ACCSCIENCE PUBLISHING

International Journal of Population Studies

RESEARCH ARTICLE

Estimates and probabilistic projections of total marriage rates and total divorce rates for probabilistic household and living arrangement projections to inform healthy aging and sustainable development in Singapore and Indonesia

Supplementary Files

S1. Equations to calculate time series of TMR(t) and TDR(t) using the five-year-age-group-specific statistics

We denote $i = 1, 2, 3, 4, 5, \ldots, 14$, represent the five-year-age-groups 15–19, 20–24, 25–29, 30–34, 35–39, …, 80+, respectively; *N(i,t)* as the male/female-combined total number of persons of age-group *i* in year *t; M(i,t)* as the male/female-combined number of newly married (including first marriages and remarriages) persons of age-group *i* in year *t*; and *m(i,t)* as the male/female-combined age-group-specific frequencies of marriages in year *t*, where:

$$m(i,t) = \frac{M(i,t)}{N(i,t)} \tag{S1}$$

Because *m(i,t)* is the average of the five single-year-age-specific frequencies of marriages of the five-year-specific-groups *i* ($i = 1, 2, 3, 4, 5, \ldots, 14$), the male/female-combined total marriage rate (*TMR[t]*) is defined as:

$$TMR(t) = \sum_{i=1}^{14} (5 \times m(i,t)) \tag{S2}$$

Then, we denote *D(i,t)* as the male/female-combined number of newly divorced persons of five-year-age-group *i* in year *t*, and *d(i,t)* as the male/female-combined age-group-specific frequencies of divorces in year *t*, where:

$$d(i,t) = \frac{D(i,t)}{N(i,t)} \tag{S3}$$

Because *d(i,t)* is the average of the five single-year-age-specific frequencies of divorces of the five-year-specific-groups *i* ($i = 1, 2, 3, 4, 5, \ldots, 14$), the male/female-combined total divorce rate (*TDR[t]*) is defined as:

$$TMR(t) = \sum_{i=1}^{14} (5 \times d(i,t)) \tag{S4}$$

S2. Equations for estimating TMR(t) and TDR(t) using single-year-age-specific survey data

We denote *N(x,t)* as the rural/urban-combined, male/female-combined total number of persons of single-year age *x* in year *t; M(x,t)* as the rural/urban-combined, male/female-combined number of newly married (including first marriages and remarriages) persons of single-year age *x* in year *t*; and *m(x,t)* as the rural/urban-combined, male/female-combined single-year-age-specific frequencies of marriages in year *t*; where:

$$\mathrm{m}(x,t) = \frac{M(x,t)}{N(x,t)} \tag{S5}$$

The rural/urban (or race)-combined, male/female-combined TMR(t) in year t is defined as the sum of $m(x,t)$ from the lowest age (e.g. 15) at which marriages may occur to the highest age (e.g. 80+) at which marriages may occur:

$$TMR(t) = \sum_{x=15}^{\beta+} m(x,t) \tag{S6}$$

Then, we denote $D(x,t)$ as the rural/urban-combined, male/female-combined number of newly divorced persons of single-year age x in year t, and $d(x,t)$ as the rural/urban-combined, male/female-combined single-year-age-specific frequencies of divorces in year t, where:

$$\mathrm{d}(x,t) = \frac{D(x,t)}{N(x,t)} \tag{S7}$$

The rural/urban (or race)-combined, male/female-combined $TDR(t)$ in year t is defined as the sum of $d(x,t)$ from the lowest age (e.g. 15 years) at which divorce may occur to the highest age (e.g. 80+ years) at which divorce may occur:

$$TDR(t) = \sum_{x=15}^{\beta+} d(x,t) \tag{S8}$$

S3. Decomposition of the probabilistically projected four marital statuses into seven marital/union statuses

Using the ProFamy methods/software for the projections of households and living arrangements, users can choose either the multistate transitional model with four marital statuses: never married, currently married, widowed, and divorced (**Figure S1A**), or with seven marital/union statuses: never married and not cohabiting, currently married, widowed and not cohabiting, divorced and not cohabiting, never married and cohabiting, widowed and cohabiting, and divorced and cohabiting (**Figure S1B**). However, if the seven-marital/union-status transition model is adopted in probabilistic household and living arrangement projections (PHPs), one would need to estimate the time series and probabilistically project the summary measures of 13 marital/union status transitions, in addition to estimating 13 sets of rural/urban (or race)-, sex-, and age-specific standard schedules:

(i) transitions from never-married and not cohabiting to currently married,
(ii) transitions from never-married and not cohabiting to never-married and cohabiting;
(iii) transitions from never-married and cohabiting to currently married;
(iv) transitions from never-married and cohabiting to never-married and not cohabiting;
(v) transitions from currently married to divorced and not cohabiting;
(vi) transitions from widowed and not cohabiting to currently married;
(vii) transitions from widowed and not cohabiting to widowed and cohabiting;
(viii) transitions from widowed and cohabiting to currently married;
(ix) transitions from widowed and cohabiting to widowed and not cohabiting;
(x) transitions from divorced and not cohabiting to currently married;
(xi) transitions from divorced and not cohabiting to divorced and cohabiting;
(xii) transitions from divorced and cohabiting to currently married;
(xiii) transitions from divorced and cohabiting to divorced and not cohabiting.

This is extremely data-intensive and not feasible, as most countries worldwide lack sufficiently long time-series data on cohabitation status transitions, since cohabitation became popular only recently. Thus, we followed the Sullivan proportional distribution approach to project future cohabitation statuses in PHPs. More specifically, we first employed the extended ProFamy multistate cohort-component model for PHPs with four marital statuses (m = 1, never married; m = 2, currently married; m = 3, widowed; m = 4, divorced), and then decomposed the three non-currently married statuses into cohabiting and non-cohabiting. In this way, we only need to estimate the age-specific standard schedules, estimate the time series, and probabilistically project the summary measures of four marital-status transitions, as follows:

(i) transitions from never-married (m = 1) to currently married (m = 2);

(ii) transitions from currently married (m = 2) to divorced (m = 4);
(iii) transitions from widowed (m = 3) to currently married (m = 2);
(iv) transitions from divorce (m = 4) to currently married (m = 2).

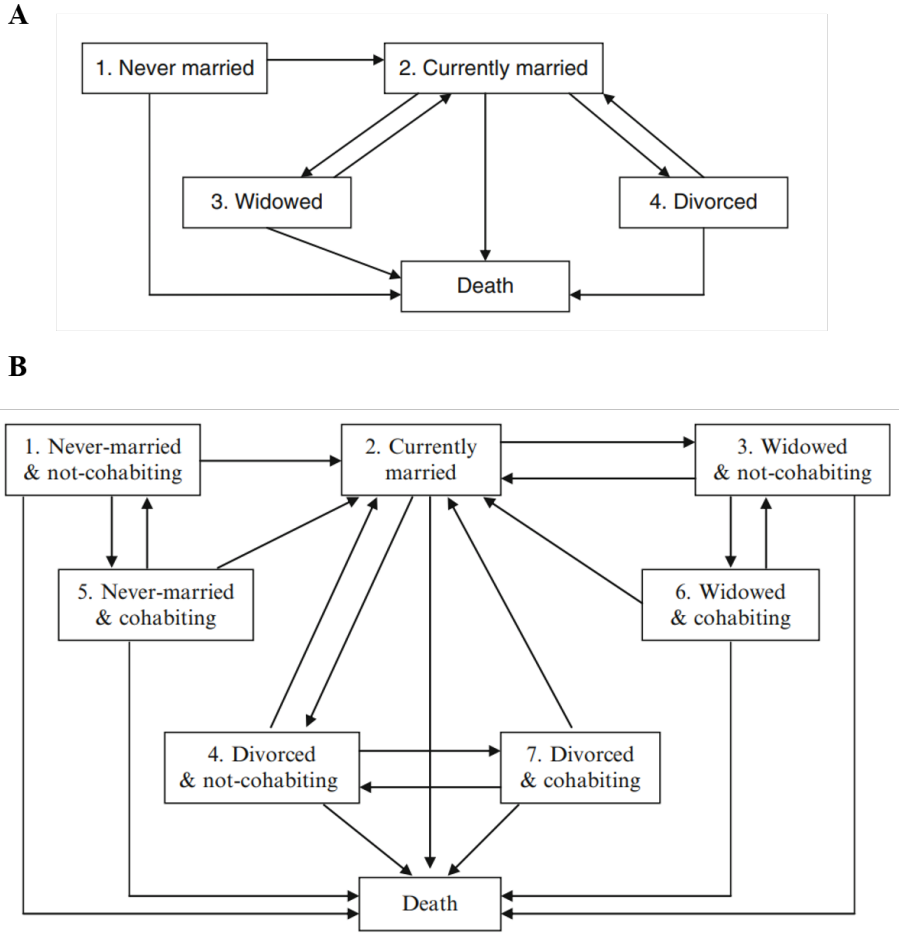


Figure S1. (A) Transitions of four marital statuses. (B) Transitions of seven marital/union statuses. Reprinted with permission from Zeng et al. (2014). Copyright © 2014 Springer Science + Business Media Dordrecht.

After PHPs were produced, we decomposed the four marital statuses into seven marital/union statuses (m = 1, never married and not cohabiting; m = 2, currently married; m = 3, widowed and not cohabiting; m = 4, divorced and not cohabiting; m = 5, never married and cohabiting; m = 6, widowed and cohabiting; m = 7, divorced and cohabiting), using **Equations S9–S16**. In this way, we avoided the complex, data-intensive task of estimating age-specific standard schedules, time-series estimates, and probabilistic projections of summary measures of transitions among seven marital/union statuses.

Denote $N4(x,m,c,k,s,r,t)$ as the probabilistically projected numbers of persons with age x, marital status m (m = 1: never married; m = 2: currently married; m = 3: widowed; m = 4: divorced), co-residence with children status c, co-residence with parent(s) status k, sex s, and rural/urban (or race) status r in the future year t; $N7(x,m,c,k,s,r,t)$ as the decomposed and estimated numbers of persons with age x, sex s, marital/union status m (m = 1: never married and not-cohabiting; m = 2: currently married; m = 3: widowed and not-cohabiting; m = 4: divorced and not-cohabiting; m = 5: never married and cohabiting; m = 6: widowed and cohabiting; m = 7: divorced and cohabiting), c, k, and r statuses in year t; $N7(x,2,c,k,s,r,t) = N4(x,2,c,k,s,r,t)$.

Denote $Pc(x,m,s,r,t)$ as the projected proportions of persons who are cohabiting among those with age x, marital status m (m = 1,3,4), sex s, and rural/urban (or race) r in year t; $AvPc(m,s,r,T1)$ as the weighted average proportions (over ages)

of persons who are cohabiting among those with marital status m (m = 1,3,4), sex s, and rural/urban (or race) r in year $T1$ ($T1$ is the most recent census year), based on the observed $Pc(x,m,s,r,T1)$, which are estimated using the census data (or the recent survey data if the census does not collect cohabitation data). We estimate the $AvPc(m,s,r,T1)$ using **Equation S9**, in which the weights are $\mathrm{Pc(x,m,s,r,T1)} / \sum_{x=15}^{\beta+} \mathrm{Pc}(x,\mathrm{m},s,\mathrm{r},\mathrm{T1})$.

$$AvPc(m,s,r,T1) = \sum_{x=15}^{\beta+}[\mathrm{Pc}(x,\mathrm{m},s,\mathrm{r},\mathrm{T1}) * \frac{\mathrm{Pc}(x,\mathrm{m},s,\mathrm{r},\mathrm{T1})}{\sum_{x=15}^{\beta+}\mathrm{Pc}(x,\mathrm{m},s,\mathrm{r},\mathrm{T1})}]; m = 1,3,4 \quad \text{(S9)}$$

$Pc(x,m,s,r,t)$ in the future year t ($t > T1$) is projected based on the observed $Pc(x,m,s,r,T1)$ and $AvPc(m,s,r,T1)$ in year $T1$ as well as the projected (or assumed) $AvPc(m,s,r,t)$ in future year t, using **Equation S10**. One may project (or assume) that $AvPc(m,s,r,t)$ will increase or decrease in the future year t based on observed trends in recent years.

$$Pc(x,m,s,r,t) = Pc(x,m,s,r,T1) \times \frac{AvPc(m,s,r,t)}{AvPc(m,s,r,\mathrm{T1})}; i = 1,3,4; t > T1 \quad \text{(S10)}$$

We multiply $N4(x,m,c,k,s,r,t)$ by $Pc(x,m,s,r,t)$ (m = 1,3,4) to project the number of persons who are cohabiting or not cohabiting in future year t using the following equations:

$$N7(x,5,c,k,s,r,t) = N4(x,1,c,k,s,r,t) \times Pc(x,1,s,r,t) \quad \text{(S11)}$$

$$N7(x,6,c,k,s,r,t) = N4(x,3,c,k,s,r,t) \times Pc(x,3,s,r,t) \quad \text{(S12)}$$

$$N7(x,7,c,k,s,r,t) = N4(x,4,c,k,s,r,t) \times Pc(x,4,s,r,t) \quad \text{(S13)}$$

$$N7(x,1,c,k,s,r,t) = N4(x,1,c,k,s,r,t) - N7(x,5,c,k,s,r,t) \quad \text{(S14)}$$

$$N7(x,3,c,k,s,r,t) = N4(x,3,c,k,s,r,t) - N7(x,6,c,k,s,r,t) \quad \text{(S15)}$$

$$N7(x,4,c,k,s,r,t) = N4(x,4,c,k,s,r,t) - N7(x,7,c,k,s,r,t) \quad \text{(S16)}$$

S4. Details of the Bayesian AR1 model incorporating expert judgment for estimating time series of TMR(t) and TDR(t)

Let Λ_t denotes an estimated trajectory of TMR(t) or TDR(t). We specify an AR1 model for each such trajectory. When TMR(t) or TDR(t) is estimated directly, we have a single trajectory; when estimated using the Bayesian approach, we have 2,000 trajectories.

$$\Lambda_t \sim N\left(\alpha_t, \tau_\Lambda^2\right) \quad \text{(S17)}$$

$$\alpha_t \sim N\left((1-\phi)\mu + \phi\alpha_{t-1}, \tau_\alpha^2\right) \quad \text{(S18)}$$

$$\alpha_1 \sim N\left((1-\phi)\mu, \tau_\alpha^2\right) \quad \text{(S19)}$$

$$\phi = a_0 + (a_1 - a_0)\phi_0 \tag{S20}$$

$$\phi_0 \sim Beta(2,2) \tag{S21}$$

$$\tau_\Lambda \sim N^+\left(0, A_\Lambda^2\right) \tag{S22}$$

$$\tau_\alpha \sim N^+\left(0, A_\alpha^2\right) \tag{S23}$$

$$\mu \sim N\left(m_\mu, A_\mu^2\right) \tag{S24}$$

We set $\alpha_0 = 0.8$ and $\alpha_1 = 0.98$, so that the autocorrelation parameter ϕ for a_t is high while remaining strictly below the unit boundary. Let $\bar{\Lambda} = \left(\Lambda_1 + \ldots + \Lambda_T\right)/T$ be the mean of the historical values. We set $A_\Lambda = 0.05\bar{\Lambda}$, $A_\alpha = 0.05\bar{\Lambda}$, $m_\mu = \bar{\Lambda}$, and $A_\mu = 10\bar{\Lambda}$.

