| Uzbekistan | 13.10% (6.40%, 13.11%) | 2000 | 2 | 1 | 51.7% (46.8%, 56.6%) | 2001 | A | 6 | 0.47% (0.32%, 0.70%) | 2006 | A | 6 |
| Viet Nam | 1.49% (1.20%, 2.00%) | 2012 | 1 | 1 | 58.3% (42.7%, 74.0%) | 2014 | A; B1 | 6 | 0.25% (0.19%, 0.31%) | 2005 | D1 | 6 |

Prevalence ranges are taken from the literature, and where they were not available ranges of ±33% are used.

1: Blach (Polaris HCV). Global prevalence and genotype distribution of hepatitis C virus infection in 2015: a modelling study.[14]

2: Hope et al. Prevalence and estimation of hepatitis B and C infections in the WHO European Region: a review of data focusing on the countries outside the European Union and the European Free Trade Association.[16]

3: Lavanchy. Evolving epidemiology of hepatitis C virus.[18]

4: Gower et al. Global epidemiology and genotype distribution of the hepatitis C virus infection.[15]

5: Riou et al. Hepatitis C virus seroprevalence in adults in Africa: a systematic review and meta-analysis.[15]

6: Degenhardt et al. Global prevalence and genotype distribution of hepatitis C virus infection in 2015: a modelling study.[1]

7: Nelson et al. Global epidemiology of hepatitis B and hepatitis C in people who inject drugs: results of systematic reviews.[23]

8: Aceijas, Rhodes. Global estimates of prevalence of HCV infection among injecting drug users.[19]

9: Grebely et al. Global, regional, and country-level estimates of hepatitis C infection among people who have recently injected drugs.[65]

10: Mumtaz et al. HIV among People Who Inject Drugs in the Middle East and North Africa: Systematic Review and Data Synthesis.[22]

11: Reid. Injection drug use, unsafe medical injections, and HIV in Africa: a systematic review.[21]

12: Mathers et al. Global epidemiology of injecting drug use and HIV among people who inject drugs: a systematic review.[20]

13: Kandeel. The prevalence of hepatitis C virus infection in Egypt 2015.[53]

14: Meffre et al. Prevalence of hepatitis B and hepatitis C virus infections in France in 2004.[55]

15: Denniston et al. Chronic hepatitis C virus infection in the United States, National Health and Nutrition Examination Survey 2003 to 2010.[57]

16: EMCDDA. Indicador Admisiones a tratamiento por consume de sustancias psicoactivas 1987-2011.[62] [17]National Progress Towards Hepatitis C Elimination – Georgia, 2015-2016.[64]

**Historical treatment numbers**

Historical annual treatment numbers were included, where available, for the years 2004 to 2017. Data from the Centre for Disease Analysis (CDA) covering 2004-2016 were used for China and Taiwan and the 2016 estimates were extended to 2017[66]. Treatment numbers for 2014-2017 were also taken from WHO access to treatment reports where available[10,67]. The data underlying a paper by Hill et al on the treatment numbers for 2015-2017 were also made available to us[68]. To obtain the treatment numbers for the years prior to this, firstly data were taken from the series of Journal of Viral Hepatitis papers on the Historical Epidemiology of hepatitis C virus in selected countries[69-72]. Estimates from these papers were available for one year. For the 48 countries that had estimates from these papers, the estimates of treatment numbers (e.g. for 2011) were extended to cover the time span of 2004-2017 (where data were not available for the later years). 2004 was chosen as the earliest year of treatment to coincide with the earliest estimates available from the CDA.

To improve the treatment number estimates, the Journal of Viral Hepatitis series estimates that had been extended to cover multiple years were then overwritten if other information was available. For each country in the model two Google searches were performed (Google was chosen over Pubmed or Web of Science to give a broader range of source types), the first with the words "HCV treated DAA" and the country name, and the second with "hepatitis c treatment" and the country name. Estimates were produced if there was evidence of treatment in the countries not included in the Journal of Viral Hepatitis series. Multiple sources could be used for each country to cover the different years. Sources could include government treatment databases, news briefings, published papers, posters, presentations, reports, and white papers. For some posters and presentations visual estimates had to be made as the exact figures were not available. More information on the sources of information for annual treatment numbers are available in supplementary table 9 below.

For some countries, there were no available estimates for different years except for the one-year estimate from the Journal of Viral Hepatitis series that had been extended backwards or forwards from another year. In these instances, any previous estimate (from any of the sources listed in the paragraph above) not from the Journal of Viral Hepatitis series was carried forward across subsequent years or any later estimate was carried backwards, whichever number was lower. For example, Finland had an estimate of 100 annual treatments in 2004[73], and 200 in 2010[73] so 100 was used for 2005-2009 and 200 from 2010 onwards. Another example is Belgium, which had an estimate of 900 annual treatments in 2004[73] and 710 in 2010[69,73,74], so 710 was used for 2005-2009 and was also carried forwards until 2014, as an updated estimate of 1300 was available in 2015[75]. More generally, 2016 estimates were extended to 2017 if no other information was available.

Absolute treatment numbers are converted to rates to be input into the model by dividing with the total number of infected individuals as the denominator. Although these treatment numbers are not varied, the treatment rates vary due to changes in other parameters. Due to a lack of information for treatment numbers in particular subgroups, eg. PWID or those with cirrhosis, treatment was spread throughout different subgroups proportional to the number of infections in each group. However, this assumption was investigated in a sensitivity analysis where the treatment rates among PWID were halved and among people with cirrhosis were doubled, see supplementary table 11.

Note, some of these country-level treatment numbers are already high, eg. 600,000 in Egypt, 15,400 in Georgia, 43,000 for Italy, and 29,700 for Spain for 2017[76]. In such countries, these modelled treatment numbers result in the HCV epidemic decreasing rapidly over the next 10 to 15 years with the WHO elimination targets for incidence being reached over the modelled time period.

**Supplementary table 9:** Historical HCV treatment numbers 2004-2017, for each country modelled

| | Treatments per year | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Country** | **2004** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** | **2017** | **Sources** |
| Afghanistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 10 | 10 | [68] |
| Albania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 117 | 117 | 117 | 48 | 48 | [77] |
| Argentina | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 350 | 200 | 1204 | 1204 | [68,70,78] |
| Armenia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Australia | 2245 | 2134 | 3215 | 3800 | 3650 | 3800 | 3750 | 3050 | 2726 | 3540 | 2800 | 7300 | 40000 | 30000 | [67,68,79] |
| Austria | 1200 | 1100 | 1100 | 1100 | 1100 | 1100 | 1100 | 1100 | 1100 | 1100 | 1100 | 2000 | 1500 | 1500 | [68,69,73,75] |
| Azerbaijan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 210 | 210 | 210 | [68] |
| Bangladesh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Belarus | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Belgium | 900 | 710 | 710 | 710 | 710 | 710 | 710 | 710 | 710 | 710 | 710 | 1300 | 1080 | 1080 | [68,69,73-75] |
| Bosnia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Brazil | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 11700 | 7500 | 7500 | 7500 | 7500 | 41000 | 45016 | [67-69,80] |
| Bulgaria | 346 | 346 | 346 | 346 | 346 | 346 | 346 | 400 | 380 | 377 | 549 | 611 | 350 | 350 | [68,81] |
| Canada | 4800 | 4800 | 4800 | 4800 | 4800 | 4800 | 4800 | 4800 | 4800 | 4800 | 4800 | 14200 | 9500 | 9500 | [68,69] |
| China | 5000 | 13636 | 22273 | 30909 | 39545 | 48182 | 56818 | 65455 | 74091 | 82727 | 91364 | 100000 | 100000 | 100000 | [66,68] |
| Croatia | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 150 | 150 | 150 | 150 | 150 | 150 | [68,72,75] |
| Cyprus | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 46 | 46 | 46 | [75] |
| Czechia | 800 | 800 | 800 | 800 | 800 | 800 | 900 | 880 | 880 | 880 | 880 | 880 | 910 | 910 | [68,69,73,75] |
| Denmark | 100 | 100 | 100 | 100 | 100 | 100 | 200 | 100 | 100 | 100 | 344 | 630 | 511 | 511 | [68,69,73,75,82] |
| Egypt | 0 | 0 | 0 | 65000 | 65000 | 65000 | 65000 | 65000 | 30000 | 30000 | 30000 | 170000 | 700000 | 600000 | [10,67,69,76,83] |
| Estonia | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 450 | 908 | 908 | [68,71,75] |
| Finland | 100 | 100 | 100 | 100 | 100 | 100 | 200 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | [68,70,73,75] |
| France | 14000 | 13287 | 13287 | 13287 | 12269 | 11332 | 9935 | 10325 | 12488 | 8382 | 11630 | 15189 | 16000 | 19300 | [9,73,76] |
| FYROM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 76 | 76 | [84] |
| Georgia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6000 | 21500 | 15400 | [76,85] |
| Germany | 8500 | 8500 | 8500 | 8500 | 8500 | 8500 | 9900 | 11667 | 11667 | 11667 | 7000 | 20100 | 13200 | 13000 | [73,86] |
| Ghana | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | [68,72] |

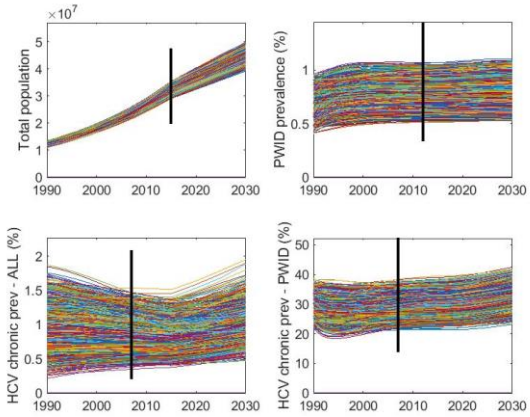
| Country | Treatments per year 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Sources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Greece | 1970 | 1970 | 1970 | 1970 | 1970 | 1970 | 3000 | 1970 | 1970 | 1970 | 1970 | 2100 | 900 | 1134 | 68,70,73,75,87 |
| Hungary | 600 | 600 | 600 | 600 | 600 | 600 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1477 | 1477 | 68,71,73,75 |
| Iceland | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 40 | 450 | 200 | 68,70,76 |
| India | 15000 | 15000 | 15000 | 15000 | 15000 | 15000 | 15000 | 15000 | 15000 | 15000 | 15000 | 42000 | 115000 | 115000 | 10,68,70 |
| Indonesia | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 600 | 600 | 68,71,88 |
| Iran | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 6000 | 6000 | 68,71 |
| Ireland | 100 | 100 | 100 | 100 | 100 | 100 | 200 | 400 | 400 | 400 | 400 | 840 | 840 | 840 | 68,70,73,75 |
| Israel | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 | 1500 | 1500 | 1500 | 68,70 |
| Italy | 22000 | 12500 | 12500 | 12500 | 12500 | 12500 | 12500 | 12500 | 12500 | 12500 | 12500 | 35000 | 30000 | 43000 | 73,76,89 |
| Japan | 26900 | 26900 | 26900 | 26900 | 26900 | 26900 | 26900 | 26900 | 26900 | 26900 | 26900 | 26900 | 87900 | 38000 | 68,71,76 |
| Kazakhstan | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1400 | 1400 | 1132 | 1750 | 68,72,90 |
| Kenya | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 68 |
| Kyrgyzstan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 100 | 91 |
| Latvia | 840 | 840 | 840 | 840 | 840 | 840 | 862 | 840 | 840 | 840 | 840 | 910 | 1071 | 1071 | 68,71,75,92 |
| Lebanon | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 325 | 325 | 68,71 |
| Libya | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 290 | 288 | 288 | 68 |
| Lithuania | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 890 | 550 | 936 | 1518 | 68,71,93 |
| Luxembourg | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 168 | 280 | 300 | 68,70,94 |
| Madagascar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 68 |
| Malaysia | 540 | 540 | 540 | 540 | 540 | 540 | 540 | 540 | 540 | 540 | 540 | 550 | 550 | 550 | 68,72 |
| Malta | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 70 | 70 | 68,75 |
| Mauritius | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Mexico | 3100 | 3100 | 3100 | 3100 | 3100 | 3100 | 3100 | 3100 | 3100 | 3100 | 3100 | 3800 | 480 | 480 | 68,70 |
| Moldova | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 300 | 300 | 300 | 90 |
| Montenegro | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Morocco | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 100 | 6500 | 8000 | 10,67,68 |
| Mozambique | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

| Country | Treatments per year 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Sources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Myanmar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2000 | 95 |
| Nepal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Netherlands | 900 | 900 | 900 | 900 | 900 | 900 | 1100 | 900 | 880 | 880 | 880 | 2000 | 2000 | 1200 | 70,73,75,76,96 |
| New Zealand | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 1100 | 1882 | 1882 | 68,70 |
| Nigeria | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 68,72 |
| Norway | 300 | 300 | 300 | 300 | 300 | 300 | 400 | 600 | 600 | 600 | 600 | 1100 | 1000 | 1000 | 68,70,73 |
| Pakistan | 0 | 23000 | 23000 | 23000 | 23000 | 23000 | 23000 | 55000 | 55000 | 55000 | 55000 | 65000 | 161000 | 161000 | 67,68,97 |
| Philippines | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 550 | 550 | 550 | 68 |
| Poland | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 2500 | 2100 | 2100 | 2100 | 2100 | 4000 | 5800 | 5800 | 68,70,73,75 |
| Portugal | 200 | 200 | 200 | 200 | 200 | 200 | 2000 | 1200 | 1200 | 1200 | 1200 | 5449 | 8248 | 4836 | 10,68,69,73,98 |
| Romania | 2500 | 2500 | 2500 | 2500 | 2500 | 2500 | 6000 | 4100 | 4100 | 4100 | 4100 | 3400 | 6000 | 8131 | 67,68,71,73,75 |
| Russia | 500 | 500 | 500 | 500 | 500 | 500 | 6000 | 5500 | 5500 | 5500 | 8800 | 5500 | 8792 | 5500 | 68,70,73,90,91 |
| Saudi Arabia | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 380 | 380 | 380 | 7500 | 2800 | 2800 | 68,71,99 |
| Senegal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Serbia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Slovakia | 200 | 200 | 200 | 200 | 200 | 200 | 500 | 300 | 300 | 300 | 300 | 350 | 316 | 316 | 68,70,73,75 |
| Slovenia | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 200 | 200 | 68,71,75 |
| Spain | 8000 | 8000 | 8000 | 8000 | 8000 | 8000 | 9800 | 9800 | 9800 | 9800 | 9800 | 38000 | 32000 | 29700 | 69,73,75,76 |
| Sweden | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 2000 | 1100 | 1100 | 1100 | 1130 | 2300 | 2500 | 2500 | 68,69,73,75,100 |
| Switzerland | 800 | 800 | 800 | 800 | 800 | 800 | 1100 | 1100 | 1100 | 1100 | 1100 | 1100 | 2300 | 3200 | 69,73,76 |
| Syria | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 10 | 68 |
| Taiwan | 3549 | 4154 | 4967 | 5567 | 5117 | 5490 | 13515 | 11262 | 10586 | 9000 | 8000 | 8000 | 4000 | 4000 | 66,68 |
| Tajikistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Tanzania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Thailand | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 920 | 3000 | 3000 | 68 |
| Tunisia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1000 | 1000 | 68 |
| Turkey | 4170 | 4170 | 4170 | 4170 | 4170 | 4170 | 4170 | 4170 | 4170 | 4170 | 4170 | 4170 | 194 | 194 | 68,101 |