Suppose that expert judgments are available for H future periods, $T + 1$, …, $T + H$. For each period $T + h$, let d_{T+h} denote the median and let u_{T+h} denote the U80 of the expert judgment distribution. Then, for each period $T + h$, the expert judgment distribution is given by:

$$\Lambda_{T+h} \sim N\left(d_{T+h}, s_{T+h}^2\right) \tag{S25}$$

where the standard deviation is derived as:

$$S_{T+H} = (u_{T+H} - d_{T+H})/1.28 \tag{S26}$$

We assume that the expert judgment distributions are independent across periods.

Let $\Psi = \left(\Lambda_{T+1}, \ldots, \Lambda_{T+H}, \alpha_{T+1}, \ldots, \alpha_{T+H}\right)$. We multiply the posterior distribution of Ψ by the expert judgment distributions to obtain the projection distribution for Ψ. This distribution is multivariate normal:

$$\Psi \sim N(\pi, \Sigma) \tag{S27}$$

The future trajectory $\left(\Lambda_{T+1}, \ldots, \Lambda_{T+H}\right)$ can then be obtained as a subvector of Ψ. When historical values of TMR(t) or TDR(t) are estimated directly, we obtain 2,000 future trajectories based on that single trajectory; when estimated using the Bayesian approach, we obtain 2,000 future trajectories based on each of the 2,000 estimated trajectories.

The derived expressions of π and Σ are as follows. Define $\Omega = \Sigma^{-1}$, we have:

(i) For $h = 1,\ldots, H$, the diagonal element corresponding to Λ_{T+h} equals $\frac{1}{\tau_\Lambda^2} + \frac{1}{s_{T+h}^2}$.

(ii) If $H > 1$, then for $h = 1,\ldots, H-1$, the diagonal element corresponding to α_{T+h} equals $\frac{1+\phi^2}{\tau_\alpha^2} + \frac{1}{\tau_\Lambda^2}$. The diagonal element corresponding to α_{T+H} equals $\frac{1}{\tau_\alpha^2} + \frac{1}{\tau_\Lambda^2}$.

(iii) For $h = 1,\ldots, H$, the two off-diagonal terms corresponding to Λ_{T+h} and α_{T+h} both equal $-\frac{1}{\tau_\Lambda^2}$.

(iv) If $H > 1$, then for $h = 1,\ldots, H-1$, the two off-diagonal terms corresponding to α_{T+h} and α_{T+h+1} both equal $-\frac{\phi}{\tau_\alpha^2}$.

Let ξ denote the $(2H) \times 1$ vector that satisfies the following conditions:

(i) For $h = 1,\ldots, H$, the element corresponding to Λ_{T+h} equals $\frac{d_{T+h}}{s_{T+h}^2}$.

(ii) If $H = 1$, the element corresponding to α_{T+1} equals $\frac{(1-\phi)\mu+\phi\alpha_T}{\tau_\alpha^2}$. If $H = 2$, it equals $\frac{(1-\phi)\mu+\phi\alpha_T-\phi(1-\phi)\mu}{\tau_\alpha^2}$ and the element corresponding to α_{T+2} equals $\frac{(1-\phi)\mu}{\tau_\alpha^2}$.

(iii) If $H > 2$, the element corresponding to α_{T+1} equals $\frac{(1-\phi)\mu+\phi\alpha_T-\phi(1-\phi)\mu}{\tau_\alpha^2}$, the elements corresponding to $\alpha_{T+2},\ldots,\alpha_{T+H-1}$ all equal $\frac{(1-\phi)\mu-\phi(1-\phi)\mu}{\tau_\alpha^2}$, and the element α_{T+H} equals $\frac{(1-\phi)\mu}{\tau_\alpha^2}$.

Table S1. Expert judgments for probabilistic projections of U80 of total marriage rates using the Bayesian AR(1) model for probabilistic household and living arrangement projections, Singapore, 2021–2060

Year	Without expert judgment	U80(I)	U80(II)	U80(III)
2021	0.719	0.703	0.630	0.593
2022	0.788	0.767	0.675	0.628
2023	0.845	0.822	0.717	0.664
2024	0.881	0.854	0.734	0.674
2025	0.930	0.901	0.768	0.702
2026	0.935	0.906	0.780	0.716
2027	0.945	0.917	0.788	0.724
2028	0.967	0.937	0.805	0.739
2029	0.965	0.937	0.812	0.750
2030	0.982	0.953	0.821	0.756
2031	0.984	0.954	0.821	0.754
2032	1.010	0.978	0.836	0.765
2033	1.005	0.973	0.829	0.757
2034	1.013	0.983	0.846	0.778
2035	1.020	0.989	0.848	0.777
2036	1.015	0.983	0.841	0.769
2037	1.008	0.978	0.843	0.775
2038	1.024	0.993	0.850	0.779
2039	1.032	1.000	0.858	0.787
2040	1.039	1.007	0.862	0.790
2041	1.028	0.998	0.860	0.791
2042	1.023	0.992	0.856	0.787
2043	1.007	0.977	0.845	0.778
2044	1.016	0.986	0.847	0.778
2045	1.013	0.982	0.846	0.778
2046	1.028	0.996	0.855	0.785
2047	1.035	1.004	0.863	0.793
2048	1.026	0.996	0.860	0.791
2049	1.040	1.010	0.874	0.807
2050	1.047	1.016	0.872	0.801
2051	1.040	1.010	0.873	0.804

(*Cont'd...*)

Table S1. (*Continued*)

Year	Without expert judgment	U80(I)	U80(II)	U80(III)
2052	1.041	1.010	0.868	0.797
2053	1.032	1.001	0.865	0.797
2054	1.031	0.999	0.856	0.785
2055	1.041	1.008	0.859	0.785
2056	1.042	1.009	0.863	0.789
2057	1.026	0.996	0.861	0.793
2058	1.034	1.003	0.868	0.800
2059	1.028	0.998	0.863	0.796
2060	1.041	1.011	0.874	0.805

Table S2. Expert judgments for probabilistic projections of U80 of total divorce rates using the Bayesian AR(1) model for probabilistic household and living arrangement projections, Singapore, 2021–2060

Year	Without expert judgment	U80(I)	U80(II)	U80(III)
2021	0.217	0.215	0.207	0.203
2022	0.221	0.219	0.207	0.202
2023	0.223	0.220	0.208	0.202
2024	0.225	0.222	0.207	0.200
2025	0.227	0.224	0.208	0.200
2026	0.227	0.224	0.207	0.199
2027	0.224	0.221	0.205	0.198
2028	0.226	0.222	0.206	0.198
2029	0.225	0.222	0.206	0.198
2030	0.225	0.222	0.206	0.198
2031	0.225	0.221	0.205	0.197
2032	0.228	0.224	0.206	0.197
2033	0.227	0.223	0.205	0.196
2034	0.226	0.223	0.206	0.197
2035	0.226	0.222	0.205	0.196
2036	0.225	0.222	0.204	0.195
2037	0.226	0.222	0.204	0.195
2038	0.225	0.221	0.204	0.196
2039	0.226	0.223	0.205	0.196
2040	0.227	0.223	0.205	0.196
2041	0.226	0.222	0.205	0.197
2042	0.224	0.220	0.204	0.195
2043	0.223	0.220	0.203	0.195
2044	0.224	0.220	0.203	0.194
2045	0.222	0.218	0.202	0.194
2046	0.226	0.222	0.204	0.195

(*Cont'd...*)

Table S2. (*Continued*)

Year	Without expert judgment	U80(I)	U80(II)	U80(III)
2047	0.226	0.222	0.204	0.195
2048	0.225	0.222	0.204	0.196
2049	0.227	0.223	0.205	0.197
2050	0.227	0.223	0.205	0.196
2051	0.228	0.224	0.206	0.197
2052	0.226	0.222	0.204	0.196
2053	0.227	0.223	0.205	0.196
2054	0.225	0.221	0.203	0.195
2055	0.226	0.222	0.203	0.194
2056	0.227	0.222	0.204	0.194
2057	0.225	0.221	0.204	0.195
2058	0.225	0.221	0.204	0.195
2059	0.225	0.221	0.204	0.195
2060	0.226	0.222	0.205	0.197

Table S3. Expert judgments for probabilistic projections of U80 of total marriage rates using the Bayesian AR(1) model for probabilistic household and living arrangement projections, Indonesia, 2021–2060

Year	Without expert judgment	U80(I)	U80(II)	U80(III)
2021–2022	1.251	1.227	1.115	1.058
2023–2024	1.353	1.322	1.180	1.110
2025–2026	1.436	1.400	1.238	1.157
2027–2028	1.476	1.438	1.268	1.183
2029–2030	1.538	1.498	1.317	1.226
2031–2032	1.589	1.546	1.353	1.257
2033–2034	1.632	1.587	1.383	1.282
2035–2036	1.662	1.616	1.408	1.304
2037–2038	1.682	1.635	1.425	1.320
2039–2040	1.699	1.652	1.437	1.330
2041–2042	1.717	1.669	1.449	1.340
2043–2044	1.717	1.669	1.456	1.349
2045–2046	1.730	1.681	1.460	1.350
2047–2048	1.747	1.696	1.463	1.346
2049–2050	1.737	1.687	1.462	1.349
2051–2052	1.760	1.708	1.478	1.363
2053–2054	1.732	1.685	1.476	1.371
2055–2056	1.757	1.708	1.488	1.378
2057–2058	1.784	1.733	1.507	1.394
2059–2060	1.798	1.746	1.515	1.400

Table S4. Expert judgments for probabilistic projections of U80 of total divorce rates using the Bayesian AR(1) model for probabilistic household and living arrangement projections, Indonesia, 2021–2060

Year	Without expert judgment	U80(I)	U80(II)	U80(III)
2021–2022	0.259	0.252	0.218	0.201
2023–2024	0.264	0.257	0.223	0.206
2025–2026	0.268	0.260	0.226	0.208
2027–2028	0.265	0.258	0.224	0.207
2029–2030	0.272	0.264	0.229	0.211
2031–2032	0.274	0.265	0.228	0.209
2033–2034	0.278	0.270	0.232	0.213
2035–2036	0.278	0.270	0.233	0.214
2037–2038	0.279	0.271	0.233	0.214
2039–2040	0.277	0.269	0.234	0.216
2041–2042	0.281	0.273	0.235	0.215
2043–2044	0.277	0.269	0.232	0.214
2045–2046	0.280	0.272	0.235	0.216
2047–2048	0.275	0.267	0.232	0.214
2049–2050	0.283	0.275	0.236	0.217
2051–2052	0.285	0.276	0.238	0.219
2053–2054	0.286	0.277	0.237	0.217
2055–2056	0.282	0.273	0.235	0.216
2057–2058	0.286	0.277	0.237	0.217
2059–2060	0.289	0.280	0.239	0.219

Table S5. The L95, L80, median, U80, and U95 of probabilistically projected total marriage rates using the Bayesian AR(1) model (without expert judgment) for probabilistic household and living arrangement projections, Singapore, 2021–2060

Year	L95	L80	Median	U80	U95
2021	0.323	0.406	0.557	0.719	0.806
2022	0.273	0.388	0.582	0.788	0.900
2023	0.273	0.380	0.611	0.845	0.967
2024	0.240	0.388	0.614	0.881	1.035
2025	0.233	0.374	0.636	0.930	1.081
2026	0.223	0.374	0.653	0.935	1.093
2027	0.242	0.374	0.660	0.945	1.106
2028	0.238	0.384	0.673	0.967	1.120
2029	0.260	0.391	0.687	0.965	1.149
2030	0.235	0.386	0.690	0.982	1.138
2031	0.221	0.366	0.687	0.984	1.154
2032	0.212	0.370	0.694	1.010	1.168
2033	0.221	0.388	0.685	1.005	1.172
2034	0.238	0.389	0.710	1.013	1.196