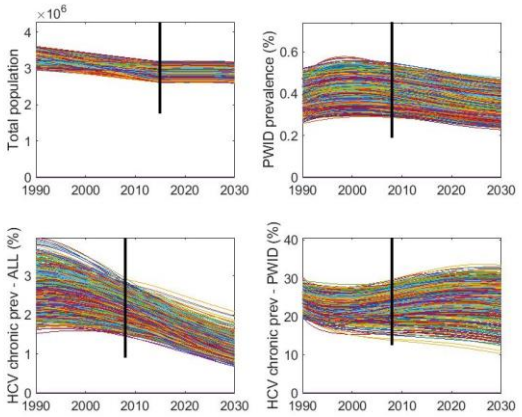
| Country | Treatments per year | | | | | | | | | | | | | | Sources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | |
| Turkmenistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| UK | 2500 | 2500 | 3000 | 4468 | 5091 | 5904 | 6449 | 6202 | 4000 | 4000 | 4000 | 9000 | 12000 | 14800 | 67,73,75,76,102 |
| Ukraine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1100 | 2000 | 2500 | 1750 | 67,68,90 |
| Uruguay | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| USA | 0 | 125000 | 105000 | 80000 | 75000 | 70000 | 60000 | 72500 | 57500 | 30000 | 140000 | 260000 | 231000 | 231000 | 68,103 |
| Uzbekistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1500 | 1500 | 1500 | 68 |
| Viet Nam | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4500 | 4500 | 10 |

**Supplementary figure 3:** Model runs showing time trends in the total population, the percentage of the adult population that are PWID, the prevalence of HCV amongst the general population, and the prevalence of HCV amongst PWID, for a) Afghanistan, Albania, Argentina (the first three countries in our analysis, alphabetically), and b) Egypt, France, and the USA (the three countries with two robust general population HCV surveys that were used for fitting). The black, vertical lines show the range of values that were fitted to.

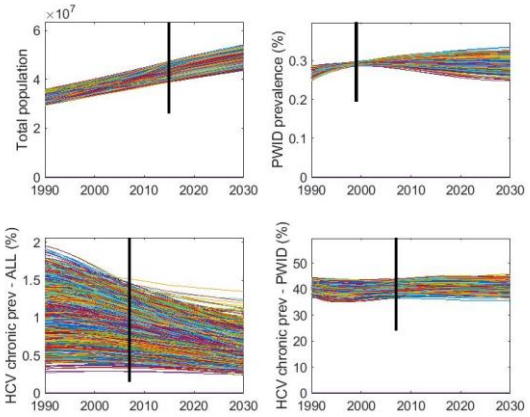
**Afghanistan***



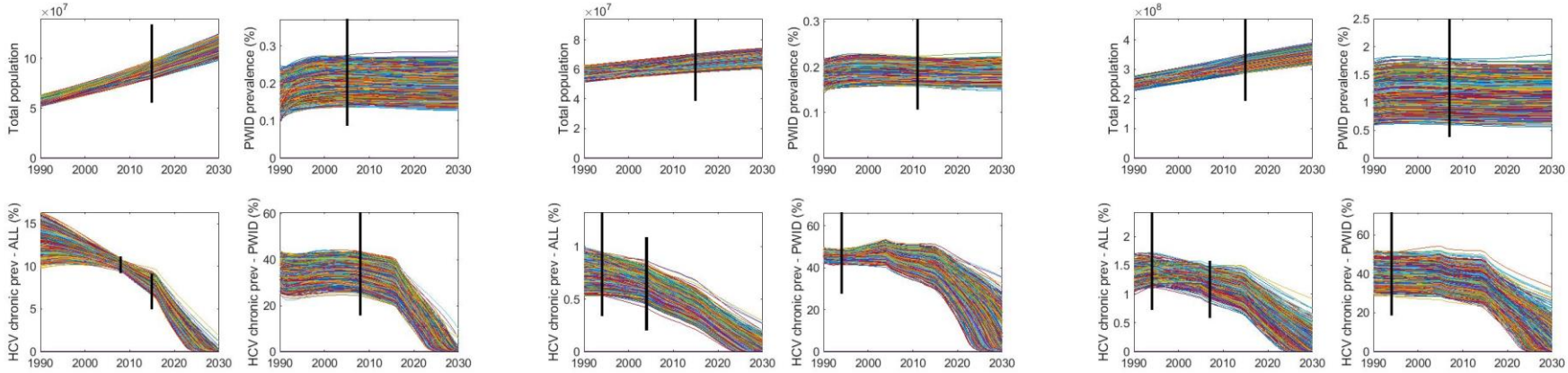

**Albania**




**Argentina**



**Egypt**** **France**** **USA****




*The HCV prevalence for many runs appears to curve upwards for runs that previously had decreasing prevalence as the transmission rates were fit for the population change for 1990 and 2015. The same transmission rates are then used from 2015 onwards, however, the UN projected population estimates often increase at a slower rate after 2015, meaning the same transmission rate causes an increase in prevalence. This also applies to other countries.

******The HCV prevalence among the general population and PWID reaches 0% for some runs in countries where treatment numbers are already high, such as Egypt, France, and the USA. This is because the model assumes these annual treatment numbers continue for future years. The model does not include diagnosis as a barrier to starting treatment as screening patterns are difficult to predict and are likely to evolve to maintain treatment rates. For example, Egypt screened 23 million people (roughly a quarter of their population) in a period of around 90 days in 2018 (Government of Egypt State Information Service, Press Release on 29th December 2018).

**Supplementary table 10:** Country-level fitted demographic data values in 2017, and model projections of the Population Attributable Fraction (PAF) of injecting drug use (IDU) to Hepatitis C virus (HCV) transmission from 2018 to 2019 (1-year PAF) and 2030 (12-year PAF) – all with 95% credibility intervals. We also give the percentage of the setting's prevalent infections in 2017 that are amongst PWID to compare with the PAF. The PAF is defined as the percentage of all new HCV infections that would be prevented if the transmission risk due to IDU was removed over this period.

| Country | Fitted demographic data values | | | PAF of HCV infections due to IDU | |
|---|---|---|---|---|---|
| | % of Adults that are PWID | Chronic HCV prevalence (%) among PWID | Chronic HCV prevalence (%) among general population | Percentage of the setting's prevalent infections that are among PWID | 2018-2019 | 2018-2030 |
| **Global** | **0.32 (0.23, 0.42)** | **34.5 (25.8, 42.0)** | **1.0 (0.7, 1.4)** | **8 (5, 12)** | **39% (21%, 64%)** | **43% (25%, 67%)** |
| **Central Asia** | **0.61 (0.44, 0.81)** | **26.4 (21.0, 29.8)** | **2.4 (1.5, 3.3)** | **4 (3, 6)** | **32% (16%, 69%)** | **37% (19%, 73%)** |
| Kazakhstan | 0.94 (0.67, 1.25) | 27.4 (18.9, 30.8) | 1.3 (0.8, 1.7) | 14 (9, 20) | 98% (60%, 100%) | 99% (67%, 100%) |
| Kyrgyzstan | 0.76 (0.56, 1.01) | 21.6 (19.5, 23.6) | 1.5 (0.8, 2.6) | 7 (5, 10) | 42% (19%, 94%) | 50% (24%, 95%) |
| Tajikistan | 0.46 (0.34, 0.62) | 30.4 (27.8, 32.9) | 1.5 (0.7, 2.6) | 6 (4, 8) | 31% (14%, 76%) | 39% (19%, 81%) |
| Turkmenistan | 0.38 (0.28, 0.48) | 29.9 (24.1, 35.9) | 2.0 (0.9, 2.7) | 4 (3, 5) | 26% (11%, 66%) | 32% (15%, 72%) |
| Uzbekistan | 0.47 (0.35, 0.63) | 25.1 (21.4, 29.0) | 3.6 (2.3, 4.8) | 2 (2, 3) | 18% (7%, 59%) | 23% (9%, 64%) |
| **Eastern Europe** | **1.13 (0.71, 1.61)** | **45.8 (34.0, 53.6)** | **2.0 (1.2, 2.6)** | **21 (12, 31)** | **95% (64%, 99%)** | **96% (69%, 99%)** |
| Armenia | 0.74 (0.47, 1.22) | 36.0 (26.6, 44.5) | 2.4 (1.8, 3.1) | 9 (5, 15) | 68% (35%, 100%) | 73% (41%, 100%) |
| Azerbaijan | 0.60 (0.51, 0.69) | 48.1 (39.5, 56.1) | 2.4 (1.8, 3.0) | 9 (7, 11) | 46% (26%, 81%) | 52% (32%, 84%) |
| Belarus | 0.57 (0.29, 0.86) | 52.8 (40.3, 61.1) | 1.1 (0.8, 1.7) | 21 (11, 34) | 96% (58%, 100%) | 96% (62%, 100%) |
| Bosnia | 0.17 (0.12, 0.21) | 41.7 (34.0, 49.1) | 0.1 (0.1, 0.1) | 52 (36, 72) | 100% (96%, 100%) | 100% (97%, 100%) |
| Bulgaria | 0.37 (0.30, 0.44) | 50.0 (38.0, 54.6) | 1.0 (0.6, 1.5) | 15 (10, 20) | 100% (62%, 100%) | 100% (67%, 100%) |
| Czech Republic | 0.64 (0.61, 0.67) | 14.8 (12.0, 17.5) | 0.3 (0.2, 0.4) | 23 (18, 28) | 80% (56%, 100%) | 88% (68%, 100%) |
| Estonia | 1.04 (0.74, 1.53) | 46.6 (36.2, 57.0) | 1.3 (1.1, 1.4) | 32 (21, 48) | 100% (89%, 100%) | 100% (94%, 100%) |
| Georgia | 4.30 (1.34, 7.32) | 40.5 (28.7, 48.3) | 4.6 (4.0, 5.3) | 29 (10, 51) | 100% (59%, 100%) | 100% (70%, 100%) |
| Hungary | 0.06 (0.04, 0.08) | 34.3 (24.6, 42.2) | 0.8 (0.3, 1.5) | 2 (1, 3) | 24% (8%, 73%) | 30% (11%, 79%) |
| Latvia | 0.90 (0.74, 1.08) | 52.4 (39.6, 59.8) | 1.6 (1.2, 2.0) | 25 (17, 33) | 100% (81%, 100%) | 100% (86%, 100%) |
| Lithuania | 0.22 (0.14, 0.31) | 34.2 (27.4, 36.8) | 1.1 (0.8, 1.5) | 6 (4, 9) | 68% (32%, 100%) | 76% (42%, 100%) |
| Moldova | 0.41 (0.29, 0.52) | 41.5 (30.8, 50.4) | 2.3 (1.6, 2.8) | 6 (4, 8) | 46% (23%, 100%) | 52% (28%, 100%) |
| Poland | 0.28 (0.21, 0.35) | 49.1 (44.8, 53.0) | 0.5 (0.4, 0.7) | 20 (15, 27) | 81% (54%, 100%) | 86% (63%, 100%) |
| Romania | 0.61 (0.48, 0.76) | 62.3 (46.5, 66.5) | 2.0 (1.8, 2.2) | 16 (11, 21) | 100% (65%, 100%) | 100% (71%, 100%) |
| Russia | 1.69 (1.06, 2.41) | 47.6 (35.1, 56.6) | 2.7 (1.6, 3.6) | 24 (14, 36) | 100% (72%, 100%) | 100% (76%, 100%) |
| Slovakia | 0.58 (0.40, 0.85) | 44.1 (32.9, 55.2) | 1.0 (0.7, 1.2) | 21 (13, 35) | 86% (55%, 100%) | 88% (62%, 100%) |
| Ukraine | 1.02 (0.62, 1.54) | 37.0 (25.4, 41.3) | 2.0 (1.0, 2.7) | 15 (9, 23) | 100% (54%, 100%) | 100% (59%, 100%) |