(*Cont'd...*)

Table S5. (*Continued*)

Year	L95	L80	Median	U80	U95
2035	0.236	0.401	0.707	1.020	1.194
2036	0.246	0.389	0.698	1.015	1.194
2037	0.236	0.386	0.707	1.008	1.166
2038	0.232	0.391	0.708	1.024	1.182
2039	0.259	0.394	0.716	1.032	1.210
2040	0.257	0.408	0.718	1.039	1.204
2041	0.244	0.423	0.722	1.028	1.228
2042	0.237	0.411	0.719	1.023	1.196
2043	0.259	0.428	0.712	1.007	1.188
2044	0.272	0.423	0.709	1.016	1.173
2045	0.230	0.422	0.710	1.013	1.191
2046	0.269	0.420	0.715	1.028	1.180
2047	0.263	0.411	0.723	1.035	1.172
2048	0.250	0.415	0.723	1.026	1.216
2049	0.277	0.426	0.739	1.040	1.205
2050	0.215	0.403	0.729	1.047	1.219
2051	0.238	0.400	0.735	1.040	1.216
2052	0.231	0.403	0.726	1.041	1.190
2053	0.219	0.411	0.728	1.032	1.200
2054	0.211	0.407	0.713	1.031	1.213
2055	0.228	0.419	0.711	1.041	1.205
2056	0.215	0.426	0.716	1.042	1.225
2057	0.270	0.426	0.726	1.026	1.232
2058	0.258	0.411	0.732	1.034	1.193
2059	0.255	0.420	0.729	1.028	1.232
2060	0.273	0.441	0.737	1.041	1.235

Table S6. The L95, L80, median, U80, and U95 of probabilistically projected total marriage rates (TMR[t]) using the Bayesian AR(1) model (with U80[I] of TMR[t] expert judgment) for probabilistic household and living arrangement projections, Singapore, 2021–2060

Year	L95	L80	Median	U80	U95
2021	0.346	0.421	0.557	0.703	0.781
2022	0.304	0.407	0.582	0.767	0.868
2023	0.307	0.403	0.611	0.822	0.931
2024	0.277	0.411	0.614	0.854	0.993
2025	0.273	0.401	0.636	0.901	1.036
2026	0.266	0.402	0.653	0.906	1.049
2027	0.284	0.403	0.660	0.917	1.062
2028	0.282	0.413	0.673	0.937	1.075
2029	0.302	0.421	0.687	0.937	1.103

(*Cont'd...*)

Table S6. (*Continued*)

Year	L95	L80	Median	U80	U95
2030	0.280	0.416	0.690	0.953	1.093
2031	0.267	0.398	0.687	0.954	1.107
2032	0.260	0.403	0.694	0.978	1.121
2033	0.268	0.418	0.685	0.973	1.123
2034	0.286	0.421	0.710	0.983	1.147
2035	0.283	0.432	0.707	0.989	1.146
2036	0.291	0.420	0.698	0.983	1.145
2037	0.283	0.418	0.707	0.978	1.120
2038	0.279	0.423	0.708	0.993	1.134
2039	0.305	0.426	0.716	1.000	1.161
2040	0.303	0.439	0.718	1.007	1.155
2041	0.291	0.452	0.722	0.998	1.178
2042	0.285	0.442	0.719	0.992	1.148
2043	0.304	0.456	0.712	0.977	1.140
2044	0.315	0.452	0.709	0.986	1.127
2045	0.278	0.451	0.710	0.982	1.143
2046	0.313	0.449	0.715	0.996	1.133
2047	0.309	0.442	0.723	1.004	1.128
2048	0.297	0.446	0.723	0.996	1.167
2049	0.323	0.458	0.739	1.010	1.158
2050	0.267	0.436	0.729	1.016	1.170
2051	0.288	0.434	0.735	1.010	1.168
2052	0.280	0.435	0.726	1.010	1.143
2053	0.270	0.443	0.728	1.001	1.153
2054	0.261	0.437	0.713	0.999	1.163
2055	0.276	0.448	0.711	1.008	1.156
2056	0.265	0.455	0.716	1.009	1.174
2057	0.315	0.456	0.726	0.996	1.181
2058	0.305	0.443	0.732	1.003	1.147
2059	0.303	0.451	0.729	0.998	1.182
2060	0.320	0.471	0.737	1.011	1.185

Table S7. The L95, L80, median, U80, and U95 of probabilistically projected total marriage rates (TMR[t]) using the Bayesian AR(1) model (with U80[II] of TMR[t] expert judgment) for probabilistic household and living arrangement projections, Singapore, 2021–2060

Year	L95	L80	Median	U80	U95
2021	0.452	0.489	0.557	0.630	0.669
2022	0.443	0.495	0.582	0.675	0.725
2023	0.459	0.507	0.611	0.717	0.771
2024	0.446	0.513	0.614	0.734	0.804

(*Cont'd...*)

Table S7. (*Continued*)

Year	L95	L80	Median	U80	U95
2025	0.454	0.518	0.636	0.768	0.836
2026	0.459	0.528	0.653	0.780	0.851
2027	0.472	0.532	0.660	0.788	0.861
2028	0.477	0.543	0.673	0.805	0.874
2029	0.495	0.554	0.687	0.812	0.895
2030	0.485	0.553	0.690	0.821	0.892
2031	0.477	0.542	0.687	0.821	0.897
2032	0.477	0.549	0.694	0.836	0.907
2033	0.477	0.552	0.685	0.829	0.904
2034	0.498	0.565	0.710	0.846	0.929
2035	0.495	0.569	0.707	0.848	0.926
2036	0.495	0.559	0.698	0.841	0.922
2037	0.495	0.563	0.707	0.843	0.914
2038	0.494	0.565	0.708	0.850	0.921
2039	0.510	0.571	0.716	0.858	0.938
2040	0.510	0.578	0.718	0.862	0.937
2041	0.507	0.587	0.722	0.860	0.950
2042	0.502	0.580	0.719	0.856	0.933
2043	0.508	0.584	0.712	0.845	0.926
2044	0.512	0.580	0.709	0.847	0.918
2045	0.494	0.580	0.710	0.846	0.926
2046	0.514	0.582	0.715	0.855	0.924
2047	0.516	0.582	0.723	0.863	0.925
2048	0.510	0.585	0.723	0.860	0.945
2049	0.531	0.598	0.739	0.874	0.949
2050	0.498	0.583	0.729	0.872	0.950
2051	0.512	0.584	0.735	0.873	0.952
2052	0.503	0.580	0.726	0.868	0.934
2053	0.499	0.585	0.728	0.865	0.941
2054	0.487	0.575	0.713	0.856	0.938
2055	0.494	0.579	0.711	0.859	0.933
2056	0.491	0.585	0.716	0.863	0.945
2057	0.521	0.591	0.726	0.861	0.954
2058	0.519	0.588	0.732	0.868	0.940
2059	0.516	0.590	0.729	0.863	0.955
2060	0.528	0.604	0.737	0.874	0.961

Table S8. The L95, L80, median, U80, and U95 of probabilistically projected total marriage rates (TMR[t]) using the Bayesian AR(1) model (with U80[III] of TMR[t] expert judgment) for probabilistic household and living arrangement projections, Singapore, 2021–2060

Year	L95	L80	Median	U80	U95
2021	0.504	0.523	0.557	0.593	0.613
2022	0.513	0.538	0.582	0.628	0.654
2023	0.535	0.559	0.611	0.664	0.691
2024	0.530	0.564	0.614	0.674	0.709
2025	0.545	0.577	0.636	0.702	0.736
2026	0.556	0.590	0.653	0.716	0.752
2027	0.566	0.596	0.660	0.724	0.761
2028	0.575	0.608	0.673	0.739	0.774
2029	0.591	0.620	0.687	0.750	0.791
2030	0.588	0.621	0.690	0.756	0.791
2031	0.582	0.615	0.687	0.754	0.792
2032	0.586	0.621	0.694	0.765	0.801
2033	0.581	0.618	0.685	0.757	0.795
2034	0.604	0.638	0.710	0.778	0.819
2035	0.601	0.638	0.707	0.777	0.817
2036	0.596	0.629	0.698	0.769	0.810
2037	0.601	0.635	0.707	0.775	0.811
2038	0.601	0.637	0.708	0.779	0.815
2039	0.613	0.643	0.716	0.787	0.827
2040	0.614	0.648	0.718	0.790	0.827
2041	0.614	0.655	0.722	0.791	0.836
2042	0.610	0.649	0.719	0.787	0.826
2043	0.610	0.648	0.712	0.778	0.819
2044	0.611	0.645	0.709	0.778	0.813
2045	0.602	0.645	0.710	0.778	0.818
2046	0.614	0.648	0.715	0.785	0.819
2047	0.620	0.653	0.723	0.793	0.824
2048	0.617	0.654	0.723	0.791	0.834
2049	0.635	0.669	0.739	0.807	0.844
2050	0.614	0.656	0.729	0.801	0.839
2051	0.624	0.660	0.735	0.804	0.844
2052	0.614	0.653	0.726	0.797	0.830
2053	0.614	0.657	0.728	0.797	0.835
2054	0.600	0.644	0.713	0.785	0.826
2055	0.602	0.645	0.711	0.785	0.822
2056	0.603	0.651	0.716	0.789	0.831
2057	0.623	0.658	0.726	0.793	0.840
2058	0.625	0.660	0.732	0.800	0.836

(*Cont'd...*)

Table S8. (*Continued*)

Year	L95	L80	Median	U80	U95
2059	0.622	0.659	0.729	0.796	0.842
2060	0.633	0.670	0.737	0.805	0.849

Table S9. The L95, L80, median, U80, and U95 of probabilistically projected total marriage rates using the Bayesian AR(1) model (without expert judgment) for probabilistic household and living arrangement projections, Indonesia, 2021–2060

Year	L95	L80	Median	U80	U95
2021–2022	0.606	0.753	1.002	1.251	1.391
2023–2024	0.537	0.713	1.039	1.353	1.502
2025–2026	0.531	0.725	1.076	1.436	1.600
2027–2028	0.496	0.720	1.098	1.476	1.672
2029–2030	0.519	0.726	1.136	1.538	1.776
2031–2032	0.520	0.721	1.160	1.589	1.852
2033–2034	0.497	0.720	1.180	1.632	1.873
2035–2036	0.481	0.756	1.200	1.662	1.924
2037–2038	0.505	0.769	1.215	1.682	1.936
2039–2040	0.512	0.766	1.223	1.699	1.945
2041–2042	0.499	0.738	1.230	1.717	1.980
2043–2044	0.498	0.761	1.242	1.717	1.990
2045–2046	0.485	0.752	1.240	1.730	2.035
2047–2048	0.505	0.774	1.230	1.747	1.980
2049–2050	0.487	0.748	1.237	1.737	2.031
2051–2052	0.465	0.761	1.248	1.760	2.050
2053–2054	0.465	0.760	1.266	1.732	2.055
2055–2056	0.477	0.758	1.269	1.757	2.039
2057–2058	0.478	0.762	1.281	1.784	2.084
2059–2060	0.500	0.773	1.284	1.798	2.100

Table S10. The L95, L80, median, U80, and U95 of probabilistically projected total marriage rates (TMR[t]) using the Bayesian AR(1) model (with U80[I] of TMR[t] expert judgment) for probabilistic household and living arrangement projections, Indonesia, 2021–2060

Year	L95	L80	Median	U80	U95
2021–2022	0.646	0.778	1.002	1.227	1.352
2023–2024	0.587	0.746	1.039	1.322	1.456
2025–2026	0.585	0.760	1.076	1.400	1.548
2027–2028	0.557	0.757	1.098	1.438	1.614
2029–2030	0.580	0.767	1.136	1.498	1.712
2031–2032	0.584	0.765	1.160	1.546	1.782
2033–2034	0.565	0.766	1.180	1.587	1.803
2035–2036	0.553	0.801	1.200	1.616	1.852

(*Cont'd...*)

Table S10. (*Continued*)

Year	L95	L80	Median	U80	U95
2037–2038	0.576	0.814	1.215	1.635	1.864
2039–2040	0.583	0.812	1.223	1.652	1.872
2041–2042	0.572	0.787	1.230	1.669	1.905
2043–2044	0.573	0.809	1.242	1.669	1.915
2045–2046	0.560	0.801	1.240	1.681	1.955
2047–2048	0.577	0.820	1.230	1.696	1.905
2049–2050	0.562	0.797	1.237	1.687	1.952
2051–2052	0.544	0.809	1.248	1.708	1.969
2053–2054	0.545	0.810	1.266	1.685	1.976
2055–2056	0.556	0.809	1.269	1.708	1.962
2057–2058	0.558	0.813	1.281	1.733	2.004
2059–2060	0.579	0.824	1.284	1.746	2.018

Table S11. The L95, L80, median, U80, and U95 of probabilistically projected total marriage rates (TMR[t]) using the Bayesian AR(1) model (with U80[II] of TMR[t] expert judgment) for probabilistic household and living arrangement projections, Indonesia, 2021–2060