| Country | Fitted demographic data values | | | Percentage of the setting's prevalent infections that are among PWID | PAF of HCV infections due to IDU | |
|---|---|---|---|---|---|---|
| | % of Adults that are PWID | Chronic HCV prevalence (%) among PWID | Chronic HCV prevalence (%) among general population | | 2018-2019 | 2018-2030 |
| **Australasia** | **0.60 (0.46, 0.73)** | **35.7 (32.0, 39.3)** | **0.8 (0.7, 1.1)** | **19 (13, 24)** | **58% (34%, 94%)** | **66% (43%, 96%)** |
| Australia | 0.58 (0.45, 0.70) | 32.4 (29.7, 35.1) | 0.8 (0.7, 1.0) | 17 (12, 21) | 54% (32%, 93%) | 62% (41%, 95%) |
| New Zealand | 0.69 (0.51, 0.87) | 50.6 (42.8, 57.1) | 1.0 (0.6, 1.4) | 26 (19, 34) | 74% (45%, 100%) | 82% (57%, 100%) |
| **East & Southeast Asia** | **0.23 (0.19, 0.28)** | **31.5 (23.8, 38.2)** | **0.7 (0.5, 1.0)** | **7 (5, 10)** | **53% (26%, 98%)** | **58% (32%, 98%)** |
| China | 0.22 (0.18, 0.27) | 27.1 (19.5, 35.0) | 0.7 (0.6, 0.9) | 6 (4, 9) | 50% (24%, 100%) | 56% (30%, 100%) |
| Indonesia | 0.11 (0.09, 0.12) | 57.5 (54.3, 60.4) | 0.5 (0.2, 0.8) | 9 (7, 11) | 61% (27%, 100%) | 67% (32%, 100%) |
| Japan | 0.44 (0.36, 0.53) | 32.9 (23.5, 40.6) | 0.6 (0.4, 1.0) | 19 (13, 26) | 100% (68%, 100%) | 100% (76%, 100%) |
| Malaysia | 1.26 (1.09, 1.43) | 42.6 (32.5, 45.7) | 1.8 (0.6, 3.8) | 20 (15, 24) | 57% (26%, 100%) | 65% (32%, 100%) |
| Myanmar | 0.47 (0.35, 0.59) | 19.4 (13.5, 21.5) | 1.0 (0.6, 1.4) | 6 (5, 9) | 70% (35%, 100%) | 75% (42%, 100%) |
| Philippines | 0.04 (0.03, 0.05) | 24.9 (14.9, 35.4) | 0.5 (0.2, 0.8) | 1 (1, 2) | 11% (3%, 35%) | 14% (5%, 42%) |
| Taiwan | 0.27 (0.20, 0.34) | 55.6 (48.5, 59.9) | 1.8 (1.0, 3.1) | 7 (5, 9) | 57% (18%, 100%) | 64% (22%, 100%) |
| Thailand | 0.10 (0.05, 0.16) | 55.7 (51.9, 59.4) | 1.0 (0.5, 1.9) | 5 (2, 7) | 38% (11%, 100%) | 43% (13%, 100%) |
| Viet Nam | 0.23 (0.18, 0.27) | 37.5 (29.7, 45.7) | 0.9 (0.7, 1.1) | 7 (5, 9) | 52% (28%, 100%) | 58% (34%, 100%) |
| **South Asia** | **0.09 (0.07, 0.11)** | **30.3 (16.2, 44.0)** | **0.9 (0.6, 1.3)** | **2 (1, 3)** | **10% (3%, 25%)** | **14% (4%, 31%)** |
| Afghanistan | 0.80 (0.56, 1.03) | 30.5 (23.6, 36.9) | 0.9 (0.5, 1.3) | 15 (10, 22) | 46% (23%, 98%) | 58% (32%, 99%) |
| Bangladesh | 0.07 (0.06, 0.07) | 27.7 (20.3, 34.9) | 0.9 (0.3, 1.4) | 1 (1, 2) | 12% (5%, 37%) | 15% (6%, 43%) |
| India | 0.02 (0.01, 0.03) | 31.2 (27.4, 35.0) | 0.7 (0.4, 1.0) | 1 (0, 1) | 4% (2%, 11%) | 6% (2%, 15%) |
| Iran | 0.27 (0.21, 0.34) | 35.5 (25.4, 44.8) | 0.4 (0.2, 0.6) | 18 (12, 26) | 78% (45%, 100%) | 85% (55%, 100%) |
| Nepal | 0.20 (0.19, 0.21) | 35.7 (27.7, 44.0) | 0.5 (0.4, 0.6) | 10 (8, 13) | 60% (34%, 100%) | 67% (42%, 100%) |
| Pakistan | 0.36 (0.32, 0.40) | 28.3 (7.3, 52.9) | 3.0 (2.7, 3.4) | 2 (1, 4) | 13% (2%, 37%) | 18% (2%, 47%) |
| **North America** | **1.08 (0.63, 1.51)** | **30.7 (22.2, 40.7)** | **0.9 (0.6, 1.2)** | **30 (16, 47)** | **67% (43%, 100%)** | **77% (56%, 100%)** |
| Canada | 0.37 (0.30, 0.43) | 50.7 (42.4, 63.2) | 0.6 (0.4, 0.8) | 23 (17, 30) | 74% (44%, 100%) | 83% (56%, 100%) |
| USA | 1.16 (0.67, 1.63) | 30 (21.2, 40.0) | 0.9 (0.6, 1.2) | 30 (16, 48) | 67% (43%, 100%) | 77% (56%, 100%) |
| **Western Europe** | **0.32 (0.23, 0.40)** | **37.9 (27.3, 44.7)** | **0.6 (0.3, 1.0)** | **15 (10, 20)** | **80% (45%, 93%)** | **83% (53%, 94%)** |
| Albania | 0.39 (0.28, 0.48) | 25.5 (17.3, 30.1) | 1.7 (1.3, 2.2) | 5 (3, 6) | 55% (22%, 100%) | 60% (26%, 100%) |
| Austria | 0.30 (0.22, 0.37) | 34.0 (27.3, 38.9) | 0.3 (0.1, 0.4) | 31 (21, 42) | 100% (69%, 100%) | 100% (79%, 100%) |
| Belgium | 0.35 (0.26, 0.45) | 38.1 (28.5, 47.3) | 0.4 (0.2, 0.6) | 25 (16, 36) | 100% (53%, 100%) | 100% (61%, 100%) |
| Croatia | 0.23 (0.19, 0.27) | 26.3 (21.5, 31.2) | 0.6 (0.4, 0.8) | 9 (7, 12) | 66% (29%, 100%) | 71% (34%, 100%) |
| Cyprus | 0.08 (0.05, 0.11) | 35.1 (31.0, 39.5) | 0.4 (0.3, 0.8) | 4 (3, 6) | 28% (10%, 78%) | 35% (13%, 84%) |
| Denmark | 0.42 (0.35, 0.48) | 27.3 (23.4, 31.2) | 0.4 (0.3, 0.4) | 26 (20, 31) | 89% (51%, 100%) | 92% (60%, 100%) |
| FYROM (Macedonia) | 0.15 (0.11, 0.19) | 45.1 (42.4, 47.6) | 0.3 (0.2, 0.4) | 17 (13, 22) | 97% (54%, 100%) | 98% (61%, 100%) |

| Country | Fitted demographic data values | | | Percentage of the setting's prevalent infections that are among PWID | PAF of HCV infections due to IDU | |
|---|---|---|---|---|---|---|
| | % of Adults that are PWID | Chronic HCV prevalence (%) among PWID | Chronic HCV prevalence (%) among general population | | 2018-2019 | 2018-2030 |
| Finland | 0.48 (0.41, 0.61) | 47.7 (36.6, 52.8) | 0.5 (0.4, 0.7) | 33 (24, 43) | 100% (84%, 100%) | 100% (87%, 100%) |
| France | 0.19 (0.16, 0.22) | 35.9 (28.5, 45.0) | 0.3 (0.2, 0.5) | 16 (12, 21) | 90% (50%, 100%) | 93% (62%, 100%) |
| Germany | 0.22 (0.07, 0.37) | 40.9 (36.4, 44.8) | 0.4 (0.2, 0.5) | 21 (7, 36) | 83% (34%, 100%) | 89% (44%, 100%) |
| Greece | 0.07 (0.06, 0.08) | 45.4 (42.2, 48.5) | 1.0 (0.4, 1.5) | 3 (2, 3) | 19% (8%, 64%) | 23% (10%, 70%) |
| Iceland | 0.23 (0.17, 0.29) | 24.4 (18.9, 28.3) | 0.2 (0.1, 0.3) | 25 (16, 36) | 100% (78%, 100%) | 100% (82%, 100%) |
| Ireland | 0.26 (0.21, 0.32) | 49.5 (46.0, 52.2) | 0.6 (0.4, 0.9) | 17 (13, 21) | 70% (37%, 100%) | 79% (46%, 100%) |
| Italy | 0.80 (0.59, 1.02) | 35.5 (19.8, 42.4) | 1.7 (0.9, 3.2) | 13 (7, 19) | 100% (47%, 100%) | 100% (55%, 100%) |
| Luxembourg | 0.56 (0.46, 0.65) | 47.5 (39.2, 52.7) | 0.6 (0.4, 0.9) | 29 (23, 36) | 88% (56%, 100%) | 94% (72%, 100%) |
| Malta | 0.27 (0.21, 0.33) | 18.8 (14.3, 23.8) | 0.2 (0.2, 0.3) | 15 (13, 21) | 72% (36%, 100%) | 79% (45%, 100%) |
| Montenegro | 0.37 (0.27, 0.47) | 30.1 (21.4, 34.4) | 0.8 (0.6, 1.0) | 11 (7, 15) | 100% (64%, 100%) | 100% (69%, 100%) |
| Netherlands | 0.03 (0.02, 0.04) | 30.3 (19.3, 35.7) | 0.1 (0.0, 0.2) | 7 (4, 9) | 41% (18%, 88%) | 52% (25%, 91%) |
| Norway | 0.24 (0.21, 0.27) | 40.2 (37.0, 43.5) | 0.3 (0.3, 0.4) | 22 (18, 26) | 74% (47%, 100%) | 83% (61%, 100%) |
| Portugal | 0.21 (0.18, 0.23) | 53.9 (42.1, 61.8) | 0.7 (0.3, 1.1) | 14 (10, 17) | 100% (54%, 100%) | 100% (67%, 100%) |
| Serbia | 0.49 (0.42, 0.55) | 17.1 (12.4, 20.8) | 0.4 (0.3, 0.4) | 19 (14, 25) | 100% (85%, 100%) | 100% (88%, 100%) |
| Slovenia | 0.40 (0.31, 0.50) | 20.2 (15.8, 23.0) | 0.3 (0.2, 0.3) | 24 (18, 32) | 93% (54%, 100%) | 95% (64%, 100%) |
| Spain | 0.07 (0.05, 0.09) | 43.1 (32.4, 46.9) | 0.8 (0.3, 1.4) | 3 (2, 4) | 22% (8%, 60%) | 31% (13%, 69%) |
| Sweden | 0.22 (0.06, 0.49) | 52.1 (48.2, 67.1) | 0.3 (0.3, 0.4) | 26 (7, 60) | 73% (29%, 100%) | 85% (45%, 100%) |
| Switzerland | 0.23 (0.20, 0.27) | 46.4 (40.8, 51.9) | 0.6 (0.4, 0.8) | 14 (11, 17) | 77% (38%, 100%) | 85% (51%, 100%) |
| UK | 0.42 (0.37, 0.45) | 42.0 (33.5, 49.8) | 0.4 (0.3, 0.5) | 33 (24, 42) | 97% (73%, 100%) | 98% (83%, 100%) |
| **Sub Saharan Africa** | **0.40 (0.26, 0.55)** | **14.2 (10.5, 17.7)** | **1.4 (0.9, 2.2)** | **3 (1, 4)** | **11% (2%, 39%)** | **14% (2%, 43%)** |
| Ghana | 0.05 (0.04, 0.06) | 29.8 (26.5, 33) | 1.8 (1.0, 3.2) | 1 (0, 1) | 2% (1%, 6%) | 3% (1%, 8%) |
| Kenya | 0.12 (0.05, 0.18) | 18.8 (13.2, 24.5) | 0.4 (0.2, 0.6) | 3 (1, 5) | 22% (8%, 51%) | 31% (13%, 61%) |
| Madagascar | 0.22 (0.06, 0.51) | 5.3 (2.0, 9.6) | 0.6 (0.5, 0.9) | 1 (0, 3) | 4% (0%, 18%) | 6% (1%, 27%) |
| Mauritius | 0.82 (0.47, 1.33) | 70.9 (54.3, 74.0) | 1.5 (1.1, 1.9) | 29 (17, 48) | 88% (55%, 100%) | 90% (59%, 100%) |
| Mozambique | 0.20 (0.05, 0.36) | 49.4 (46.1, 52.6) | 1.6 (0.4, 3.9) | 3 (1, 6) | 17% (3%, 59%) | 21% (4%, 67%) |
| Nigeria | 0.36 (0.26, 0.46) | 4.0 (2.6, 5.8) | 1.4 (1.3, 1.6) | 1 (0, 1) | 1% (0%, 3%) | 2% (0%, 4%) |
| Senegal | 0.08 (0.06, 0.10) | 33.4 (27.5, 39.0) | 1.0 (0.2, 2.5) | 1 (1, 2) | 7% (2%, 31%) | 10% (3%, 41%) |
| Tanzania | 1.23 (0.84, 1.63) | 20.0 (16.5, 23.9) | 2.4 (0.7, 4.5) | 6 (4, 8) | 29% (9%, 87%) | 37% (13%, 91%) |
| **Latin America** | **0.44 (0.35, 0.53)** | **49.7 (44.1, 52.8)** | **0.8 (0.7, 1.0)** | **18 (14, 23)** | **66% (41%, 98%)** | **71% (49%, 98%)** |
| Argentina | 0.29 (0.28, 0.32) | 41.1 (38.3, 43.9) | 0.8 (0.4, 1.2) | 11 (9, 12) | 51% (25%, 99%) | 58% (31%, 99%) |
| Brazil | 0.63 (0.50, 0.76) | 47.1 (41.0, 50.2) | 0.9 (0.8, 1.1) | 23 (18, 30) | 77% (49%, 100%) | 83% (59%, 100%) |

| Country | Fitted demographic data values | | | Percentage of the setting's prevalent infections that are among PWID | PAF of HCV infections due to IDU | |
|---|---|---|---|---|---|---|
| | % of Adults that are PWID | Chronic HCV prevalence (%) among PWID | Chronic HCV prevalence (%) among general population | | 2018-2019 | 2018-2030 |
| Mexico | 0.17 (0.13, 0.22) | 72.4 (69.1, 75.2) | 0.7 (0.6, 0.9) | 12 (8, 15) | 48% (27%, 94%) | 53% (32%, 95%) |
| Uruguay | 0.39 (0.15, 0.75) | 16.3 (14.4, 18.4) | 0.6 (0.5, 0.8) | 8 (3, 15) | 43% (16%, 100%) | 49% (20%, 100%) |
| **Middle East & North Africa** | **0.24 (0.17, 0.30)** | **31.7 (23.6, 36.8)** | **2.5 (2.0, 3.1)** | **2 (1, 3)** | **13% (6%, 25%)** | **16% (8%, 28%)** |
| Egypt | 0.21 (0.14, 0.26) | 26.1 (18.8, 33.7) | 6.3 (5.3, 7.6) | 1 (0, 1) | 3% (1%, 9%) | 5% (2%, 12%) |
| Israel | 0.41 (0.30, 0.51) | 28.3 (24.3, 32.6) | 0.9 (0.6, 1.1) | 9 (6, 12) | 28% (14%, 59%) | 37% (20%, 69%) |
| Lebanon | 0.14 (0.10, 0.18) | 15.6 (11.3, 20.6) | 0.2 (0.1, 0.4) | 7 (4, 10) | 35% (14%, 86%) | 46% (20%, 92%) |
| Libya | 0.05 (0.02, 0.08) | 65.0 (62.0, 68.2) | 0.6 (0.5, 0.7) | 3 (1, 6) | 35% (12%, 86%) | 42% (15%, 89%) |
| Morocco | 0.13 (0.08, 0.18) | 38.0 (26.9, 48.3) | 0.8 (0.6, 1.0) | 5 (2, 7) | 29% (11%, 72%) | 37% (16%, 80%) |
| Saudi Arabia | 0.19 (0.13, 0.24) | 50.8 (45.1, 54.3) | 0.3 (0.3, 0.4) | 19 (14, 25) | 88% (54%, 100%) | 92% (65%, 100%) |
| Syria | 0.06 (0.04, 0.08) | 43.6 (32.6, 53.5) | 1.3 (0.5, 1.9) | 1 (1, 2) | 12% (4%, 34%) | 15% (6%, 41%) |
| Tunisia | 0.20 (0.14, 0.25) | 28.2 (23.4, 32.5) | 0.5 (0.2, 0.8) | 8 (6, 11) | 79% (35%, 100%) | 84% (43%, 100%) |
| Turkey | 0.4 (0.3, 0.5) | 30.9 (21.8, 33.6) | 0.7 (0.5, 1.1) | 11 (8, 16) | 89% (47%, 100%) | 91% (54%, 100%) |