Year	L95	L80	Median	U80	U95
2021–2022	0.824	0.890	1.002	1.115	1.177
2023–2024	0.813	0.892	1.039	1.180	1.248
2025–2026	0.831	0.918	1.076	1.238	1.312
2027–2028	0.827	0.928	1.098	1.268	1.356
2029–2030	0.858	0.951	1.136	1.317	1.424
2031–2032	0.872	0.963	1.160	1.353	1.471
2033–2034	0.873	0.973	1.180	1.383	1.492
2035–2036	0.877	1.000	1.200	1.408	1.526
2037–2038	0.895	1.014	1.215	1.425	1.539
2039–2040	0.903	1.018	1.223	1.437	1.548
2041–2042	0.901	1.009	1.230	1.449	1.568
2043–2044	0.907	1.026	1.242	1.456	1.579
2045–2046	0.900	1.020	1.240	1.460	1.597
2047–2048	0.903	1.025	1.230	1.463	1.567
2049–2050	0.900	1.017	1.237	1.462	1.594
2051–2052	0.896	1.029	1.248	1.478	1.609
2053–2054	0.906	1.038	1.266	1.476	1.621
2055–2056	0.912	1.039	1.269	1.488	1.615
2057–2058	0.920	1.047	1.281	1.507	1.642
2059–2060	0.931	1.054	1.284	1.515	1.651

Table S12. The L95, L80, median, U80, and U95 of probabilistically projected total marriage rates (TMR[t]) using the Bayesian AR(1) model (with U80[III] of TMR[t] expert judgment) for probabilistic household and living arrangement projections, Indonesia, 2021–2060

Year	L95	L80	Median	U80	U95
2021–2022	0.913	0.946	1.002	1.058	1.090
2023–2024	0.926	0.966	1.039	1.110	1.143
2025–2026	0.953	0.997	1.076	1.157	1.194
2027–2028	0.962	1.013	1.098	1.183	1.227
2029–2030	0.997	1.043	1.136	1.226	1.280
2031–2032	1.016	1.061	1.160	1.257	1.316
2033–2034	1.026	1.077	1.180	1.282	1.336
2035–2036	1.038	1.100	1.200	1.304	1.363
2037–2038	1.055	1.115	1.215	1.320	1.377
2039–2040	1.063	1.120	1.223	1.330	1.385
2041–2042	1.066	1.119	1.230	1.340	1.399
2043–2044	1.075	1.134	1.242	1.349	1.410
2045–2046	1.070	1.130	1.240	1.350	1.419
2047–2048	1.067	1.127	1.230	1.346	1.399
2049–2050	1.068	1.127	1.237	1.349	1.416
2051–2052	1.072	1.138	1.248	1.363	1.428
2053–2054	1.086	1.152	1.266	1.371	1.444
2055–2056	1.090	1.154	1.269	1.378	1.442
2057–2058	1.100	1.164	1.281	1.394	1.462
2059–2060	1.108	1.169	1.284	1.400	1.468

Table S13. The L95, L80, median, U80, and U95 of probabilistically projected total divorce rates using the Bayesian AR(1) model (without expert judgment) for probabilistic household and living arrangement projections, Singapore, 2021–2060

Year	L95	L80	Median	U80	U95
2021	0.171	0.180	0.199	0.217	0.230
2022	0.159	0.173	0.196	0.221	0.234
2023	0.154	0.169	0.196	0.223	0.237
2024	0.149	0.164	0.193	0.225	0.244
2025	0.144	0.163	0.192	0.227	0.246
2026	0.142	0.157	0.191	0.227	0.245
2027	0.139	0.157	0.190	0.224	0.245
2028	0.142	0.156	0.190	0.226	0.247
2029	0.141	0.156	0.191	0.225	0.245
2030	0.138	0.154	0.190	0.225	0.246
2031	0.136	0.151	0.189	0.225	0.246
2032	0.133	0.150	0.188	0.228	0.245
2033	0.131	0.150	0.187	0.227	0.249
2034	0.132	0.150	0.189	0.226	0.248

(*Cont'd...*)

Table S13. (*Continued*)

Year	L95	L80	Median	U80	U95
2035	0.133	0.150	0.188	0.226	0.251
2036	0.132	0.149	0.186	0.225	0.247
2037	0.131	0.148	0.186	0.226	0.243
2038	0.131	0.148	0.187	0.225	0.246
2039	0.132	0.148	0.187	0.226	0.250
2040	0.132	0.149	0.187	0.227	0.251
2041	0.131	0.151	0.188	0.226	0.251
2042	0.128	0.149	0.187	0.224	0.245
2043	0.131	0.150	0.187	0.223	0.247
2044	0.131	0.151	0.185	0.224	0.244
2045	0.126	0.150	0.186	0.222	0.245
2046	0.130	0.149	0.186	0.226	0.244
2047	0.126	0.150	0.187	0.226	0.244
2048	0.129	0.150	0.187	0.225	0.247
2049	0.132	0.150	0.188	0.227	0.245
2050	0.125	0.149	0.187	0.227	0.246
2051	0.125	0.148	0.188	0.228	0.250
2052	0.127	0.148	0.187	0.226	0.245
2053	0.125	0.150	0.187	0.227	0.246
2054	0.124	0.149	0.186	0.225	0.247
2055	0.126	0.149	0.185	0.226	0.246
2056	0.123	0.150	0.185	0.227	0.249
2057	0.129	0.150	0.186	0.225	0.249
2058	0.130	0.148	0.187	0.225	0.248
2059	0.130	0.150	0.187	0.225	0.250
2060	0.130	0.152	0.189	0.226	0.249

Table S14. The L95, L80, median, U80, and U95 of probabilistically projected total divorce rates (TDR[t]) using the Bayesian AR(1) model (with U80[I] of TDR[t] expert judgment) for probabilistic household and living arrangement projections, Singapore, 2021–2060

Year	L95	L80	Median	U80	U95
2021	0.173	0.182	0.199	0.215	0.227
2022	0.163	0.176	0.196	0.219	0.230
2023	0.158	0.171	0.196	0.220	0.233
2024	0.153	0.167	0.193	0.222	0.239
2025	0.149	0.165	0.192	0.224	0.240
2026	0.147	0.161	0.191	0.224	0.239
2027	0.144	0.160	0.190	0.221	0.239
2028	0.147	0.159	0.190	0.222	0.241
2029	0.146	0.159	0.191	0.222	0.240

(*Cont'd...*)

Table S14. (*Continued*)

Year	L95	L80	Median	U80	U95
2030	0.143	0.157	0.190	0.222	0.240
2031	0.141	0.154	0.189	0.221	0.240
2032	0.139	0.154	0.188	0.224	0.240
2033	0.136	0.154	0.187	0.223	0.243
2034	0.137	0.153	0.189	0.223	0.242
2035	0.138	0.154	0.188	0.222	0.244
2036	0.137	0.153	0.186	0.222	0.241
2037	0.137	0.152	0.186	0.222	0.237
2038	0.137	0.152	0.187	0.221	0.240
2039	0.137	0.152	0.187	0.223	0.244
2040	0.137	0.153	0.187	0.223	0.244
2041	0.137	0.154	0.188	0.222	0.244
2042	0.134	0.153	0.187	0.220	0.239
2043	0.137	0.153	0.187	0.220	0.241
2044	0.136	0.154	0.185	0.220	0.238
2045	0.132	0.153	0.186	0.218	0.239
2046	0.136	0.153	0.186	0.222	0.239
2047	0.132	0.153	0.187	0.222	0.238
2048	0.135	0.154	0.187	0.222	0.241
2049	0.137	0.154	0.188	0.223	0.240
2050	0.131	0.153	0.187	0.223	0.240
2051	0.132	0.152	0.188	0.224	0.244
2052	0.133	0.152	0.187	0.222	0.240
2053	0.131	0.153	0.187	0.223	0.241
2054	0.130	0.152	0.186	0.221	0.241
2055	0.132	0.152	0.185	0.222	0.240
2056	0.130	0.153	0.185	0.222	0.243
2057	0.134	0.154	0.186	0.221	0.243
2058	0.135	0.152	0.187	0.221	0.242
2059	0.135	0.153	0.187	0.221	0.243
2060	0.136	0.155	0.189	0.222	0.243

Table S15. The L95, L80, median, U80, and U95 of probabilistically projected total divorce rates (TDR[t]) using the Bayesian AR(1) model (with U80[II] of TDR[t] expert judgment) for probabilistic household and living arrangement projections, Singapore, 2021–2060

Year	L95	L80	Median	U80	U95
2021	0.186	0.190	0.199	0.207	0.213
2022	0.179	0.186	0.196	0.207	0.213
2023	0.177	0.184	0.196	0.208	0.215
2024	0.173	0.180	0.193	0.207	0.216

(*Cont'd...*)

Table S15. (*Continued*)

Year	L95	L80	Median	U80	U95
2025	0.170	0.179	0.192	0.208	0.216
2026	0.169	0.176	0.191	0.207	0.215
2027	0.167	0.175	0.190	0.205	0.215
2028	0.168	0.175	0.190	0.206	0.215
2029	0.168	0.175	0.191	0.206	0.215
2030	0.167	0.174	0.190	0.206	0.215
2031	0.165	0.171	0.189	0.205	0.215
2032	0.163	0.171	0.188	0.206	0.214
2033	0.162	0.170	0.187	0.205	0.215
2034	0.163	0.171	0.189	0.206	0.215
2035	0.163	0.171	0.188	0.205	0.216
2036	0.161	0.169	0.186	0.204	0.213
2037	0.162	0.169	0.186	0.204	0.212
2038	0.162	0.169	0.187	0.204	0.214
2039	0.162	0.170	0.187	0.205	0.215
2040	0.162	0.170	0.187	0.205	0.215
2041	0.162	0.171	0.188	0.205	0.216
2042	0.160	0.170	0.187	0.204	0.213
2043	0.162	0.170	0.187	0.203	0.214
2044	0.161	0.170	0.185	0.203	0.212
2045	0.159	0.170	0.186	0.202	0.213
2046	0.161	0.170	0.186	0.204	0.212
2047	0.159	0.170	0.187	0.204	0.212
2048	0.161	0.170	0.187	0.204	0.214
2049	0.163	0.171	0.188	0.205	0.214
2050	0.159	0.170	0.187	0.205	0.214
2051	0.160	0.170	0.188	0.206	0.216
2052	0.160	0.169	0.187	0.204	0.213
2053	0.159	0.170	0.187	0.205	0.214
2054	0.158	0.169	0.186	0.203	0.213
2055	0.158	0.168	0.185	0.203	0.212
2056	0.157	0.169	0.185	0.204	0.214
2057	0.160	0.170	0.186	0.204	0.215
2058	0.161	0.169	0.187	0.204	0.215
2059	0.161	0.170	0.187	0.204	0.215
2060	0.162	0.172	0.189	0.205	0.216

Table S16. The L95, L80, median, U80, and U95 of probabilistically projected total divorce rates (TDR[t]) using the Bayesian AR(1) model (with U80[III] of TDR[t] expert judgment) for probabilistic household and living arrangement projections, Singapore, 2021–2060

Year	L95	L80	Median	U80	U95
2021	0.192	0.194	0.199	0.203	0.206
2022	0.188	0.191	0.196	0.202	0.205
2023	0.186	0.190	0.196	0.202	0.205
2024	0.183	0.186	0.193	0.200	0.204
2025	0.181	0.185	0.192	0.200	0.204
2026	0.180	0.184	0.191	0.199	0.203
2027	0.178	0.183	0.190	0.198	0.202
2028	0.179	0.182	0.190	0.198	0.203
2029	0.179	0.183	0.191	0.198	0.203
2030	0.178	0.182	0.190	0.198	0.202
2031	0.177	0.180	0.189	0.197	0.202
2032	0.175	0.179	0.188	0.197	0.201
2033	0.174	0.179	0.187	0.196	0.201
2034	0.176	0.180	0.189	0.197	0.202
2035	0.175	0.179	0.188	0.196	0.202
2036	0.174	0.177	0.186	0.195	0.200
2037	0.174	0.178	0.186	0.195	0.199
2038	0.174	0.178	0.187	0.196	0.200
2039	0.175	0.178	0.187	0.196	0.201
2040	0.174	0.178	0.187	0.196	0.201
2041	0.175	0.180	0.188	0.197	0.202
2042	0.173	0.178	0.187	0.195	0.200
2043	0.174	0.178	0.187	0.195	0.200
2044	0.173	0.178	0.185	0.194	0.198
2045	0.173	0.178	0.186	0.194	0.199
2046	0.174	0.178	0.186	0.195	0.199
2047	0.173	0.178	0.187	0.195	0.200
2048	0.174	0.179	0.187	0.196	0.201
2049	0.175	0.180	0.188	0.197	0.201
2050	0.173	0.179	0.187	0.196	0.200
2051	0.174	0.179	0.188	0.197	0.202
2052	0.173	0.178	0.187	0.196	0.200
2053	0.173	0.178	0.187	0.196	0.200
2054	0.172	0.177	0.186	0.195	0.200
2055	0.171	0.177	0.185	0.194	0.198
2056	0.171	0.177	0.185	0.194	0.199
2057	0.173	0.178	0.186	0.195	0.201
2058	0.174	0.178	0.187	0.195	0.201

(*Cont'd...*)

Table S16. (*Continued*)

Year	L95	L80	Median	U80	U95
2059	0.174	0.178	0.187	0.195	0.201
2060	0.175	0.180	0.189	0.197	0.202

Table S17. The L95, L80, median, U80, and U95 of probabilistically projected total divorce rates using the Bayesian AR(1) model (without expert judgment) for probabilistic household and living arrangement projections, Indonesia, 2021–2060