**Supplementary table 11:** Sensitivity analyses for the Population Attributable Fraction (PAF) of injecting drug use (IDU) to Hepatitis C virus (HCV) transmission from 2018 to 2030, with 95% credibility intervals. The PAF is defined as the percentage of all new HCV infections that would be prevented over 2018-2030 if the transmission risk due to IDU was removed over this period. All sensitivity analyses (and the main analysis for better comparison) were ran to produce 100 model fits rather than 1000, as comparison runs shows running for 100 or 1000 fits produced very similar results.

| | **Population Attributable Fraction of injecting drug use to Hepatitis C virus transmission 2018-2030** | | | | | |
|---|---|---|---|---|---|---|
| **Country** | **Main analysis** | **Stable general population HCV prevalence** | **Decreasing PWID HCV prevalence*** | **Stable proportion of adults that are PWID in 1990 in EE and SSA**** | **Altered treatment rates for PWID and people with cirrhosis***** | **Varied epidemic trajectories by region** |
| **Global** | **43% (24%, 66%)** | **33% (20%, 54%)** | **43% (23%, 66%)** | **43% (25%, 66%)** | **43% (23%, 66%)** | **30% (15%, 51%)** |
| **Central Asia** | **36% (18%, 76%)** | **23% (13%, 44%)** | **36% (19%, 77%)** | **36% (18%, 76%)** | **36% (18%, 76%)** | **4% (1%, 15%)** |
| Kazakhstan | 99% (71%, 100%) | 79% (57%, 100%) | 99% (70%, 100%) | 99% (71%, 100%) | 99% (71%, 100%) | 45% (9%, 100%) |
| Kyrgyzstan | 52% (22%, 95%) | 36% (17%, 85%) | 51% (22%, 97%) | 52% (22%, 95%) | 52% (22%, 95%) | 8% (1%, 47%) |
| Tajikistan | 41% (17%, 84%) | 28% (14%, 55%) | 40% (17%, 86%) | 41% (17%, 84%) | 41% (17%, 84%) | 6% (1%, 36%) |
| Turkmenistan | 33% (16%, 77%) | 21% (12%, 59%) | 33% (16%, 80%) | 33% (16%, 77%) | 33% (16%, 77%) | 4% (0%, 30%) |
| Uzbekistan | 21% (9%, 68%) | 13% (6%, 25%) | 20% (9%, 68%) | 21% (9%, 68%) | 21% (9%, 68%) | 1% (0%, 7%) |
| **Eastern Europe** | **96% (65%, 99%)** | **81% (54%, 96%)** | **96% (66%, 99%)** | **96% (70%, 99%)** | **96% (65%, 99%)** | **45% (10%, 86%)** |
| Armenia | 79% (41%, 100%) | 45% (27%, 68%) | 79% (41%, 100%) | 74% (31%, 100%) | 79% (41%, 100%) | 4% (0%, 28%) |
| Azerbaijan | 52% (31%, 76%) | 36% (25%, 56%) | 52% (31%, 77%) | 51% (27%, 92%) | 52% (31%, 76%) | 5% (0%, 21%) |
| Belarus | 100% (67%, 100%) | 72% (40%, 100%) | 100% (67%, 100%) | 100% (63%, 100%) | 100% (67%, 100%) | 32% (6%, 90%) |
| Bosnia | 100% (97%, 100%) | 100% (89%, 100%) | 100% (97%, 100%) | 100% (100%, 100%) | 100% (97%, 100%) | 96% (59%, 100%) |
| Bulgaria | 100% (63%, 100%) | 72% (52%, 100%) | 100% (63%, 100%) | 100% (65%, 100%) | 100% (63%, 100%) | 36% (8%, 84%) |
| Czech Republic | 89% (69%, 100%) | 76% (57%, 96%) | 89% (68%, 100%) | 94% (56%, 100%) | 88% (69%, 100%) | 50% (17%, 90%) |
| Estonia | 100% (96%, 100%) | 100% (89%, 100%) | 100% (95%, 100%) | 100% (96%, 100%) | 100% (93%, 100%) | 93% (54%, 100%) |
| Georgia | 100% (68%, 100%) | 91% (60%, 100%) | 100% (68%, 100%) | 100% (57%, 100%) | 100% (73%, 100%) | 61% (11%, 100%) |
| Hungary | 30% (13%, 74%) | 16% (6%, 37%) | 29% (12%, 73%) | 20% (6%, 71%) | 30% (13%, 74%) | 5% (1%, 23%) |
| Latvia | 100% (85%, 100%) | 92% (73%, 100%) | 100% (85%, 100%) | 100% (91%, 100%) | 100% (83%, 100%) | 51% (15%, 100%) |
| Lithuania | 76% (37%, 100%) | 42% (27%, 65%) | 76% (37%, 100%) | 72% (32%, 100%) | 78% (38%, 100%) | 9% (0%, 32%) |
| Moldova | 56% (27%, 100%) | 30% (20%, 48%) | 56% (27%, 100%) | 48% (19%, 100%) | 56% (27%, 100%) | 6% (0%, 25%) |
| Poland | 87% (62%, 100%) | 65% (53%, 89%) | 87% (62%, 100%) | 96% (56%, 100%) | 86% (62%, 100%) | 28% (12%, 64%) |
| Romania | 100% (64%, 100%) | 70% (57%, 100%) | 100% (64%, 100%) | 100% (78%, 100%) | 100% (62%, 100%) | 33% (12%, 76%) |
| Russia | 100% (73%, 100%) | 90% (61%, 100%) | 100% (74%, 100%) | 100% (80%, 100%) | 100% (73%, 100%) | 60% (13%, 100%) |
| Slovakia | 86% (61%, 100%) | 70% (50%, 100%) | 87% (61%, 100%) | 96% (50%, 100%) | 86% (60%, 100%) | 38% (8%, 76%) |
| Ukraine | 100% (53%, 100%) | 76% (42%, 100%) | 100% (51%, 100%) | 100% (53%, 100%) | 100% (53%, 100%) | 30% (6%, 99%) |
| **Australasia** | **69% (43%, 100%)** | **52% (34%, 85%)** | **69% (43%, 100%)** | **69% (43%, 100%)** | **74% (49%, 100%)** | **48% (29%, 80%)** |
| Australia | 66% (41%, 100%) | 48% (32%, 81%) | 65% (40%, 100%) | 66% (41%, 100%) | 72% (48%, 100%) | 44% (27%, 75%) |
| New Zealand | 82% (55%, 100%) | 70% (47%, 100%) | 84% (56%, 100%) | 82% (55%, 100%) | 80% (54%, 100%) | 68% (37%, 99%) |

| | Population Attributable Fraction of injecting drug use to Hepatitis C virus transmission 2018-2030 | | | | | |
|---|---|---|---|---|---|---|
| **Country** | **Main analysis** | **Stable general population HCV prevalence** | **Decreasing PWID HCV prevalence*** | **Stable proportion of adults that are PWID in 1990 in EE and SSA**** | **Altered treatment rates for PWID and people with cirrhosis***** | **Varied epidemic trajectories by region** |
| **East & Southeast Asia** | **58% (29%, 95%)** | **42% (25%, 73%)** | **59% (29%, 97%)** | **58% (29%, 95%)** | **59% (29%, 95%)** | **44% (24%, 75%)** |
| China | 56% (28%, 95%) | 39% (24%, 68%) | 57% (27%, 99%) | 56% (28%, 95%) | 56% (28%, 95%) | 45% (24%, 72%) |
| Indonesia | 73% (35%, 100%) | 48% (23%, 100%) | 74% (35%, 100%) | 73% (35%, 100%) | 73% (35%, 100%) | 39% (19%, 95%) |
| Japan | 100% (71%, 100%) | 96% (59%, 100%) | 100% (72%, 100%) | 100% (71%, 100%) | 100% (70%, 100%) | 100% (78%, 100%) |
| Malaysia | 67% (26%, 100%) | 52% (24%, 100%) | 68% (26%, 100%) | 67% (26%, 100%) | 67% (26%, 100%) | 52% (23%, 100%) |
| Myanmar | 72% (34%, 100%) | 59% (33%, 98%) | 74% (33%, 100%) | 72% (34%, 100%) | 72% (34%, 100%) | 51% (27%, 88%) |
| Philippines | 14% (4%, 40%) | 8% (3%, 19%) | 12% (4%, 38%) | 14% (4%, 40%) | 14% (4%, 40%) | 7% (3%, 21%) |
| Taiwan | 62% (19%, 100%) | 27% (12%, 56%) | 62% (19%, 100%) | 62% (19%, 100%) | 61% (19%, 100%) | 36% (15%, 68%) |
| Thailand | 41% (15%, 100%) | 24% (10%, 64%) | 41% (15%, 100%) | 41% (15%, 100%) | 41% (15%, 100%) | 24% (9%, 65%) |
| Viet Nam | 56% (30%, 98%) | 41% (25%, 69%) | 57% (30%, 100%) | 56% (30%, 98%) | 57% (30%, 98%) | 36% (23%, 69%) |
| **South Asia** | **13% (4%, 30%)** | **9% (4%, 22%)** | **13% (3%, 30%)** | **13% (4%, 30%)** | **13% (4%, 30%)** | **10% (3%, 20%)** |
| Afghanistan | 61% (35%, 99%) | 51% (29%, 98%) | 62% (34%, 100%) | 61% (35%, 99%) | 61% (35%, 99%) | 52% (25%, 97%) |
| Bangladesh | 15% (5%, 46%) | 9% (4%, 31%) | 14% (5%, 45%) | 15% (5%, 46%) | 15% (5%, 46%) | 7% (4%, 28%) |
| India | 5% (3%, 13%) | 3% (2%, 9%) | 5% (2%, 13%) | 5% (3%, 13%) | 5% (3%, 13%) | 4% (2%, 8%) |
| Iran | 84% (55%, 100%) | 67% (42%, 100%) | 86% (55%, 100%) | 84% (55%, 100%) | 84% (54%, 100%) | 82% (52%, 100%) |
| Nepal | 70% (47%, 100%) | 51% (32%, 97%) | 72% (47%, 100%) | 70% (47%, 100%) | 70% (47%, 100%) | 48% (31%, 83%) |
| Pakistan | 19% (1%, 48%) | 13% (3%, 33%) | 18% (1%, 49%) | 19% (1%, 48%) | 19% (1%, 48%) | 12% (1%, 26%) |
| **North America** | **77% (54%, 100%)** | **67% (46%, 93%)** | **74% (50%, 100%)** | **80% (56%, 100%)** | **70% (33%, 100%)** | **74% (55%, 100%)** |
| Canada | 82% (55%, 100%) | 72% (46%, 100%) | 83% (56%, 100%) | 82% (55%, 100%) | 81% (53%, 100%) | 80% (54%, 100%) |
| USA | 77% (54%, 100%) | 67% (46%, 93%) | 73% (49%, 100%) | 80% (56%, 100%) | 69% (31%, 100%) | 74% (55%, 100%) |
| **Western Europe** | **83% (54%, 95%)** | **65% (41%, 89%)** | **83% (54%, 95%)** | **83% (52%, 95%)** | **84% (54%, 95%)** | **62% (39%, 86%)** |
| Albania | 65% (25%, 100%) | 28% (17%, 48%) | 63% (24%, 100%) | 64% (26%, 100%) | 65% (25%, 100%) | 6% (2%, 21%) |
| Austria | 100% (82%, 100%) | 94% (68%, 100%) | 100% (82%, 100%) | 100% (82%, 100%) | 100% (81%, 100%) | 100% (73%, 100%) |
| Belgium | 96% (56%, 100%) | 82% (48%, 100%) | 97% (55%, 100%) | 96% (56%, 100%) | 96% (57%, 100%) | 74% (46%, 100%) |
| Croatia | 72% (37%, 100%) | 42% (26%, 71%) | 72% (35%, 100%) | 72% (37%, 100%) | 71% (37%, 100%) | 14% (4%, 44%) |
| Cyprus | 37% (13%, 78%) | 18% (8%, 53%) | 35% (12%, 79%) | 37% (13%, 78%) | 37% (13%, 78%) | 19% (8%, 45%) |
| Denmark | 92% (59%, 100%) | 70% (48%, 100%) | 95% (58%, 100%) | 92% (59%, 100%) | 92% (60%, 100%) | 71% (47%, 100%) |
| FYROM | 91% (56%, 100%) | 72% (46%, 100%) | 93% (56%, 100%) | 91% (56%, 100%) | 91% (56%, 100%) | 32% (9%, 80%) |
| Finland | 100% (88%, 100%) | 100% (76%, 100%) | 100% (88%, 100%) | 100% (88%, 100%) | 100% (87%, 100%) | 100% (79%, 100%) |
| France | 93% (59%, 100%) | 69% (53%, 98%) | 92% (56%, 100%) | 96% (61%, 100%) | 95% (65%, 100%) | 67% (45%, 91%) |
| Germany | 86% (47%, 100%) | 76% (31%, 100%) | 88% (41%, 100%) | 86% (47%, 100%) | 85% (43%, 100%) | 69% (28%, 100%) |
| Greece | 23% (10%, 65%) | 12% (7%, 25%) | 23% (10%, 67%) | 23% (10%, 65%) | 22% (10%, 63%) | 13% (7%, 31%) |

| | Population Attributable Fraction of injecting drug use to Hepatitis C virus transmission 2018-2030 | | | | | |
|---|---|---|---|---|---|---|
| **Country** | **Main analysis** | **Stable general population HCV prevalence** | **Decreasing PWID HCV prevalence*** | **Stable proportion of adults that are PWID in 1990 in EE and SSA**** | **Altered treatment rates for PWID and people with cirrhosis***** | **Varied epidemic trajectories by region** |
| Iceland | 100% (96%, 100%) | 100% (88%, 100%) | 100% (98%, 100%) | 100% (96%, 100%) | 100% (84%, 100%) | 100% (89%, 100%) |
| Ireland | 82% (50%, 100%) | 56% (35%, 97%) | 83% (50%, 100%) | 82% (50%, 100%) | 81% (49%, 100%) | 62% (42%, 100%) |
| Italy | 100% (55%, 100%) | 77% (38%, 100%) | 100% (54%, 100%) | 100% (55%, 100%) | 100% (56%, 100%) | 76% (39%, 100%) |
| Luxembourg | 96% (76%, 100%) | 92% (67%, 100%) | 97% (76%, 100%) | 96% (76%, 100%) | 95% (75%, 100%) | 87% (63%, 100%) |
| Malta | 83% (43%, 100%) | 61% (36%, 96%) | 84% (43%, 100%) | 83% (43%, 100%) | 84% (46%, 100%) | 61% (34%, 100%) |
| Montenegro | 100% (68%, 100%) | 81% (51%, 100%) | 100% (68%, 100%) | 100% (68%, 100%) | 100% (68%, 100%) | 39% (13%, 100%) |
| Netherlands | 57% (20%, 88%) | 33% (18%, 70%) | 56% (19%, 90%) | 57% (20%, 88%) | 61% (20%, 90%) | 35% (20%, 69%) |
| Norway | 85% (61%, 100%) | 69% (53%, 100%) | 86% (61%, 100%) | 85% (61%, 100%) | 84% (60%, 100%) | 73% (54%, 100%) |
| Portugal | 100% (72%, 100%) | 76% (43%, 100%) | 100% (71%, 100%) | 100% (72%, 100%) | 100% (71%, 100%) | 71% (40%, 100%) |
| Serbia | 100% (88%, 100%) | 98% (73%, 100%) | 100% (89%, 100%) | 100% (88%, 100%) | 100% (88%, 100%) | 64% (27%, 100%) |
| Slovenia | 97% (68%, 100%) | 84% (54%, 100%) | 100% (68%, 100%) | 97% (68%, 100%) | 95% (67%, 100%) | 84% (56%, 100%) |
| Spain | 31% (15%, 70%) | 19% (8%, 53%) | 31% (14%, 71%) | 31% (15%, 70%) | 34% (15%, 74%) | 19% (9%, 42%) |
| Sweden | 90% (41%, 100%) | 75% (32%, 100%) | 92% (40%, 100%) | 90% (41%, 100%) | 88% (40%, 100%) | 78% (30%, 100%) |
| Switzerland | 92% (52%, 100%) | 57% (35%, 91%) | 92% (49%, 100%) | 92% (52%, 100%) | 92% (54%, 100%) | 59% (34%, 92%) |
| UK | 97% (86%, 100%) | 89% (76%, 100%) | 98% (86%, 100%) | 100% (80%, 100%) | 97% (86%, 100%) | 87% (75%, 100%) |
| **Sub Saharan Africa** | **13% (3%, 42%)** | **11% (2%, 36%)** | **13% (2%, 42%)** | **12% (2%, 43%)** | **13% (3%, 42%)** | **12% (2%, 41%)** |
| Ghana | 3% (1%, 7%) | 2% (1%, 5%) | 3% (1%, 7%) | 2% (1%, 7%) | 3% (1%, 7%) | 2% (1%, 6%) |
| Kenya | 29% (15%, 56%) | 23% (11%, 47%) | 28% (14%, 54%) | 22% (8%, 52%) | 29% (15%, 56%) | 26% (11%, 51%) |
| Madagascar | 6% (1%, 29%) | 5% (0%, 15%) | 6% (0%, 26%) | 3% (0%, 11%) | 6% (1%, 29%) | 5% (1%, 22%) |
| Mauritius | 88% (55%, 100%) | 73% (48%, 100%) | 89% (55%, 100%) | 100% (63%, 100%) | 88% (55%, 100%) | 82% (51%, 100%) |
| Mozambique | 20% (5%, 64%) | 14% (3%, 54%) | 20% (5%, 64%) | 19% (4%, 56%) | 20% (5%, 64%) | 22% (3%, 69%) |
| Nigeria | 1% (0%, 3%) | 1% (0%, 3%) | 1% (0%, 3%) | 1% (0%, 4%) | 1% (0%, 3%) | 1% (0%, 4%) |
| Senegal | 11% (3%, 40%) | 6% (3%, 17%) | 11% (3%, 39%) | 8% (2%, 43%) | 11% (3%, 40%) | 9% (3%, 27%) |
| Tanzania | 34% (13%, 95%) | 33% (10%, 86%) | 34% (13%, 96%) | 38% (12%, 100%) | 34% (13%, 95%) | 32% (11%, 83%) |
| **Latin America** | **75% (48%, 98%)** | **54% (39%, 80%)** | **76% (48%, 99%)** | **75% (48%, 99%)** | **75% (48%, 98%)** | **64% (45%, 88%)** |
| Argentina | 60% (32%, 98%) | 37% (23%, 64%) | 60% (32%, 100%) | 61% (31%, 100%) | 60% (32%, 98%) | 50% (29%, 90%) |
| Brazil | 87% (59%, 100%) | 70% (51%, 100%) | 89% (59%, 100%) | 87% (59%, 100%) | 87% (59%, 100%) | 78% (56%, 100%) |
| Mexico | 55% (30%, 95%) | 32% (24%, 52%) | 56% (30%, 96%) | 55% (30%, 95%) | 55% (30%, 95%) | 43% (29%, 63%) |
| Uruguay | 48% (22%, 99%) | 29% (11%, 68%) | 46% (20%, 100%) | 48% (22%, 99%) | 48% (22%, 99%) | 41% (19%, 75%) |
| **Middle East & North Africa** | **16% (8%, 26%)** | **11% (5%, 22%)** | **15% (8%, 26%)** | **16% (8%, 28%)** | **17% (8%, 29%)** | **14% (7%, 24%)** |
| Egypt | 5% (2%, 10%) | 3% (1%, 8%) | 4% (2%, 10%) | 5% (2%, 12%) | 6% (2%, 13%) | 4% (2%, 9%) |
| Israel | 38% (19%, 67%) | 25% (16%, 52%) | 34% (18%, 65%) | 38% (19%, 67%) | 38% (19%, 67%) | 28% (16%, 51%) |

| | Population Attributable Fraction of injecting drug use to Hepatitis C virus transmission 2018-2030 | | | | | |
|---|---|---|---|---|---|---|
| **Country** | **Main analysis** | **Stable general population HCV prevalence** | **Decreasing PWID HCV prevalence*** | **Stable proportion of adults that are PWID in 1990 in EE and SSA**** | **Altered treatment rates for PWID and people with cirrhosis***** | **Varied epidemic trajectories by region** |
| Lebanon | 49% (18%, 89%) | 33% (14%, 82%) | 48% (17%, 91%) | 49% (18%, 89%) | 50% (19%, 89%) | 45% (18%, 99%) |
| Libya | 38% (12%, 92%) | 22% (9%, 51%) | 39% (12%, 93%) | 38% (12%, 92%) | 38% (12%, 92%) | 36% (15%, 68%) |
| Morocco | 41% (17%, 75%) | 21% (13%, 40%) | 41% (16%, 76%) | 41% (17%, 75%) | 41% (17%, 75%) | 35% (17%, 62%) |
| Saudi Arabia | 87% (64%, 100%) | 84% (58%, 100%) | 88% (65%, 100%) | 87% (64%, 100%) | 85% (62%, 100%) | 96% (65%, 100%) |
| Syria | 17% (6%, 47%) | 8% (4%, 27%) | 17% (6%, 47%) | 17% (6%, 47%) | 17% (6%, 47%) | 14% (6%, 35%) |
| Tunisia | 78% (42%, 100%) | 55% (28%, 86%) | 77% (41%, 100%) | 78% (42%, 100%) | 78% (43%, 100%) | 80% (43%, 100%) |
| Turkey | 92% (58%, 100%) | 74% (39%, 100%) | 95% (59%, 100%) | 92% (58%, 100%) | 92% (59%, 100%) | 90% (49%, 100%) |

*Decreasing at the same rate as the HCV prevalence among the general population

**EE: Eastern Europe; SSA: Sub Saharan Africa

***Treatment numbers remain the same as in the main analysis but treatment rates among PWID are halved and among people with cirrhosis are doubled. This can also mean an alteration in the treatment rates (either an increase or a decrease depending on the country) for people that do not inject drugs and do not have cirrhosis.

**Supplementary table 12:** Sensitivity analysis where the proportion of adults that are PWID in the USA expands from 2010 onwards*

| | Fitted demographic data values | | | | PAF of HCV infections due to IDU |
|---|---|---|---|---|---|
| **Assumptions** | **% of Adults that are PWID** | **Chronic HCV prevalence (%) among PWID** | **Chronic HCV prevalence (%) among general population** | **Percentage of the setting's prevalent infections that are among PWID** | **2018-2030** |
| Original | 1.19 (0.72, 1.69) | 30.2 (20.9, 41.2) | 0.9 (0.5, 1.2) | 29 (13, 50) | 77% (56%, 100%) |
| More PWID | 2.18 (1.47, 3.19) | 18.1 (12.3, 26.3) | 0.9 (065, 1.3) | 34 (16, 55) | 85% (62%, 100%) |

*From 2010 onwards the rate of initiating injecting is multiplied by 2.9 due to evidence of incidence of viral hepatitis C increasing by this amount between 2010 and 2015[59], which is thought to be driven by an increase in injecting drug use[58]

### Investigation of HCV epidemic growth and 12-year PAF

A mixed-effects regression analysis was performed with country as the panel variable, the 12-year PAF as the dependent variable and the general population annual HCV epidemic growth as the independent variable (calculated between 2018 and 2038). For each country all of the 1000 fitted runs were included, with the HCV prevalence growth and PAF varying between runs. This analysis found that a higher annual general population HCV prevalence growth was associated with a 3.39% lower PAF (-3.35% [95% CI: -3.52%, -3.18%]) per percentage point increase in general population HCV prevalence.

**Supplementary table 13:** PAF of IDU to HCV for 2018-2030 and percentages of incident infections 2018-2030 among the general population that would be avoided if all HCV among PWID was treated in 2018 and transmission was reduced to levels in the general population

| | **Infections avoided among general population** | **2018-2030 PAF** | |
|---|---|---|---|
| **Country** | **Percentage (95% Credibility Intervals)** | **Main analysis** | **Treating all PWID in 2018** |
| **Global** | **6% (3%, 12%)** | 43% (24%, 66%) | 46% (26%, 65%) |
| Central Asia | 6% (3%, 12%) | 36% (18%, 76%) | 39% (21%, 72%) |
| Eastern Europe | 15% (10%, 21%) | 96% (65%, 99%) | 96% (70%, 99%) |
| Australasia | 27% (20%, 39%) | 69% (43%, 100%) | 75% (52%, 100%) |
| East & Southeast Asia | 11% (6%, 19%) | 58% (29%, 95%) | 60% (33%, 95%) |
| South Asia | 4% (1%, 8%) | 13% (4%, 30%) | 16% (5%, 29%) |
| North America | 42% (28%, 53%) | 77% (54%, 100%) | 87% (64%, 100%) |
| Western Europe | 17% (10%, 26%) | 83% (54%, 95%) | 83% (56%, 94%) |
| Sub Saharan Africa | 4% (1%, 12%) | 13% (3%, 42%) | 14% (4%, 44%) |
| Latin America | 21% (14%, 28%) | 75% (48%, 98%) | 78% (54%, 99%) |
| Middle East & North Africa | 2% (1%, 3%) | 16% (8%, 26%) | 16% (8%, 27%) |

The sensitivity analysis presented in supplementary table 13 was performed by comparing the baseline scenario with a scenario where the additional transmission rate among PWID was set to zero and all infected PWID in 2018 were treated in order to completely remove transmission among PWID. Both scenarios were run for 100 successful fits rather than 1000, as results show that 100 and 1000 fits produce similar results.

### Comparing regional versus weighted national projections

To examine whether the PAF estimates of our 'average' national models could capture the average PAF of a set of sub-national epidemic models, we investigated how well the PAF estimates of an 'average' regional model would approximate the average PAF of the set of national models for that region. For each country in Central Asia (chosen as the first listed region) we took the weighted national prevalence estimates of HCV prevalence among PWID and the general population, and the percentage of adults that are PWID, as well as other weighted national parameters. We used the average 'regional' values to calibrate a regional model for Central Asia. We compared the 12-year PAF estimate for this regional model with the average regional PAF calculated by averaging across the different national estimates (from the national models, presented in supplementary table 10). The regional 'average' model produced very similar results, with a PAF of 34% (95% CrI: 19%-71%), compared to the average PAF across the different national models of 37% (95% CrI: 19%-73%).