Year	L95	L80	Median	U80	U95
2021–2022	0.113	0.138	0.184	0.259	0.303
2023–2024	0.101	0.135	0.189	0.264	0.300
2025–2026	0.105	0.135	0.191	0.268	0.308
2027–2028	0.101	0.132	0.190	0.265	0.311
2029–2030	0.100	0.130	0.193	0.272	0.322
2031–2032	0.096	0.133	0.190	0.274	0.332
2033–2034	0.098	0.125	0.194	0.278	0.327
2035–2036	0.092	0.132	0.195	0.278	0.328
2037–2038	0.093	0.130	0.196	0.279	0.339
2039–2040	0.096	0.131	0.198	0.277	0.332
2041–2042	0.101	0.126	0.196	0.281	0.338
2043–2044	0.087	0.128	0.196	0.277	0.336
2045–2046	0.091	0.125	0.197	0.280	0.339
2047–2048	0.093	0.129	0.197	0.275	0.341
2049–2050	0.091	0.127	0.197	0.283	0.330
2051–2052	0.092	0.127	0.200	0.285	0.329
2053–2054	0.093	0.125	0.197	0.286	0.340
2055–2056	0.088	0.126	0.197	0.282	0.342
2057–2058	0.091	0.126	0.198	0.286	0.336
2059–2060	0.090	0.130	0.198	0.289	0.338

Table S18. The L95, L80, median, U80, and U95 of probabilistically projected total divorce rates (TDR[t]) using the Bayesian AR(1) model (with U80[I] of TDR[t] expert judgment) for probabilistic household and living arrangement projections, Indonesia, 2021–2060

Year	L95	L80	Median	U80	U95
2021–2022	0.120	0.142	0.184	0.252	0.291
2023–2024	0.110	0.140	0.189	0.257	0.289
2025–2026	0.114	0.141	0.191	0.260	0.296
2027–2028	0.110	0.138	0.190	0.258	0.299
2029–2030	0.109	0.136	0.193	0.264	0.309
2031–2032	0.105	0.138	0.190	0.265	0.318
2033–2034	0.108	0.132	0.194	0.270	0.313
2035–2036	0.103	0.138	0.195	0.270	0.315

(*Cont'd...*)

Table S18. (*Continued*)

Year	L95	L80	Median	U80	U95
2037–2038	0.103	0.136	0.196	0.271	0.325
2039–2040	0.107	0.138	0.198	0.269	0.318
2041–2042	0.111	0.133	0.196	0.273	0.324
2043–2044	0.098	0.135	0.196	0.269	0.322
2045–2046	0.101	0.132	0.197	0.272	0.325
2047–2048	0.103	0.136	0.197	0.267	0.327
2049–2050	0.102	0.134	0.197	0.275	0.317
2051–2052	0.103	0.134	0.200	0.276	0.316
2053–2054	0.103	0.133	0.197	0.277	0.325
2055–2056	0.099	0.133	0.197	0.273	0.328
2057–2058	0.102	0.133	0.198	0.277	0.322
2059–2060	0.101	0.136	0.198	0.280	0.324

Table S19. The L95, L80, median, U80, and U95 of probabilistically projected total divorce rates (TDR[t]) using the Bayesian AR(1) model (with U80[II] of TDR[t] expert judgment) for probabilistic household and living arrangement projections, Indonesia, 2021–2060

Year	L95	L80	Median	U80	U95
2021–2022	0.152	0.163	0.184	0.218	0.238
2023–2024	0.150	0.165	0.189	0.223	0.239
2025–2026	0.153	0.166	0.191	0.226	0.244
2027–2028	0.150	0.164	0.190	0.224	0.244
2029–2030	0.151	0.165	0.193	0.229	0.251
2031–2032	0.148	0.164	0.190	0.228	0.254
2033–2034	0.151	0.163	0.194	0.232	0.254
2035–2036	0.149	0.167	0.195	0.233	0.255
2037–2038	0.149	0.166	0.196	0.233	0.260
2039–2040	0.152	0.168	0.198	0.234	0.258
2041–2042	0.154	0.164	0.196	0.235	0.260
2043–2044	0.147	0.165	0.196	0.232	0.259
2045–2046	0.149	0.165	0.197	0.235	0.261
2047–2048	0.150	0.166	0.197	0.232	0.262
2049–2050	0.150	0.166	0.197	0.236	0.257
2051–2052	0.151	0.167	0.200	0.238	0.258
2053–2054	0.150	0.165	0.197	0.237	0.261
2055–2056	0.148	0.165	0.197	0.235	0.263
2057–2058	0.150	0.166	0.198	0.237	0.260
2059–2060	0.150	0.167	0.198	0.239	0.261

Table S20. The L95, L80, median, U80, and U95 of probabilistically projected total divorce rates (TDR[t]) using the Bayesian AR(1) model (with U80[III] of TDR[t] expert judgment) for probabilistic household and living arrangement projections, Indonesia, 2021–2060

Year	L95	L80	Median	U80	U95
2021–2022	0.168	0.174	0.184	0.201	0.211
2023–2024	0.170	0.177	0.189	0.206	0.214
2025–2026	0.172	0.179	0.191	0.208	0.217
2027–2028	0.170	0.177	0.190	0.207	0.217
2029–2030	0.172	0.179	0.193	0.211	0.222
2031–2032	0.169	0.177	0.190	0.209	0.222
2033–2034	0.172	0.178	0.194	0.213	0.224
2035–2036	0.172	0.181	0.195	0.214	0.225
2037–2038	0.172	0.181	0.196	0.214	0.228
2039–2040	0.175	0.183	0.198	0.216	0.228
2041–2042	0.175	0.180	0.196	0.215	0.228
2043–2044	0.172	0.181	0.196	0.214	0.228
2045–2046	0.173	0.181	0.197	0.216	0.229
2047–2048	0.173	0.181	0.197	0.214	0.229
2049–2050	0.173	0.181	0.197	0.217	0.227
2051–2052	0.175	0.183	0.200	0.219	0.229
2053–2054	0.173	0.181	0.197	0.217	0.229
2055–2056	0.173	0.181	0.197	0.216	0.230
2057–2058	0.174	0.182	0.198	0.217	0.229
2059–2060	0.174	0.183	0.198	0.219	0.230

We applied the Bayesian AR1 (first-order autoregressive) and Bayesian DT (damped linear trend) models for probabilistic projections of TMR(t) and TDR(t) and found that the Bayesian AR1 model performed much better than the Bayesian DT model in terms of the plausibility of the projection results. Although both models were fitted to the same historical time-series data, they generated substantially different long-term trajectories. The prediction interval obtained using the Bayesian DT model continued to widen throughout the projection period, and its lower bound became negative after 2040 (see Figure S2b). Therefore, we used the Bayesian AR1 model to estimate the time series of TMR(t) and TDR(t) over the past decades and to probabilistically project TMR(t) and TDR(t) for future years.

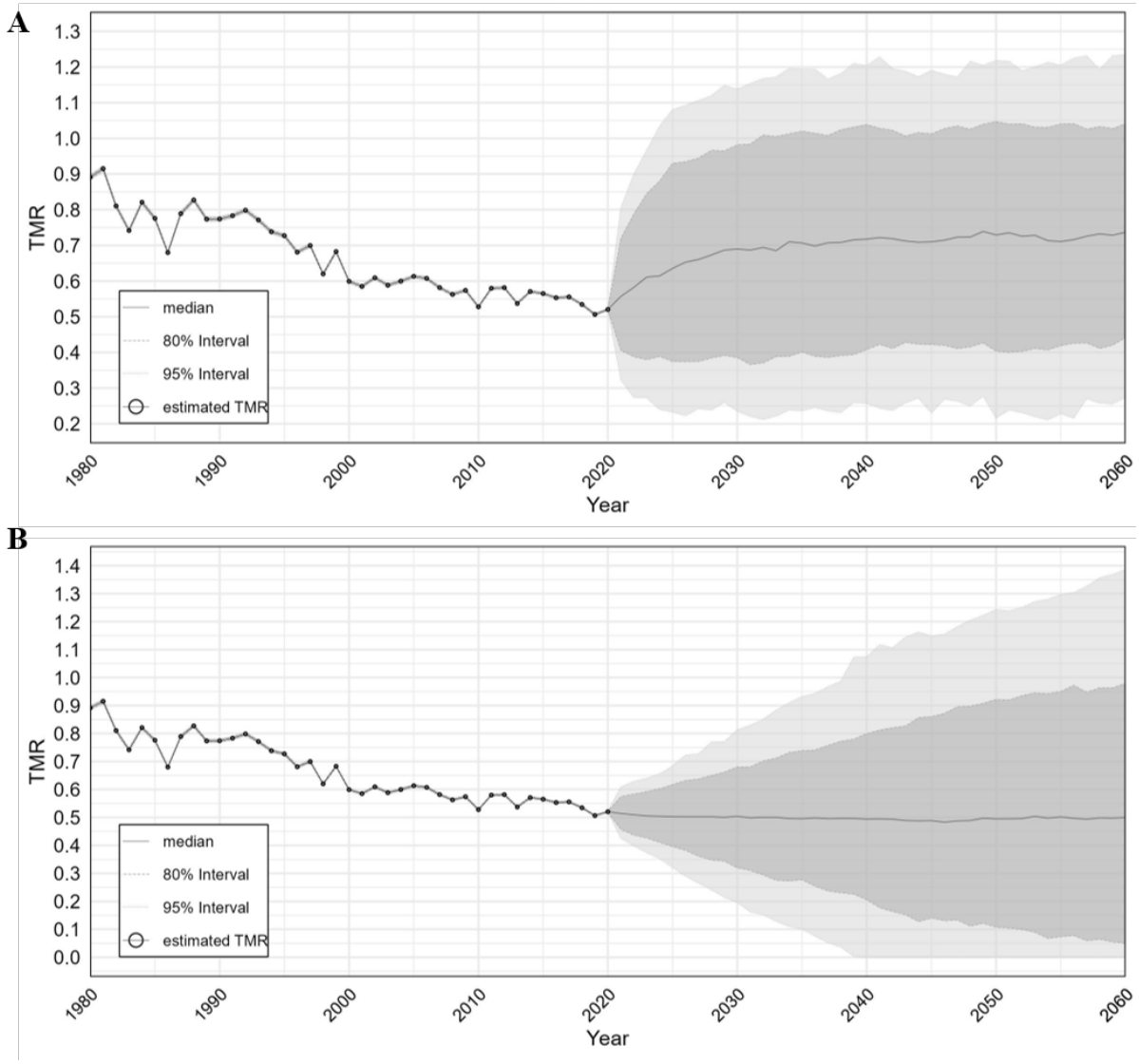


Figure S2. Estimates of total marriage rate (TMR[t]) for 1980–2020, and probabilistically projected TMR(t) employing the (A) Bayesian AR1 model (without expert judgment) or (B) Bayesian damped linear trend model for 2021–2060 for probabilistic household and living arrangement projections, Singapore

As shown in Figure S2a, the probabilistic prediction intervals for TMR(t) based on the Bayesian AR1 model without expert judgment for 2021–2060 in Singapore are too wide. Thus, we incorporated three possible expert judgments (**Tables S1–S4**) for probabilistic projections of TMR(t) and TDR(t) in future years using the Bayesian AR1 model, and then selected the most appropriate ones for PHPs.

As shown in **Figures S2–S9**, the probabilistic prediction intervals of TMR(t) and TDR(t) employing the Bayesian AR1 model with expert judgment U(II) are most appropriate; the probabilistic prediction intervals without expert judgment and with expert judgment U(I) are too wide; and with expert judgment U(III) are too narrow. Thus, we selected the expert judgment U(II) employing the Bayesian AR1 model for PHPs in Singapore.