## Transmission parameters

**Supplementary table 14:** HCV transmission parameters* (to 4 decimal places) among the general population and PWID

| | Transmission parameters (95% credibility intervals) | |
|---|---|---|
| **Country** | **General population (β)** | **PWID (θ)** |
| **Kazakhstan** | 0.0012 (0.0000, 0.0270) | 0.5549 (0.4409, 0.9079) |
| **Kyrgyzstan** | 0.0365 (0.0041, 0.0607) | 0.4676 (0.3592, 0.8775) |
| **Tajikistan** | 0.0515 (0.0173, 0.0786) | 0.5958 (0.4466, 1.0845) |
| **Turkmenistan** | 0.0443 (0.0179, 0.0692) | 0.5559 (0.4063, 1.0192) |
| **Uzbekistan** | 0.0381 (0.0089, 0.0656) | 0.4587 (0.3312, 0.8418) |
| **Armenia** | 0.0085 (0.0000, 0.0224) | 0.3014 (0.2379, 0.4369) |
| **Azerbaijan** | 0.0235 (0.0070, 0.0411) | 0.4361 (0.3471, 0.6763) |
| **Belarus** | 0.0019 (0.0000, 0.0182) | 0.4146 (0.3436, 0.5666) |
| **Bosnia** | 0.0000 (0.0000, 0.0031) | 0.3202 (0.2831, 0.3932) |
| **Bulgaria** | 0.0000 (0.0000, 0.0142) | 0.4215 (0.3515, 0.6085) |
| **Czech Republic** | 0.0116 (0.0000, 0.0275) | 0.2702 (0.2264, 0.3999) |
| **Estonia** | 0.0000 (0.0000, 0.0072) | 0.4185 (0.3583, 0.5157) |
| **Georgia** | 0.0000 (0.0000, 0.0160) | 0.3034 (0.2468, 0.4038) |
| **Hungary** | 0.0173 (0.0028, 0.0327) | 0.3356 (0.2639, 0.5363) |
| **Latvia** | 0.0000 (0.0000, 0.0103) | 0.4341 (0.3488, 0.5445) |
| **Lithuania** | 0.0067 (0.0000, 0.0217) | 0.3155 (0.2648, 0.4786) |
| **Moldova** | 0.0133 (0.0000, 0.0283) | 0.3258 (0.2595, 0.4624) |
| **Poland** | 0.0083 (0.0000, 0.0245) | 0.3526 (0.3083, 0.4869) |
| **Romania** | 0.0000 (0.0000, 0.0144) | 0.5035 (0.3877, 0.6627) |
| **Russia** | 0.0000 (0.0000, 0.0141) | 0.4163 (0.3474, 0.5627) |
| **Slovakia** | 0.0062 (0.0000, 0.0229) | 0.3482 (0.2794, 0.4923) |
| **Ukraine** | 0.0000 (0.0000, 0.0140) | 0.2344 (0.1806, 0.3665) |
| **Australia** | 0.0215 (0.0035, 0.0359) | 0.2375 (0.1882, 0.3864) |
| **New Zealand** | 0.0135 (0.0000, 0.0288) | 0.3142 (0.2412, 0.4764) |
| **China** | 0.0166 (0.0000, 0.0344) | 0.3604 (0.2618, 0.6583) |
| **Indonesia** | 0.0164 (0.0000, 0.0365) | 0.6285 (0.4898, 1.1142) |
| **Japan** | 0.0000 (0.0000, 0.0151) | 0.3690 (0.2867, 0.5806) |
| **Malaysia** | 0.0264 (0.0000, 0.0475) | 0.3393 (0.2756, 0.5183) |
| **Myanmar** | 0.0127 (0.0000, 0.0328) | 0.5381 (0.4001, 1.093) |
| **Philippines** | 0.0346 (0.0140, 0.0522) | 0.3880 (0.2869, 0.7131) |
| **Taiwan** | 0.0091 (0.0000, 0.0284) | 0.3605 (0.2742, 0.6109) |
| **Thailand** | 0.0182 (0.0000, 0.0375) | 0.5718 (0.4270, 1.0401) |
| **Viet Nam** | 0.0189 (0.0000, 0.0365) | 0.4905 (0.3518, 0.9202) |
| **Afghanistan** | 0.0422 (0.0018, 0.0647) | 0.3912 (0.2958, 0.6647) |
| **Bangladesh** | 0.0293 (0.0149, 0.0449) | 0.3526 (0.2582, 0.6167) |
| **India** | 0.0329 (0.0187, 0.0471) | 0.3300 (0.2521, 0.5846) |
| **Iran** | 0.0107 (0.0000, 0.0281) | 0.3437 (0.2578, 0.5785) |
| **Nepal** | 0.0190 (0.0000, 0.0351) | 0.4520 (0.3206, 0.8031) |
| **Pakistan** | 0.0395 (0.0224, 0.0552) | 0.3894 (0.1510, 0.8511) |
| **Canada** | 0.0130 (0.0000, 0.0283) | 0.3449 (0.2390, 0.5760) |

| | Transmission parameters (95% credibility intervals) | |
|---|---|---|
| **Country** | **General population (β)** | **PWID (θ)** |
| **USA** | 0.0173 (0.0000, 0.0342) | 0.2002 (0.1526, 0.3445) |
| **Albania** | 0.0066 (0.0000, 0.0195) | 0.2095 (0.1585, 0.3493) |
| **Austria** | 0.0000 (0.0000, 0.0155) | 0.2679 (0.2157, 0.4166) |
| **Belgium** | 0.0000 (0.0000, 0.0211) | 0.2595 (0.1836, 0.4671) |
| **Croatia** | 0.0076 (0.0000, 0.0215) | 0.2179 (0.1690, 0.3515) |
| **Cyprus** | 0.0233 (0.0043, 0.0404) | 0.3175 (0.2354, 0.5717) |
| **Denmark** | 0.0039 (0.0000, 0.0200) | 0.1792 (0.1419, 0.2760) |
| **FYROM** | 0.0009 (0.0000, 0.0168) | 0.3069 (0.2446, 0.4949) |
| **Finland** | 0.0000 (0.0000, 0.0078) | 0.2910 (0.2415, 0.4114) |
| **France** | 0.0035 (0.0000, 0.0206) | 0.2794 (0.2133, 0.5294) |
| **Germany** | 0.0068 (0.0000, 0.0251) | 0.2758 (0.2134, 0.4547) |
| **Greece** | 0.0197 (0.0036, 0.0348) | 0.3000 (0.2315, 0.5252) |
| **Iceland** | 0.0000 (0.0000, 0.0173) | 0.4142 (0.3355, 0.6434) |
| **Ireland** | 0.0128 (0.0000, 0.0297) | 0.3445 (0.2739, 0.5643) |
| **Italy** | 0.0000 (0.0000, 0.0161) | 0.2615 (0.1652, 0.4608) |
| **Luxembourg** | 0.0078 (0.0000, 0.0288) | 0.3922 (0.3053, 0.5833) |
| **Malta** | 0.0093 (0.0000, 0.0262) | 0.2012 (0.1517, 0.3426) |
| **Montenegro** | 0.0000 (0.0000, 0.0119) | 0.3467 (0.2663, 0.6136) |
| **Netherlands** | 0.0196 (0.0032, 0.0356) | 0.2675 (0.2062, 0.4653) |
| **Norway** | 0.0121 (0.0000, 0.0279) | 0.2895 (0.2267, 0.4639) |
| **Portugal** | 0.0000 (0.0000, 0.0171) | 0.4132 (0.2976, 0.7454) |
| **Serbia** | 0.0000 (0.0000, 0.0053) | 0.2280 (0.1865, 0.3367) |
| **Slovenia** | 0.0028 (0.0000, 0.0206) | 0.2069 (0.1611, 0.3256) |
| **Spain** | 0.0250 (0.0081, 0.0401) | 0.3389 (0.2622, 0.5964) |
| **Sweden** | 0.0151 (0.0000, 0.0371) | 0.3409 (0.2737, 0.5077) |
| **Switzerland** | 0.0080 (0.0000, 0.026) | 0.3226 (0.2439, 0.5766) |
| **UK** | 0.0027 (0.0000, 0.0221) | 0.4220 (0.3515, 0.5903) |
| **Ghana** | 0.0507 (0.0344, 0.0678) | 0.3440 (0.2786, 0.5063) |
| **Kenya** | 0.0424 (0.0232, 0.0612) | 0.4664 (0.3733, 0.7531) |
| **Madagascar** | 0.0525 (0.033, 0.0709) | 0.2679 (0.1444, 0.4235) |
| **Mauritius** | 0.0063 (0.0000, 0.0255) | 0.5430 (0.4808, 0.7071) |
| **Mozambique** | 0.0457 (0.0233, 0.0658) | 0.5539 (0.4480, 0.856) |
| **Nigeria** | 0.0554 (0.0374, 0.0737) | 0.1533 (0.0672, 0.2790) |
| **Senegal** | 0.0569 (0.0376, 0.0757) | 0.4350 (0.3485, 0.6628) |
| **Tanzania** | 0.0476 (0.0112, 0.0682) | 0.4446 (0.2958, 0.8229) |
| **Argentina** | 0.0178 (0.0003, 0.0332) | 0.2851 (0.2310, 0.4611) |
| **Brazil** | 0.0114 (0, 0.0275) | 0.3256 (0.2664, 0.4884) |
| **Mexico** | 0.0196 (0.0018, 0.0359) | 0.5666 (0.4646, 0.8733) |
| **Uruguay** | 0.0144 (0.0000, 0.0294) | 0.1693 (0.1351, 0.2912) |
| **Egypt** | 0.0412 (0.0214, 0.0593) | 0.3221 (0.2065, 0.6465) |
| **Israel** | 0.0366 (0.0179, 0.0528) | 0.2428 (0.1961, 0.4018) |
| **Lebanon** | 0.0414 (0.0108, 0.0602) | 0.4069 (0.3018, 0.7549) |
| **Libya** | 0.0219 (0.0031, 0.0381) | 0.9148 (0.6745, 1.6960) |
| **Morocco** | 0.0247 (0.0064, 0.0407) | 0.3450 (0.2528, 0.5824) |

| Country | Transmission parameters (95% credibility intervals) | |
|---|---|---|
| | General population (β) | PWID (θ) |
| **Saudi Arabia** | 0.0092 (0.0000, 0.0345) | 0.6855 (0.5189, 1.1848) |
| **Syria** | 0.0359 (0.0179, 0.0539) | 0.5669 (0.3980, 1.0766) |
| **Tunisia** | 0.0076 (0.0000, 0.0273) | 0.4432 (0.3156, 0.8650) |
| **Turkey** | 0.0055 (0.0000, 0.0273) | 0.5272 (0.3984, 0.9477) |

*The transmission parameters for the general population (β) and PWID (θ) are used to calculate the transmission rates through multiplication with the HCV prevalences in the respective populations; see the model equations section for more information.

**Supplementary table 15:** Percentage differences between target prevalences and fitted values: median (95% credibility intervals) differences to 4 decimal places

| Country | Adult % PWID | PWID % chronic HCV | Gen-pop % chronic HCV |
|---|---|---|---|
| **Overall** | **0.0000 (0.0000, 0.0000)** | **0.0000 (0.0000, 23.1888)** | **0.0000 (0.0000, 19.5878)** |
| Kazakhstan | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 30.3155) | 0.0000 (0.0000, 4.3707) |
| Kyrgyzstan | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Tajikistan | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Turkmenistan | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Uzbekistan | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Armenia | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 24.2182) | 0.0000 (0.0000, 2.4835) |
| Azerbaijan | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Belarus | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 26.3122) | 0.0000 (0.0000, 9.7487) |
| Bosnia | 0.0000 (0.0000, 0.0000) | 0.5768 (0.0000, 1.9393) | 12.4833 (0.0000, 31.1541) |
| Bulgaria | 0.0000 (0.0000, 0.0000) | 1.3755 (0.0000, 25.4172) | 0.9233 (0.0000, 16.8026) |
| Czech Republic | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 13.5840) | 0.0000 (0.0000, 5.1109) |
| Estonia | 0.0000 (0.0000, 0.0000) | 15.957 (0.0000, 32.1406) | 3.5712 (0.0000, 6.84) |
| Georgia | 0.0000 (0.0000, 0.0000) | 5.2998 (0.0000, 30.2172) | 0.0744 (0.0000, 0.4336) |
| Hungary | 0.0000 (0.0000, 0.0000) | 0 (0.0000, 0.0001) | 0 (0.0000, 0.0001) |
| Latvia | 0.0000 (0.0000, 0.0000) | 8.0438 (0.0000, 31.3363) | 1.7592 (0.0000, 6.5260) |
| Lithuania | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 17.7356) | 0.0000 (0.0000, 10.1816) |
| Moldova | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 7.8567) | 0.0000 (0.0000, 2.1969) |
| Poland | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 6.1191) | 0.0000 (0.0000, 10.6574) |
| Romania | 0.0000 (0.0000, 0.0000) | 1.6976 (0.0000, 30.0756) | 0.3841 (0.0000, 7.948) |
| Russia | 0.0000 (0.0000, 0.0000) | 11.4323 (0.0000, 32.0523) | 0.732 (0.0000, 3.7018) |
| Slovakia | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 17.6179) | 0 (0.0000, 8.0233) |
| Ukraine | 0.0000 (0.0000, 0.0000) | 0.0677 (0.0000, 31.3127) | 0.0082 (0.0000, 5.7633) |
| Australia | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0003) | 0.0000 (0.0000, 0.0004) |
| New Zealand | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 14.3745) | 0.0000 (0.0000, 6.2953) |
| China | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 5.2793) | 0.0000 (0.0000, 2.7310) |
| Indonesia | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 2.0484) | 0.0000 (0.0000, 12.7867) |
| Japan | 0.0000 (0.0000, 0.0000) | 6.2041 (0.0000, 30.4503) | 3.8911 (0.0000, 22.0100) |
| Malaysia | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 23.9627) | 0.0000 (0.0000, 9.4064) |
| Myanmar | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 26.3299) | 0.0000 (0.0000, 2.8791) |
| Philippines | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Taiwan | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 10.9844) | 0.0000 (0.0000, 6.7234) |
| Thailand | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 2.3005) | 0.0000 (0.0000, 3.8096) |
| Viet Nam | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 3.1905) | 0.0000 (0.0000, 1.4454) |
| Afghanistan | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.9701) | 0.0000 (0.0000, 0.4177) |
| Bangladesh | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| India | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Iran | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 8.6769) | 0.0000 (0.0000, 18.0241) |
| Nepal | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 2.5258) | 0.0000 (0.0000, 3.4996) |
| Pakistan | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Canada | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 9.3889) | 0.0000 (0.0000, 11.0014) |
| USA | 0.0000 (0.0000, 0.0000) | 5.0788 (0.3235, 11.5012) | 19.7636 (0.9881, 32.3413) |
| Albania | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 25.6438) | 0.0000 (0.0000, 5.9925) |
| Austria | 0.0000 (0.0000, 0.0000) | 1.1589 (0.0000, 12.6917) | 4.3463 (0.0000, 29.3384) |