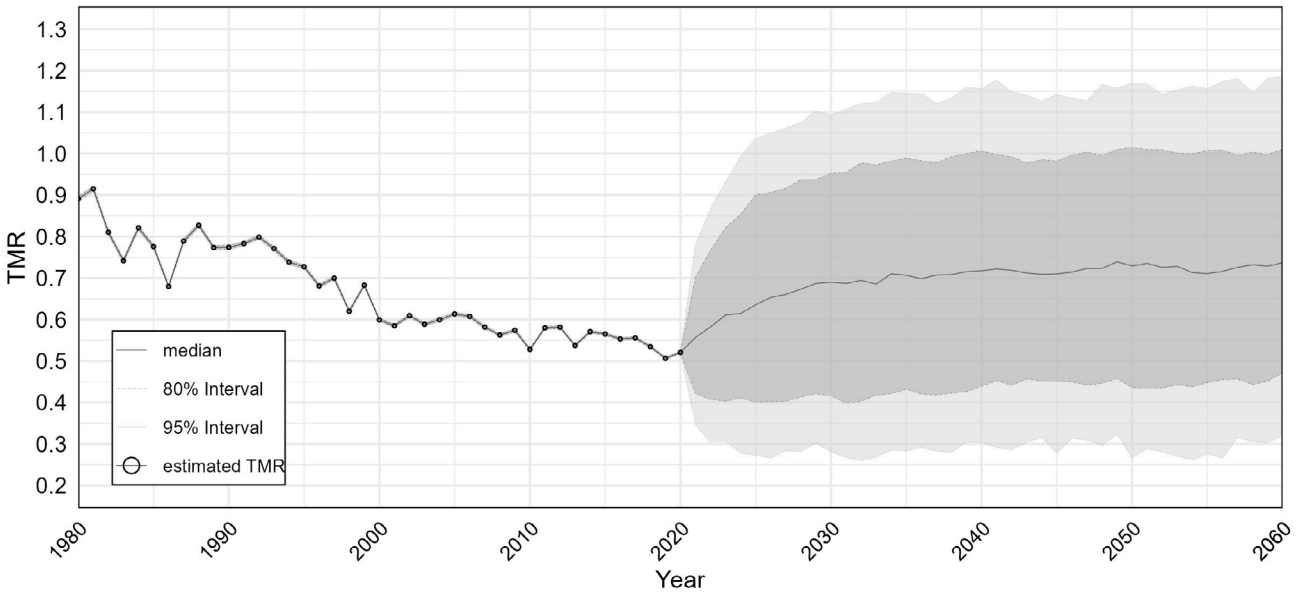


Figure S3. Estimates of total marriage rate (TMR[t]) for 1980–2020, and probabilistically projected TMR(t) employing the Bayesian AR1 model (with U80[I] of TMR[t] expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Singapore

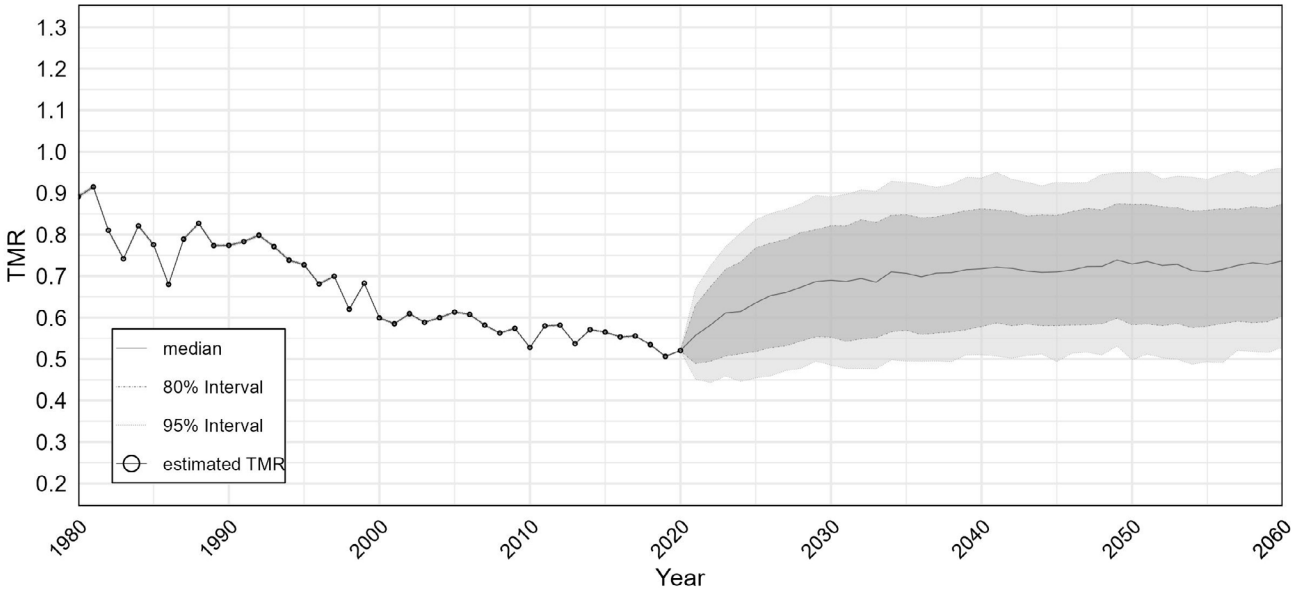


Figure S4. Estimates of total marriage rate (TMR[t]) for 1980–2020, and probabilistically projected TMR(t) employing the Bayesian AR1 model (with U80[II] of TMR[t] expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Singapore

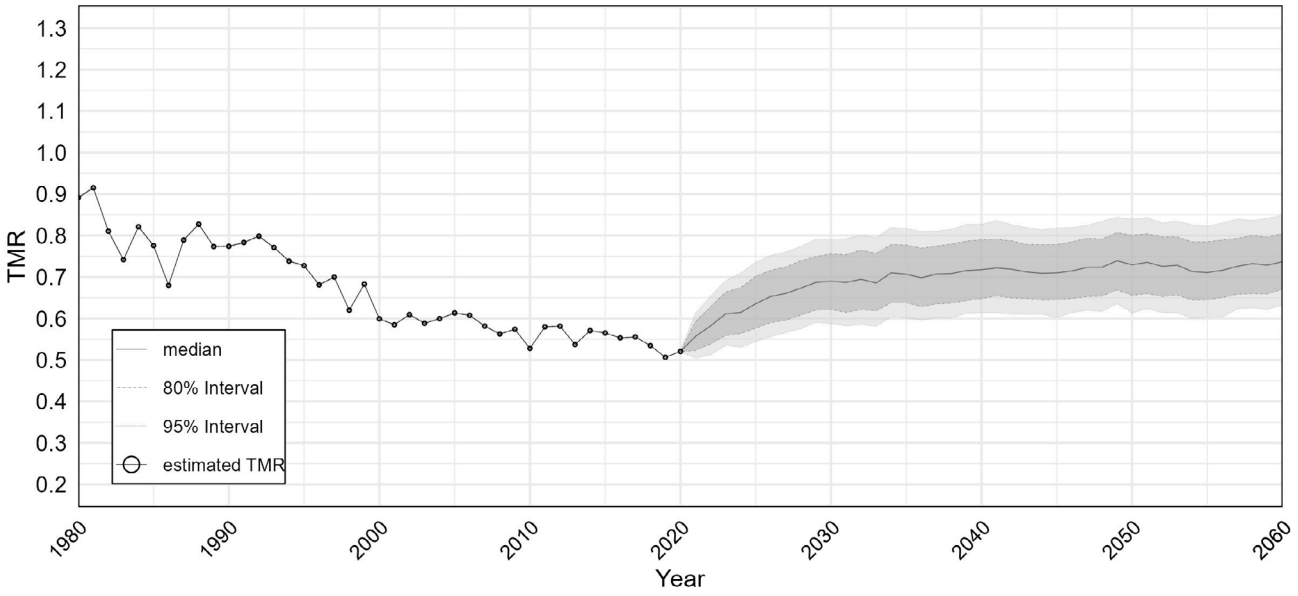


Figure S5. Estimates of total marriage rate (TMR[t]) for 1980–2020, and probabilistically projected TMR(t) employing the Bayesian AR1 model (with U80[III] of TMR[t] expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Singapore

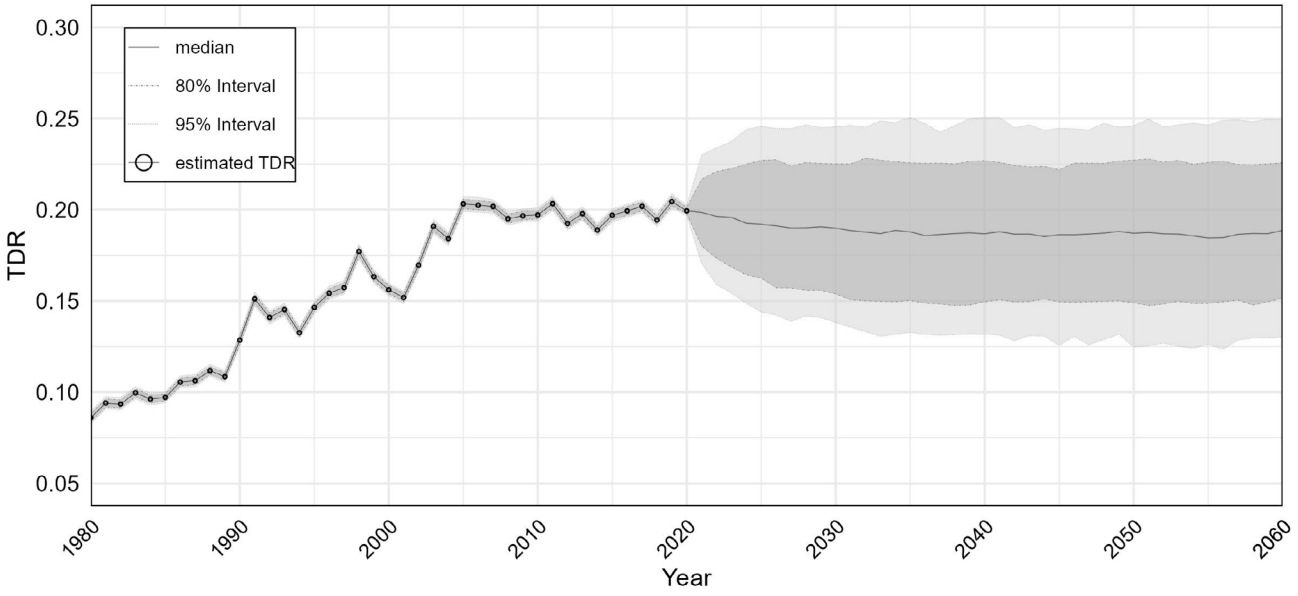


Figure S6. Estimates of total divorce rate (TDR[t]) for 1980–2020, and probabilistically projected TDR(t) employing the Bayesian AR1 model (without expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Singapore

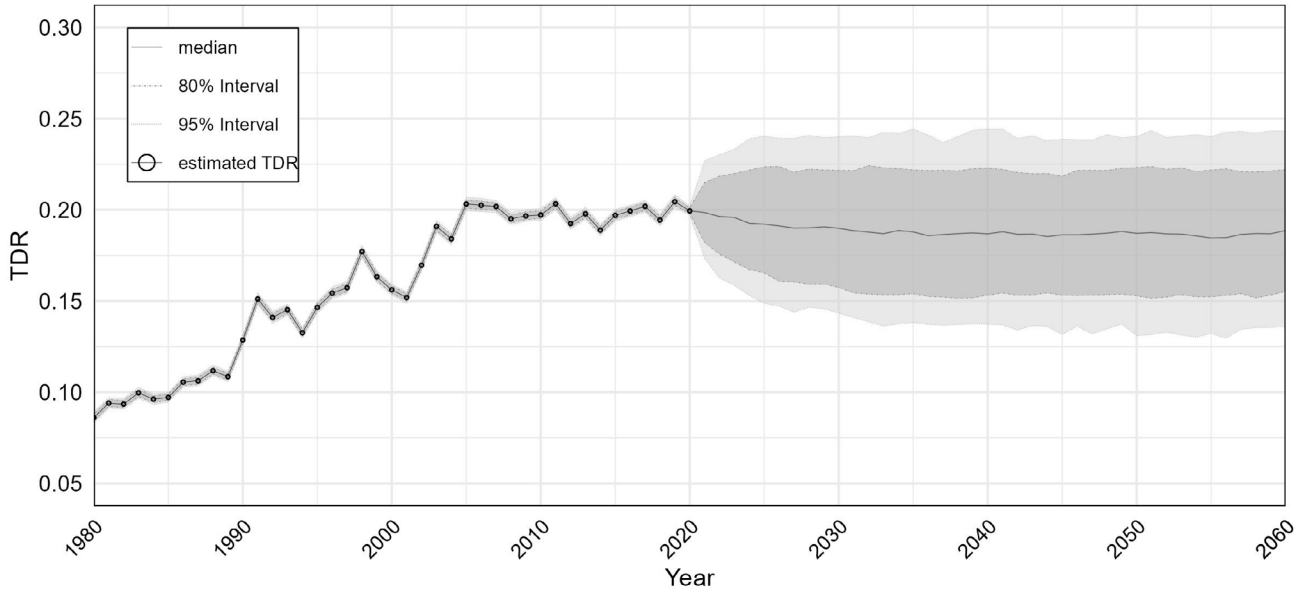


Figure S7. Estimates of total divorce rate (TDR[t]) for 1980–2020, and probabilistically projected TDR(t) employing the Bayesian AR1 model (with U80[I] of TDR[t] expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Singapore

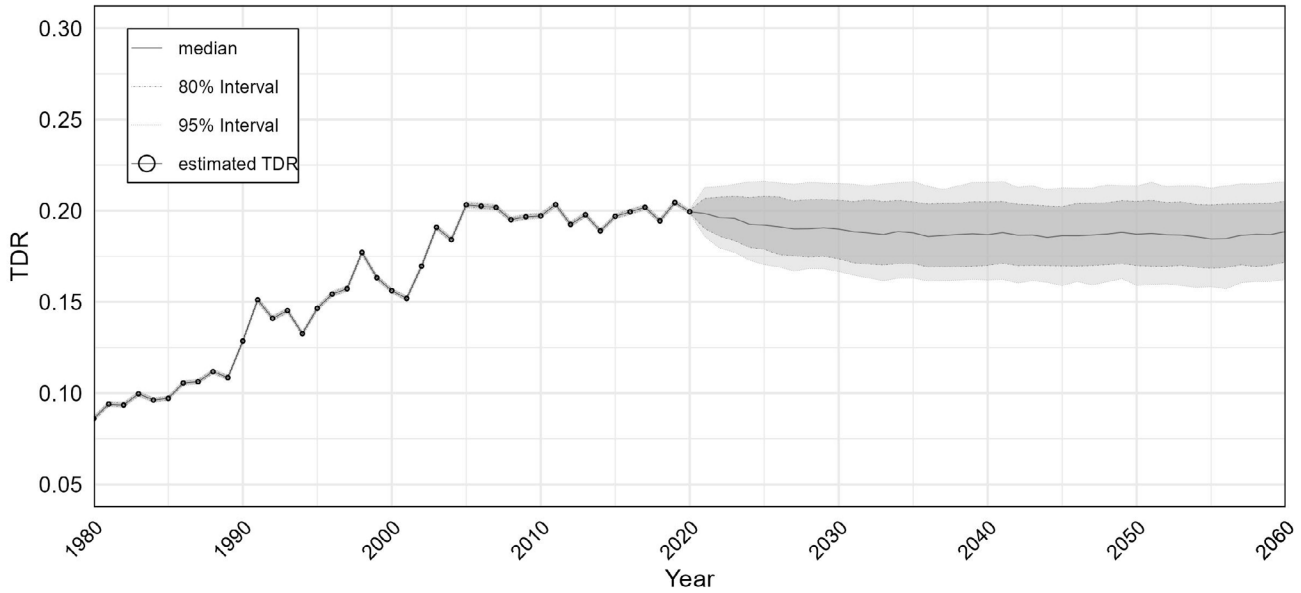


Figure S8. Estimates of total divorce rate (TDR[t]) for 1980–2020, and probabilistically projected TDR(t) employing the Bayesian AR1 model (with U80[II] of TDR[t] expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Singapore

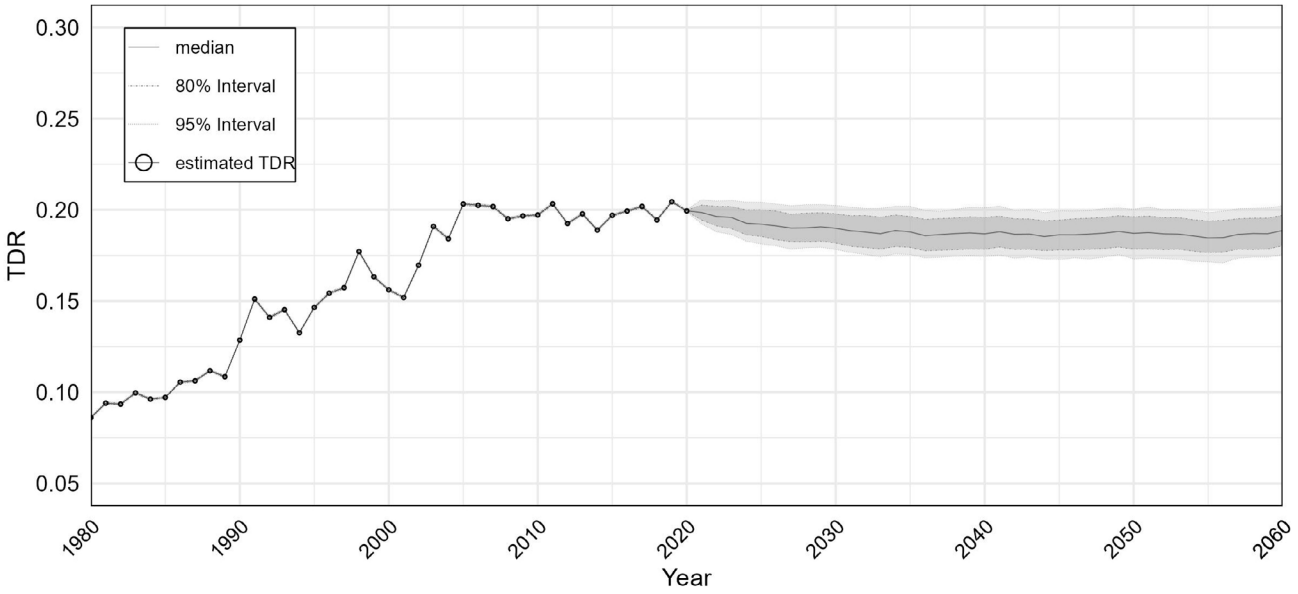


Figure S9. Estimates of total divorce rate (TDR[t]) for 1980–2020, and probabilistically projected TDR(t) employing the Bayesian AR1 model (with U80[III] of TDR[t] expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Singapore

As shown in **Figures S10 and S14**, the probabilistic prediction intervals for TMR(t) and TDR(t) based on the Bayesian AR1 model without expert judgment for 2021–2060 in Indonesia are too wide. Thus, we incorporated three possible expert judgments into our probabilistic projections of TMR(t) and TDR(t) in Indonesia, using the Bayesian AR1 model, as shown in **Figures S10–S17**. We then selected the most appropriate ones for PHPs.

The probabilistic prediction intervals of TMR(t) and TDR(t) with expert judgment U(II) are most appropriate; the probabilistic prediction intervals without expert judgment and with expert judgment U(I) are too wide; and with expert judgment U(III) are too narrow. Thus, we selected the expert judgment U(II) employing the Bayesian AR1 model for PHPs in Indonesia.

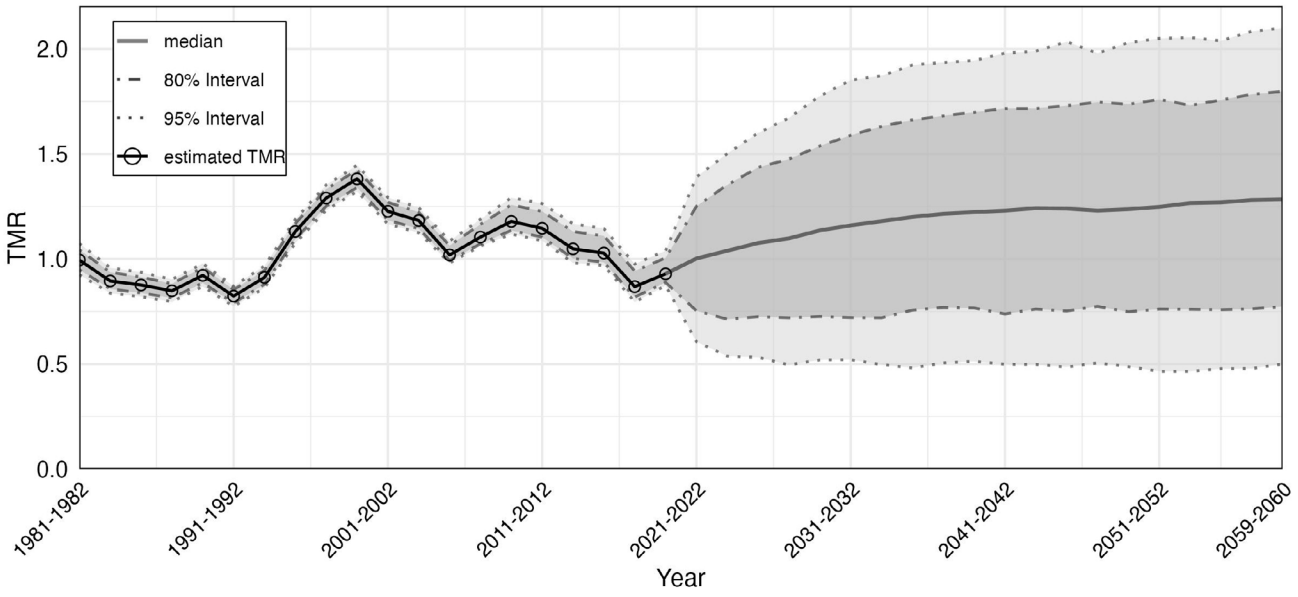


Figure S10. The probabilistically projected U95, U80, median, L80, and L95 of the rural/urban-combined, male/female-combined total marriage rate (TMR[t]) for 2021–2060 using the Bayesian AR1 model (without expert judgment) based on the estimated TMR(t) for 1981–2020 (**Table S3**), Indonesia

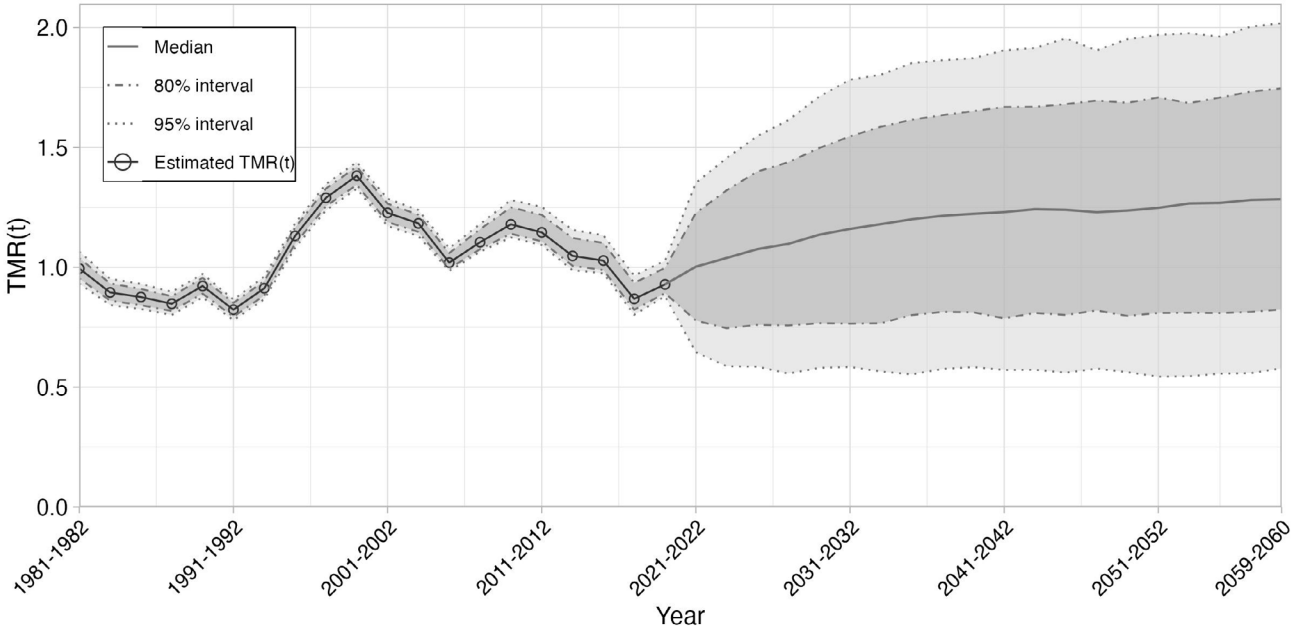


Figure S11. Estimates of total divorce rate (TDR[t]) for 1981–2020, and probabilistically projected TDR(t) employing the Bayesian AR1 model (with U80[I] of T*D*R[t] expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Indonesia

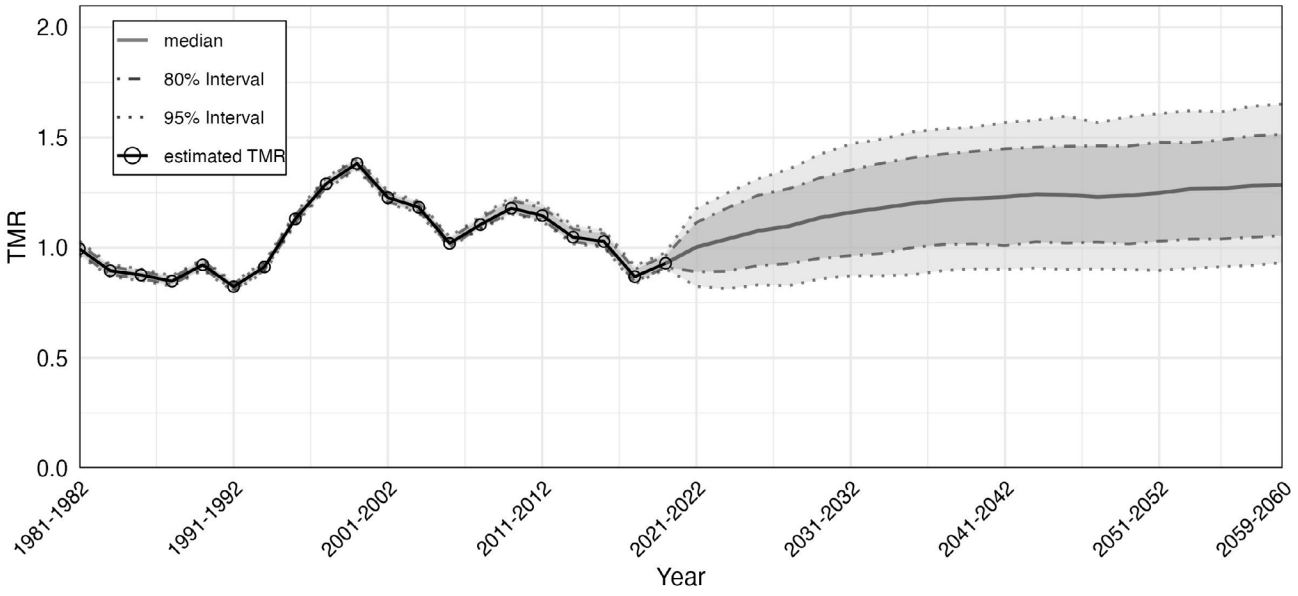


Figure S12. Estimates of total marriage rate (TMR[t]) for 1981–2020, and probabilistically projected TMR(t) employing the Bayesian AR1 model (with U80[II] of TMR[t] expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Indonesia