| Country | Adult % PWID | PWID % chronic HCV | Gen-pop % chronic HCV |
|---|---|---|---|
| Belgium | 0.0000 (0.0000, 0.0000) | 0.0027 (0.0000, 3.7323) | 0.0060 (0.0000, 10.1140) |
| Croatia | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 8.5050) | 0.0000 (0.0000, 8.2879) |
| Cyprus | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Denmark | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 13.5931) | 0.0000 (0.0000, 15.3433) |
| FYROM | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 5.3951) | 0.0000 (0.0000, 22.0363) |
| Finland | 0.0000 (0.0000, 0.0000) | 6.3568 (0.0000, 28.0295) | 9.3372 (0.0000, 28.9889) |
| France | 0.0000 (0.0000, 0.0000) | 2.4406 (0.0898, 11.7872) | 12.1664 (0.6639, 31.1497) |
| Germany | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 10.9042) | 0.0001 (0.0000, 24.2749) |
| Greece | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0002) | 0.0000 (0.0000, 0.0002) |
| Iceland | 0.0000 (0.0000, 0.0000) | 1.3938 (0.0000, 13.3933) | 5.2428 (0.0000, 31.048) |
| Ireland | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 4.9363) | 0.0000 (0.0000, 9.1627) |
| Italy | 0.0000 (0.0000, 0.0000) | 3.1544 (0.0000, 31.5321) | 0.4526 (0.0000, 6.4067) |
| Luxembourg | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 18.3903) | 0.0000 (0.0000, 16.6488) |
| Malta | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 6.8324) | 0 (0.0000, 11.0054) |
| Montenegro | 0.0000 (0.0000, 0.0000) | 6.4577 (0.0000, 30.9746) | 3.1795 (0.0000, 14.3764) |
| Netherlands | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Norway | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 5.4320) | 0.0000 (0.0000, 12.1772) |
| Portugal | 0.0000 (0.0000, 0.0000) | 0.2116 (0.0000, 3.5705) | 0.5945 (0.0000, 8.8305) |
| Serbia | 0.0000 (0.0000, 0.0000) | 11.5035 (0.0000, 31.1178) | 8.4594 (0.0000, 20.0265) |
| Slovenia | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 23.4785) | 0.0000 (0.0000, 19.5172) |
| Spain | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0002) | 0.0000 (0.0000, 0.0002) |
| Sweden | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 24.6035) | 0.0000 (0.0000, 17.9099) |
| Switzerland | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 3.3232) | 0.0000 (0.0000, 6.5402) |
| UK | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 11.5702) | 0.0000 (0.0000, 16.8252) |
| Ghana | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Kenya | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Madagascar | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Mauritius | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 26.2514) | 0.0000 (0.0000, 7.1136) |
| Mozambique | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Nigeria | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Senegal | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Tanzania | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Argentina | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.3733) | 0.0000 (0.0000, 0.4496) |
| Brazil | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 12.8522) | 0.0000 (0.0000, 6.1677) |
| Mexico | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Uruguay | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 2.8755) | 0.0000 (0.0000, 0.8262) |
| Egypt | 0.0000 (0.0000, 0.0000) | 9.6947 (4.5902, 16.2080) | 12.1368 (0.7298, 29.0261) |
| Israel | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Lebanon | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Libya | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Morocco | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Saudi Arabia | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 12.3862) | 0.0000 (0.0000, 27.4478) |
| Syria | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 0.0000) |
| Tunisia | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 5.2494) | 0.0000 (0.0000, 7.0606) |
| Turkey | 0.0000 (0.0000, 0.0000) | 0.0000 (0.0000, 28.0645) | 0.0000 (0.0000, 10.8709) |

**Supplementary table 16:** Prior and posterior distributions, median (minimum, maximum), of the general population HCV prevalence, PWID HCV prevalence, and the percentage of adults that are PWID

| | General population HCV prevalence Median (minimum, maximum) | | PWID HCV prevalence Median (minimum, maximum) | | Adult % PWID Median (minimum, maximum) | |
|---|---|---|---|---|---|---|
| **Country** | **Prior** | **Posterior** | **Prior** | **Posterior** | **Prior** | **Posterior** |
| Afghanistan | 0.89% (0.33%, 1.54%) | 0.90% (0.35%, 1.54%) | 29.7% (21.3%, 38.4%) | 29.7% (21.3%, 38.4%) | 0.80% (0.52%, 1.08%) | 0.80% (0.52%, 1.08%) |
| Albania | 2.13% (1.39%, 2.91%) | 2.14% (1.43%, 2.91%) | 24.3% (19.1%, 30.2%) | 23.8% (13.6%, 29.0%) | 0.42% (0.29%, 0.55%) | 0.42% (0.29%, 0.55%) |
| Argentina | 0.98% (0.25%, 1.53%) | 0.99% (0.28%, 1.53%) | 40.4% (36.5%, 44.3%) | 40.3% (36.5%, 44.2%) | 0.29% (0.29%, 0.30%) | 0.29% (0.29%, 0.30%) |
| Armenia | 2.77% (1.85%, 3.78%) | 2.77% (1.95%, 3.78%) | 29.7% (20.6%, 40.0%) | 29.3% (16.7%, 39.0%) | 0.77% (0.41%, 1.34%) | 0.76% (0.42%, 1.33%) |
| Australia | 1.07% (0.87%, 1.41%) | 1.07% (0.90%, 1.41%) | 40.1% (36.5%, 43.7%) | 40.1% (35.6%, 43.5%) | 0.60% (0.44%, 0.75%) | 0.60% (0.44%, 0.75%) |
| Austria | 0.32% (0.08%, 0.50%) | 0.35% (0.13%, 0.55%) | 43.2% (38.2%, 49.0%) | 42.2% (33.5%, 48.6%) | 0.32% (0.22%, 0.42%) | 0.31% (0.22%, 0.41%) |
| Azerbaijan | 2.58% (1.70%, 3.52%) | 2.58% (1.70%, 3.45%) | 43.2% (32.7%, 54.1%) | 43.3% (32.9%, 53.9%) | 0.61% (0.49%, 0.74%) | 0.62% (0.50%, 0.74%) |
| Bangladesh | 0.98% (0.17%, 1.76%) | 1.01% (0.17%, 1.73%) | 26.7% (17.5%, 36.2%) | 26.6% (17.6%, 35.5%) | 0.07% (0.06%, 0.07%) | 0.07% (0.06%, 0.07%) |
| Belarus | 1.11% (0.59%, 2.02%) | 1.13% (0.62%, 1.97%) | 40.5% (29.7%, 51.8%) | 38.7% (23.5%, 51.2%) | 0.59% (0.23%, 0.95%) | 0.59% (0.23%, 0.95%) |
| Belgium | 0.51% (0.10%, 0.79%) | 0.52% (0.14%, 0.79%) | 41.4% (32.8%, 50.3%) | 41.2% (32.4%, 49.7%) | 0.36% (0.24%, 0.49%) | 0.36% (0.24%, 0.49%) |
| Bosnia | 0.07% (0.05%, 0.09%) | 0.08% (0.05%, 0.11%) | 27.8% (19.0%, 37.2%) | 27.4% (18.9%, 36.5%) | 0.17% (0.11%, 0.22%) | 0.17% (0.11%, 0.22%) |
| Brazil | 1.02% (0.81%, 1.23%) | 1.02% (0.81%, 1.23%) | 47.3% (43.3%, 51.3%) | 47.0% (34.5%, 51.1%) | 0.68% (0.51%, 0.87%) | 0.68% (0.52%, 0.86%) |
| Bulgaria | 1.06% (0.50%, 1.72%) | 1.08% (0.53%, 1.77%) | 47.7% (43.1%, 52.5%) | 46.2% (31.6%, 52.0%) | 0.38% (0.30%, 0.45%) | 0.38% (0.30%, 0.45%) |
| Canada | 0.73% (0.47%, 1.02%) | 0.74% (0.48%, 1.02%) | 56.1% (44.2%, 72.4%) | 55.7% (42.0%, 71.1%) | 0.39% (0.31%, 0.47%) | 0.39% (0.31%, 0.47%) |
| China | 0.77% (0.58%, 0.98%) | 0.77% (0.59%, 0.98%) | 27.3% (17.1%, 38.0%) | 27.2% (17.1%, 37.4%) | 0.25% (0.19%, 0.31%) | 0.25% (0.19%, 0.31%) |
| Croatia | 0.66% (0.36%, 1.01%) | 0.66% (0.39%, 1.03%) | 26.1% (19.7%, 33.1%) | 25.9% (18.7%, 32.7%) | 0.23% (0.18%, 0.29%) | 0.23% (0.18%, 0.29%) |
| Cyprus | 0.64% (0.32%, 1.33%) | 0.64% (0.32%, 1.31%) | 35.2% (30.6%, 40.1%) | 35.3% (31.2%, 39.7%) | 0.08% (0.04%, 0.12%) | 0.08% (0.04%, 0.12%) |
| Czech Republic | 0.35% (0.14%, 0.49%) | 0.35% (0.15%, 0.50%) | 12.8% (9.9%, 16.0%) | 12.6% (8.6%, 15.5%) | 0.64% (0.61%, 0.67%) | 0.64% (0.61%, 0.67%) |
| Denmark | 0.43% (0.33%, 0.52%) | 0.44% (0.33%, 0.58%) | 30.2% (25.2%, 35.7%) | 29.7% (21.2%, 35.5%) | 0.44% (0.35%, 0.52%) | 0.44% (0.35%, 0.52%) |
| Egypt | 6.88% (6.33%, 7.49%) | 7.73% (6.57%, 9.79%) | 34.0% (24.2%, 44.4%) | 30.7% (20.5%, 41.0%) | 0.21% (0.13%, 0.28%) | 0.21% (0.14%, 0.28%) |
| Estonia | 1.28% (1.03%, 1.46%) | 1.32% (1.04%, 1.49%) | 55.0% (45.3%, 64.6%) | 46.1% (32.3%, 62.4%) | 1.09% (0.71%, 1.72%) | 1.08% (0.71%, 1.71%) |
| FYROM | 0.36% (0.24%, 0.48%) | 0.37% (0.24%, 0.54%) | 44.1% (40.9%, 47.7%) | 43.8% (38.9%, 47.4%) | 0.16% (0.11%, 0.21%) | 0.16% (0.11%, 0.21%) |
| Finland | 0.51% (0.42%, 0.66%) | 0.57% (0.44%, 0.76%) | 52.2% (47.5%, 56.9%) | 48.6% (33.9%, 55.9%) | 0.50% (0.41%, 0.67%) | 0.50% (0.41%, 0.67%) |
| France | 0.57% (0.32%, 0.80%) | 0.63% (0.42%, 0.87%) | 45.4% (41.5%, 49.1%) | 46.2% (40.1%, 53.6%) | 0.20% (0.16%, 0.23%) | 0.20% (0.16%, 0.23%) |

| | General population HCV prevalence Median (minimum, maximum) | | PWID HCV prevalence Median (minimum, maximum) | | Adult % PWID Median (minimum, maximum) | |
|---|---|---|---|---|---|---|
| **Country** | **Prior** | **Posterior** | **Prior** | **Posterior** | **Prior** | **Posterior** |
| Georgia | 5.40% (4.56%, 6.35%) | 5.41% (4.58%, 6.29%) | 48.0% (39.0%, 57.2%) | 44.3% (29.0%, 57.0%) | 4.26% (0.61%, 7.81%) | 4.23% (0.70%, 7.81%) |
| Germany | 0.42% (0.21%, 0.65%) | 0.43% (0.22%, 0.65%) | 46.1% (41.2%, 51.2%) | 45.7% (36.9%, 50.5%) | 0.24% (0.03%, 0.45%) | 0.23% (0.04%, 0.44%) |
| Ghana | 1.96% (0.85%, 3.86%) | 1.91% (0.88%, 3.79%) | 28.2% (23.8%, 32.9%) | 28.2% (24%, 32.9%) | 0.05% (0.03%, 0.07%) | 0.05% (0.03%, 0.07%) |
| Greece | 1.17% (0.35%, 1.85%) | 1.17% (0.39%, 1.83%) | 46.7% (42.3%, 51.2%) | 46.6% (42.3%, 51.2%) | 0.07% (0.06%, 0.09%) | 0.07% (0.06%, 0.09%) |
| Hungary | 0.82% (0.28%, 1.89%) | 0.84% (0.28%, 1.89%) | 32.4% (21.1%, 45.3%) | 32.6% (21.4%, 44.3%) | 0.06% (0.03%, 0.08%) | 0.06% (0.03%, 0.08%) |
| Iceland | 0.29% (0.23%, 0.35%) | 0.31% (0.24%, 0.44%) | 44.7% (40.8%, 48.4%) | 43.6% (35.5%, 48.4%) | 0.24% (0.16%, 0.32%) | 0.24% (0.16%, 0.32%) |
| India | 0.72% (0.40%, 1.18%) | 0.73% (0.40%, 1.18%) | 31.3% (26%, 36.7%) | 31.4% (26%, 36.5%) | 0.02% (0.01%, 0.03%) | 0.02% (0.01%, 0.03%) |
| Indonesia | 0.55% (0.08%, 1.08%) | 0.55% (0.11%, 1.07%) | 56.5% (52.2%, 61.3%) | 56.4% (52.3%, 60.9%) | 0.11% (0.09%, 0.13%) | 0.11% (0.09%, 0.13%) |
| Iran | 0.44% (0.15%, 0.79%) | 0.44% (0.17%, 0.79%) | 34.7% (21.8%, 47.8%) | 34.3% (21.8%, 46.4%) | 0.28% (0.19%, 0.37%) | 0.28% (0.19%, 0.37%) |
| Ireland | 0.68% (0.47%, 1.14%) | 0.68% (0.47%, 1.13%) | 52.9% (49%, 56.8%) | 52.8% (46.6%, 56.8%) | 0.27% (0.20%, 0.33%) | 0.27% (0.20%, 0.33%) |
| Israel | 1.16% (0.61%, 1.50%) | 1.15% (0.65%, 1.47%) | 31.2% (25.6%, 37%) | 31.2% (25.6%, 37%) | 0.41% (0.28%, 0.54%) | 0.41% (0.28%, 0.54%) |
| Italy | 2.54% (1.17%, 5.29%) | 2.58% (1.26%, 5.15%) | 41.1% (36%, 46.5%) | 38.9% (25.7%, 46%) | 0.85% (0.57%, 1.13%) | 0.85% (0.57%, 1.12%) |
| Japan | 0.75% (0.31%, 1.39%) | 0.79% (0.38%, 1.46%) | 41.1% (34.3%, 48.6%) | 38.1% (24.4%, 46.9%) | 0.47% (0.36%, 0.58%) | 0.47% (0.36%, 0.58%) |
| Kazakhstan | 1.43% (0.63%, 2.16%) | 1.48% (0.71%, 2.16%) | 28.6% (25%, 32.8%) | 27.3% (17.3%, 31.9%) | 1.00% (0.65%, 1.42%) | 0.99% (0.65%, 1.38%) |
| Kenya | 0.47% (0.15%, 0.72%) | 0.48% (0.16%, 0.72%) | 11.8% (7.6%, 16.7%) | 11.8% (7.7%, 16.5%) | 0.12% (0.03%, 0.20%) | 0.12% (0.04%, 0.20%) |
| Kyrgyzstan | 1.66% (0.77%, 3.29%) | 1.69% (0.82%, 3.19%) | 21.4% (18.7%, 24.1%) | 21.4% (15.1%, 24%) | 0.77% (0.51%, 1.10%) | 0.77% (0.51%, 1.10%) |
| Latvia | 1.70% (1.18%, 2.30%) | 1.75% (1.26%, 2.33%) | 51.7% (45.1%, 58.1%) | 47.3% (31.7%, 57.4%) | 0.93% (0.73%, 1.17%) | 0.93% (0.74%, 1.15%) |
| Lebanon | 0.22% (0.08%, 0.49%) | 0.22% (0.08%, 0.47%) | 16.3% (10.5%, 23.3%) | 16.4% (10.7%, 22.9%) | 0.14% (0.09%, 0.19%) | 0.14% (0.09%, 0.19%) |
| Libya | 0.83% (0.74%, 0.92%) | 0.83% (0.74%, 0.92%) | 64.8% (60.3%, 69.1%) | 64.9% (60.3%, 69%) | 0.05% (0.01%, 0.10%) | 0.05% (0.01%, 0.10%) |
| Lithuania | 1.35% (0.83%, 1.93%) | 1.36% (0.87%, 2.02%) | 28.6% (25.6%, 31.5%) | 28.3% (19.8%, 31.2%) | 0.23% (0.12%, 0.34%) | 0.22% (0.12%, 0.33%) |
| Luxembourg | 0.85% (0.40%, 1.17%) | 0.85% (0.43%, 1.20%) | 57.6% (52.5%, 62.8%) | 56.9% (41.6%, 62.1%) | 0.57% (0.45%, 0.69%) | 0.57% (0.45%, 0.68%) |
| Madagascar | 0.86% (0.53%, 1.24%) | 0.85% (0.53%, 1.22%) | 3.9% (1.6%, 6.4%) | 3.9% (1.6%, 6.3%) | 0.22% (0.02%, 0.58%) | 0.22% (0.03%, 0.58%) |
| Malaysia | 1.91% (0.20%, 4.82%) | 1.87% (0.45%, 4.78%) | 42.6% (38.3%, 46.9%) | 42.4% (28.9%, 46.9%) | 1.33% (1.12%, 1.55%) | 1.33% (1.13%, 1.55%) |
| Malta | 0.28% (0.19%, 0.43%) | 0.29% (0.19%, 0.43%) | 17.9% (9.3%, 26.9%) | 20% (13.7%, 26.9%) | 0.26% (0.18%, 0.35%) | 0.27% (0.18%, 0.35%) |
| Mauritius | 1.48% (0.98%, 2.04%) | 1.50% (0.98%, 2.04%) | 68.4% (64.7%, 72.2%) | 67.7% (45.9%, 71.8%) | 0.87% (0.40%, 1.52%) | 0.86% (0.42%, 1.50%) |
| Mexico | 1.02% (0.81%, 1.21%) | 1.02% (0.81%, 1.25%) | 70.6% (66.4%, 74.9%) | 70.6% (66.7%, 74.9%) | 0.18% (0.12%, 0.25%) | 0.18% (0.12%, 0.25%) |
| Moldova | 2.66% (1.58%, 3.25%) | 2.67% (1.65%, 3.31%) | 34.8% (23.2%, 47%) | 34.7% (23.2%, 46.5%) | 0.40% (0.25%, 0.54%) | 0.39% (0.26%, 0.54%) |