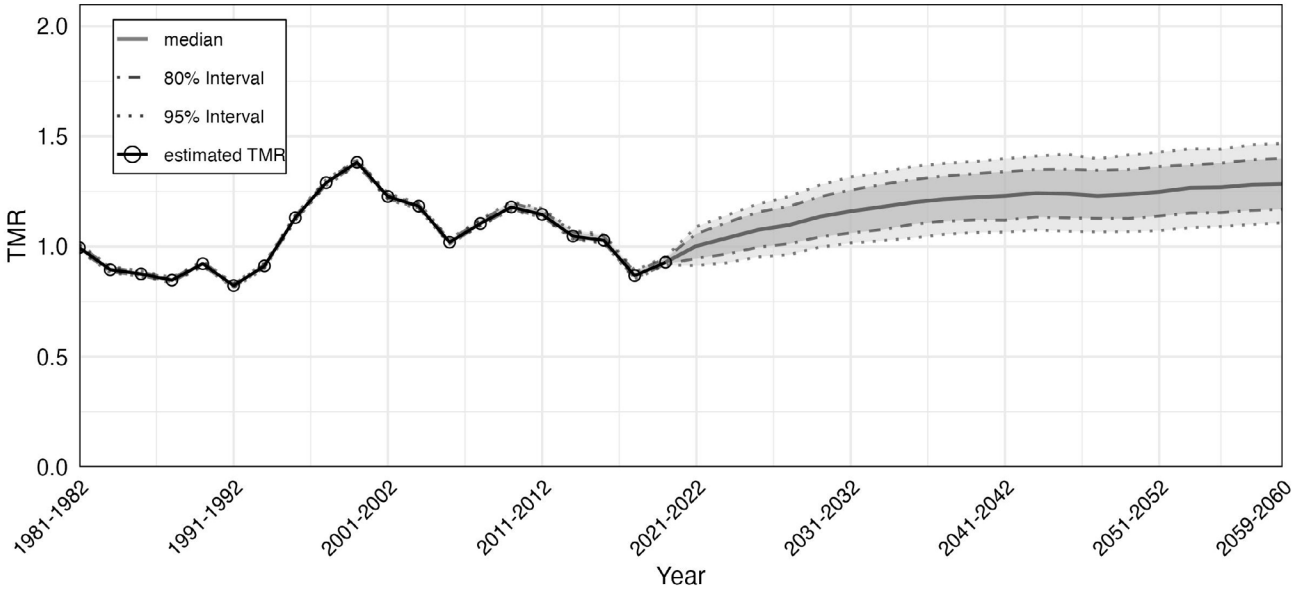


Figure S13. Estimates of total marriage rate (TMR[t]) for 1981–2020, and probabilistically projected TMR(t) employing the Bayesian AR1 model (with U80[III] of TMR[t] expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Indonesia

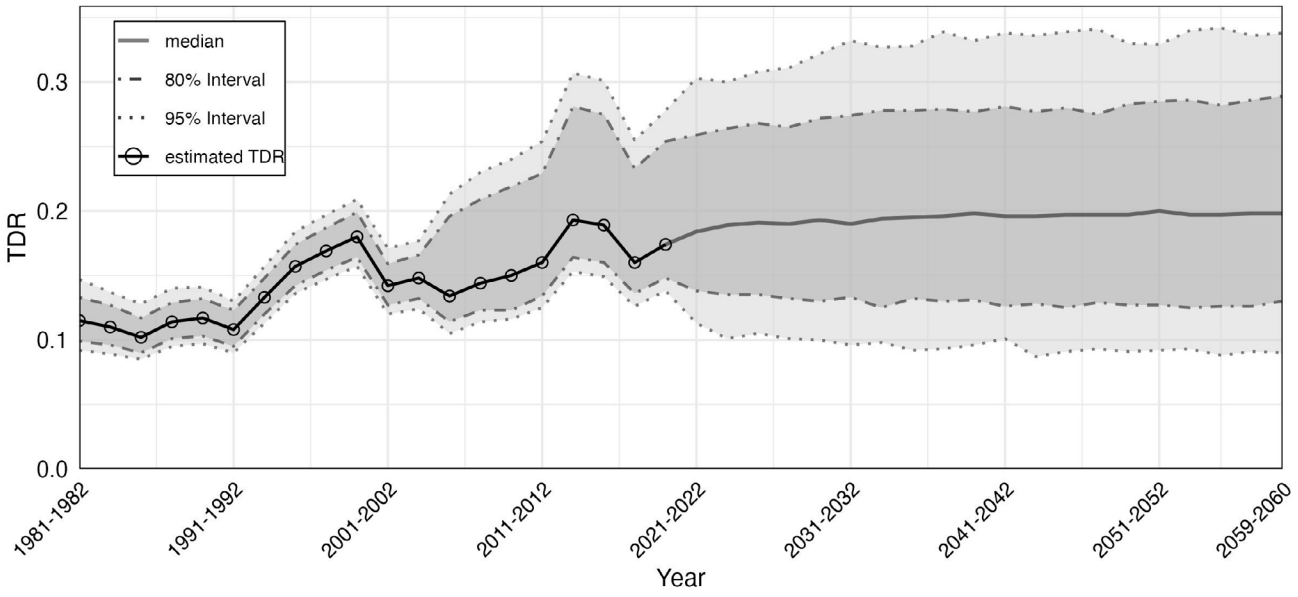


Figure S14. Estimates of total divorce rate (TDR[t]) for 1981–2020, and probabilistically projected TDR(t) employing the Bayesian AR1 model (without expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Indonesia

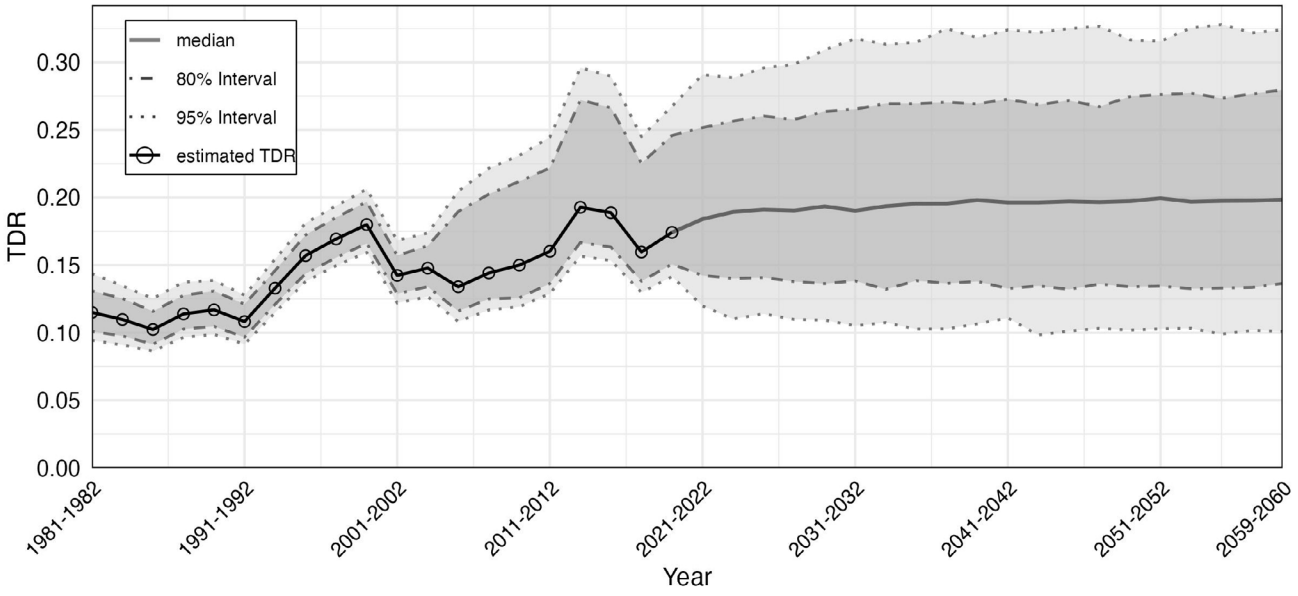


Figure S15. Estimates of total divorce rate (TDR[t]) for 1981–2020, and probabilistically projected TDR(t) employing the Bayesian AR1 model (with U80[I] of TDR[t] expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Indonesia

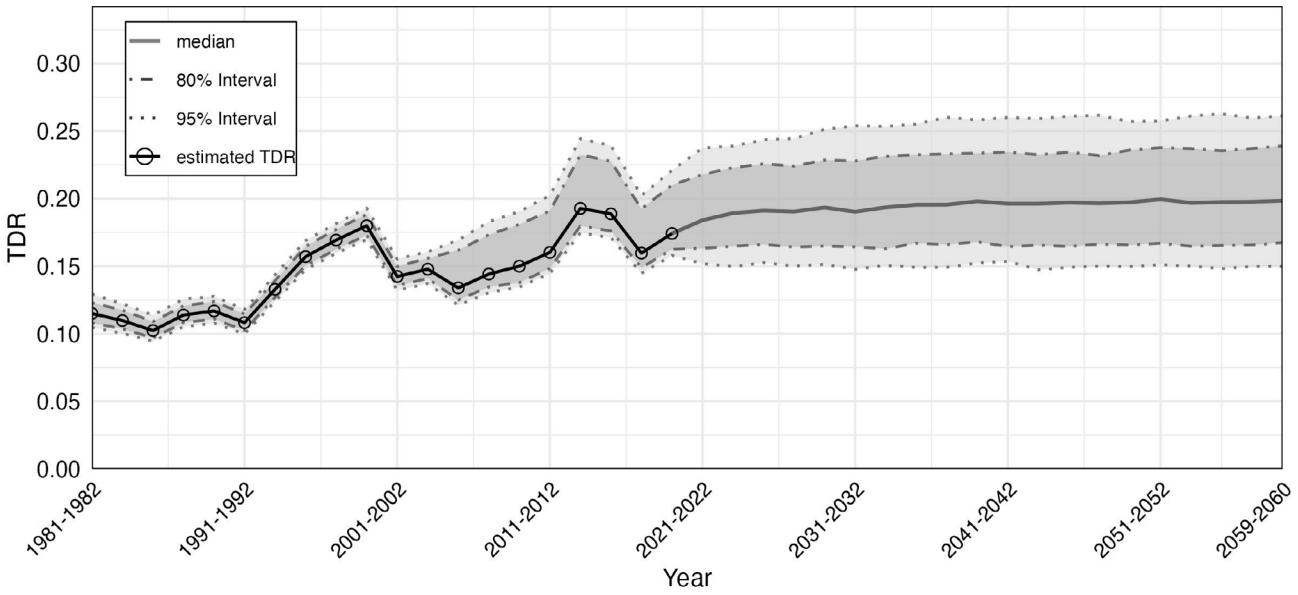


Figure S16. Estimates of total divorce rate (TDR[t]) for 1981–2020, and probabilistically projected TDR(t) employing the Bayesian AR1 model (with U80[II] of TDR[t] expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Indonesia

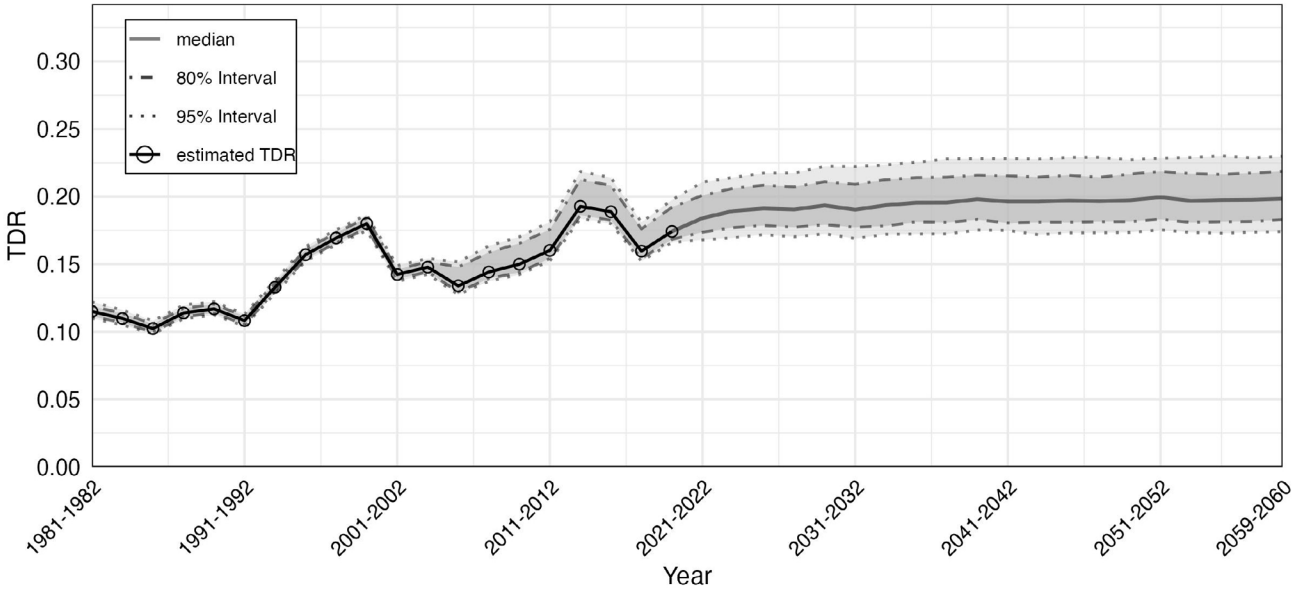


Figure S17. Estimates of total divorce rate (TDR[t]) for 1981–2020, and probabilistically projected TDR(t) employing the Bayesian AR1 model (with U80[III] of TDR[t] expert judgment) for 2021–2060 for probabilistic household and living arrangement projections, Indonesia

Reference

Zeng, Y., Land, K. C., Gu, D., & Wang, Z. (2014). *Household and living arrangement projections: The extended cohort-component method and applications to the U.S. and China*. Springer.

https://doi.org/10.1007/978-90-481-8906-9