| | General population HCV prevalence Median (minimum, maximum) | | PWID HCV prevalence Median (minimum, maximum) | | Adult % PWID Median (minimum, maximum) | |
|---|---|---|---|---|---|---|
| **Country** | **Prior** | **Posterior** | **Prior** | **Posterior** | **Prior** | **Posterior** |
| Montenegro | 0.85% (0.57%, 1.15%) | 0.88% (0.58%, 1.21%) | 30.8% (27.3%, 34.5%) | 28.6% (19.5%, 34.5%) | 0.40% (0.27%, 0.53%) | 0.39% (0.27%, 0.52%) |
| Morocco | 0.95% (0.74%, 1.34%) | 0.96% (0.75%, 1.33%) | 37.2% (22.9%, 51.5%) | 37.5% (24%, 50.9%) | 0.13% (0.07%, 0.20%) | 0.13% (0.07%, 0.20%) |
| Mozambique | 1.79% (0.11%, 4.95%) | 1.78% (0.14%, 4.95%) | 47.3% (42.5%, 51.7%) | 47.2% (42.5%, 51.6%) | 0.20% (0.00%, 0.41%) | 0.20% (0.00%, 0.41%) |
| Myanmar | 1.11% (0.60%, 1.75%) | 1.1% (0.60%, 1.67%) | 18.8% (16.6%, 21.4%) | 18.6% (11.9%, 21.3%) | 0.48% (0.33%, 0.64%) | 0.48% (0.33%, 0.64%) |
| Nepal | 0.50% (0.33%, 0.68%) | 0.50% (0.34%, 0.68%) | 35% (23.5%, 46.1%) | 34.7% (24.3%, 46%) | 0.20% (0.19%, 0.21%) | 0.20% (0.19%, 0.21%) |
| Netherlands | 0.16% (0.05%, 0.27%) | 0.16% (0.06%, 0.27%) | 39.2% (34.4%, 44.8%) | 39.2% (34.5%, 44.8%) | 0.03% (0.02%, 0.04%) | 0.03% (0.02%, 0.04%) |
| New Zealand | 1.09% (0.61%, 1.62%) | 1.10% (0.61%, 1.61%) | 53.8% (46.6%, 61.8%) | 53.3% (38.4%, 61%) | 0.73% (0.50%, 0.96%) | 0.73% (0.51%, 0.96%) |
| Nigeria | 1.59% (1.43%, 1.83%) | 1.59% (1.44%, 1.81%) | 4.2% (2.5%, 6.3%) | 4.2% (2.5%, 6.3%) | 0.35% (0.24%, 0.46%) | 0.35% (0.24%, 0.46%) |
| Norway | 0.40% (0.31%, 0.51%) | 0.40% (0.32%, 0.56%) | 45.9% (41.1%, 50.9%) | 45.7% (38.7%, 50.9%) | 0.25% (0.21%, 0.29%) | 0.25% (0.21%, 0.29%) |
| Pakistan | 3.82% (3.55%, 4.14%) | 3.82% (3.56%, 4.11%) | 30.6% (4.7%, 62%) | 30.1% (5.2%, 62%) | 0.37% (0.32%, 0.42%) | 0.37% (0.32%, 0.42%) |
| Philippines | 0.68% (0.22%, 1.28%) | 0.68% (0.22%, 1.28%) | 22.1% (10.5%, 35.6%) | 22.1% (10.5%, 35.6%) | 0.04% (0.03%, 0.05%) | 0.04% (0.03%, 0.05%) |
| Poland | 0.60% (0.40%, 0.81%) | 0.60% (0.40%, 0.81%) | 41.6% (36.9%, 47.6%) | 41.5% (36.4%, 47.6%) | 0.27% (0.18%, 0.36%) | 0.27% (0.18%, 0.36%) |
| Portugal | 1.13% (0.35%, 2.05%) | 1.16% (0.39%, 2.08%) | 62.3% (55.1%, 69.3%) | 61.7% (54.6%, 69.2%) | 0.22% (0.19%, 0.25%) | 0.22% (0.19%, 0.25%) |
| Romania | 2.25% (1.99%, 2.55%) | 2.29% (2.02%, 2.74%) | 58.4% (54%, 63.3%) | 56.2% (39%, 62.3%) | 0.64% (0.47%, 0.83%) | 0.64% (0.47%, 0.83%) |
| Russia | 2.59% (0.83%, 3.93%) | 2.70% (0.90%, 3.91%) | 47.8% (40.2%, 55.5%) | 42.1% (28.5%, 54.5%) | 1.79% (0.95%, 2.67%) | 1.76% (0.97%, 2.66%) |
| Saudi Arabia | 0.35% (0.27%, 0.43%) | 0.36% (0.28%, 0.52%) | 53.4% (48.5%, 58.3%) | 52.9% (41.8%, 57.6%) | 0.20% (0.13%, 0.27%) | 0.20% (0.13%, 0.27%) |
| Senegal | 1.20% (0.02%, 3.27%) | 1.23% (0.02%, 3.20%) | 27.6% (21.6%, 34.4%) | 27.6% (21.6%, 34.4%) | 0.08% (0.05%, 0.11%) | 0.08% (0.05%, 0.11%) |
| Serbia | 0.36% (0.23%, 0.48%) | 0.38% (0.26%, 0.55%) | 18.4% (15.2%, 21.8%) | 16.2% (11.4%, 20.8%) | 0.49% (0.41%, 0.58%) | 0.49% (0.41%, 0.58%) |
| Slovakia | 0.99% (0.60%, 1.40%) | 1.00% (0.62%, 1.43%) | 38.9% (24.8%, 53.8%) | 37.8% (22%, 53.2%) | 0.56% (0.35%, 0.88%) | 0.56% (0.35%, 0.88%) |
| Slovenia | 0.28% (0.21%, 0.36%) | 0.29% (0.21%, 0.39%) | 21.6% (18.2%, 25.3%) | 20.9% (14.2%, 24.8%) | 0.42% (0.30%, 0.55%) | 0.42% (0.30%, 0.55%) |
| Spain | 1.06% (0.30%, 1.87%) | 1.08% (0.29%, 1.83%) | 50.4% (47.2%, 53.7%) | 50.4% (47.2%, 57.4%) | 0.07% (0.05%, 0.10%) | 0.08% (0.05%, 0.10%) |
| Sweden | 0.41% (0.33%, 0.50%) | 0.41% (0.32%, 0.58%) | 57.9% (54.1%, 61.6%) | 57.9% (49.1%, 75.4%) | 0.24% (0.04%, 0.61%) | 0.23% (0.04%, 0.61%) |
| Switzerland | 0.99% (0.57%, 1.27%) | 1.01% (0.57%, 1.27%) | 52.9% (47.6%, 58.5%) | 52.7% (47%, 57.9%) | 0.24% (0.19%, 0.29%) | 0.24% (0.19%, 0.29%) |
| Syria | 1.68% (0.43%, 2.58%) | 1.71% (0.48%, 2.54%) | 41.7% (27.9%, 56.6%) | 41.6% (27.9%, 56.1%) | 0.07% (0.04%, 0.09%) | 0.07% (0.04%, 0.09%) |
| Taiwan | 2.91% (1.56%, 5.53%) | 2.96% (1.56%, 5.44%) | 57.9% (54.4%, 61.5%) | 57.6% (45.5%, 61.5%) | 0.30% (0.20%, 0.40%) | 0.30% (0.20%, 0.39%) |
| Tajikistan | 1.71% (0.54%, 3.29%) | 1.72% (0.55%, 3.28%) | 29.9% (25.9%, 33.6%) | 29.9% (26.2%, 33.6%) | 0.47% (0.31%, 0.65%) | 0.47% (0.31%, 0.65%) |
| Tanzania | 2.43% (0.16%, 5.59%) | 2.50% (0.20%, 5.45%) | 19.6% (15.1%, 24.1%) | 19.5% (12.4%, 23.7%) | 1.24% (0.72%, 1.74%) | 1.24% (0.72%, 1.74%) |

| | General population HCV prevalence Median (minimum, maximum) | | PWID HCV prevalence Median (minimum, maximum) | | Adult % PWID Median (minimum, maximum) | |
|---|---|---|---|---|---|---|
| **Country** | **Prior** | **Posterior** | **Prior** | **Posterior** | **Prior** | **Posterior** |
| Thailand | 1.04% (0.48%, 2.36%) | 1.03% (0.49%, 2.28%) | 56% (50.7%, 61.9%) | 55.8% (48%, 61.3%) | 0.11% (0.03%, 0.18%) | 0.11% (0.03%, 0.18%) |
| Tunisia | 0.76% (0.16%, 1.21%) | 0.75% (0.17%, 1.20%) | 20% (17.1%, 23.2%) | 19.9% (16.9%, 23.2%) | 0.21% (0.14%, 0.29%) | 0.21% (0.14%, 0.28%) |
| Turkey | 0.80% (0.42%, 1.47%) | 0.83% (0.44%, 1.42%) | 30.9% (27.8%, 34%) | 30.3% (19.9%, 33.9%) | 0.42% (0.28%, 0.55%) | 0.42% (0.29%, 0.55%) |
| Turkmenistan | 2.28% (0.60%, 3.34%) | 2.30% (0.65%, 3.34%) | 29.5% (21.6%, 38.4%) | 29.4% (22.9%, 37.5%) | 0.40% (0.27%, 0.53%) | 0.40% (0.28%, 0.53%) |
| UK | 0.38% (0.27%, 0.53%) | 0.39% (0.27%, 0.57%) | 32.1% (21.5%, 43.3%) | 31.5% (20.7%, 43.3%) | 0.40% (0.38%, 0.42%) | 0.40% (0.38%, 0.42%) |
| USA | 1.01% (0.88%, 1.17%) | 1.21% (0.84%, 1.52%) | 40.2% (28.5%, 52.6%) | 37.6% (25.4%, 52.6%) | 1.31% (0.59%, 1.86%) | 1.22% (0.62%, 1.84%) |
| Ukraine | 2.19% (0.64%, 3.25%) | 2.25% (0.70%, 3.21%) | 38.3% (33.9%, 42.8%) | 36.6% (23.6%, 42.6%) | 1.07% (0.54%, 1.79%) | 1.06% (0.55%, 1.73%) |
| Uruguay | 0.74% (0.50%, 0.99%) | 0.74% (0.51%, 0.99%) | 16.2% (13.7%, 18.7%) | 16.1% (10.7%, 18.7%) | 0.40% (0.10%, 0.86%) | 0.40% (0.10%, 0.85%) |
| Uzbekistan | 5.45% (3.08%, 6.83%) | 5.45% (3.22%, 6.69%) | 25.2% (21.9%, 29.1%) | 25.2% (19%, 29.1%) | 0.49% (0.32%, 0.69%) | 0.49% (0.32%, 0.69%) |
| Viet Nam | 0.99% (0.75%, 1.31%) | 0.99% (0.75%, 1.31%) | 37.2% (26.6%, 48.2%) | 37.1% (27%, 48%) | 0.25% (0.19%, 0.31%) | 0.25% (0.19%, 0.31%) |

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