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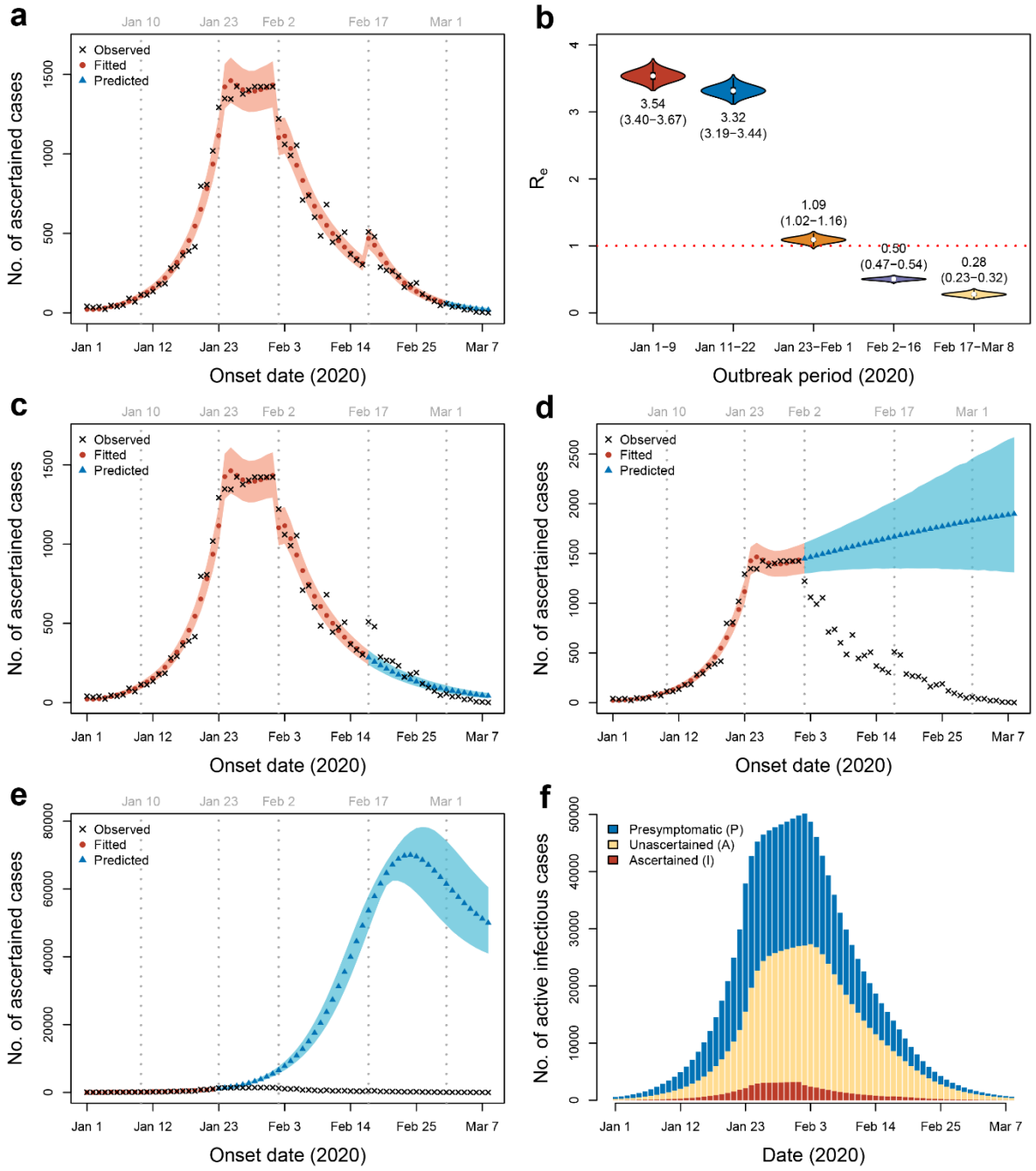
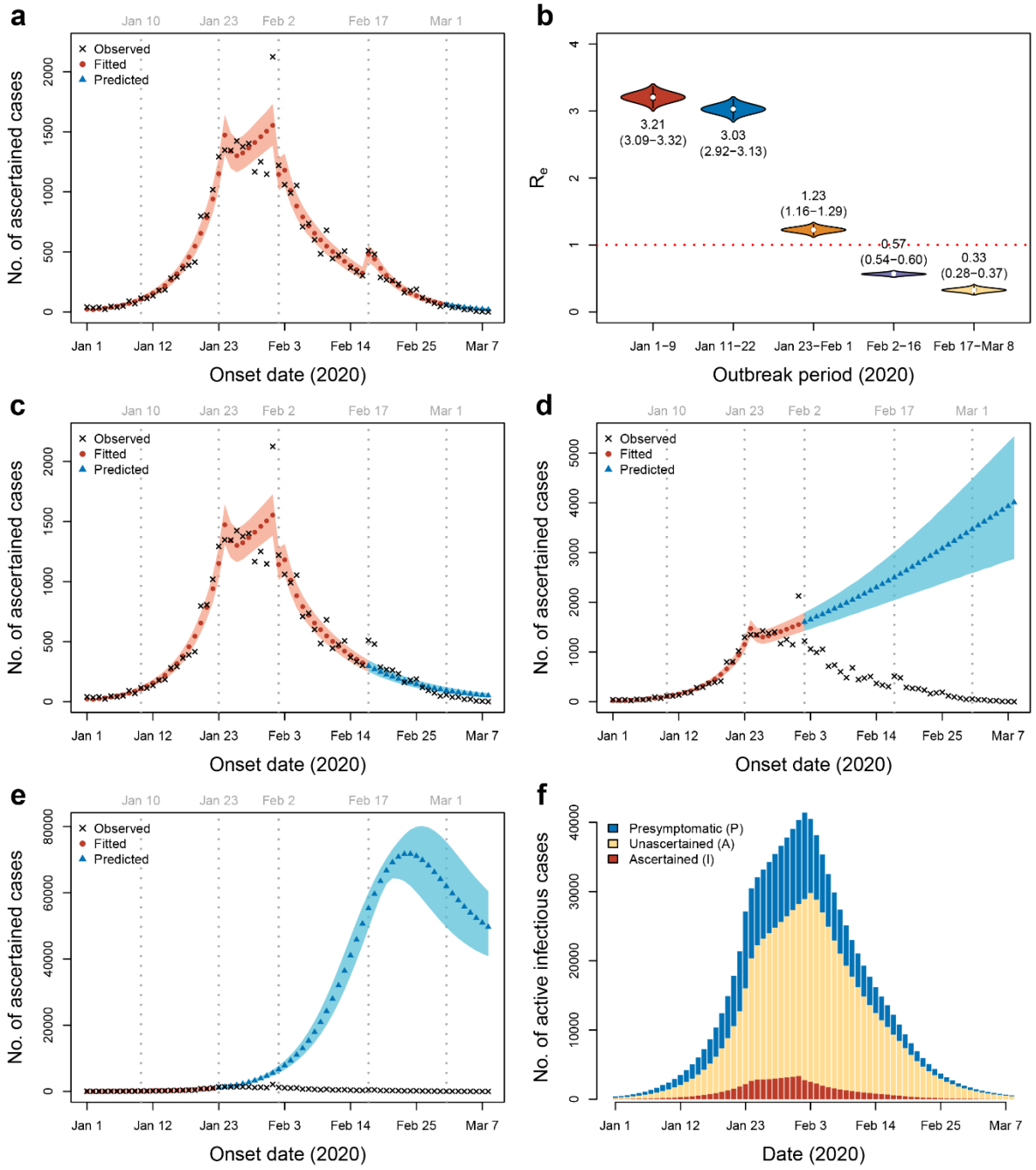
Supplementary information

Reconstruction of the full transmission dynamics of COVID-19 in Wuhan

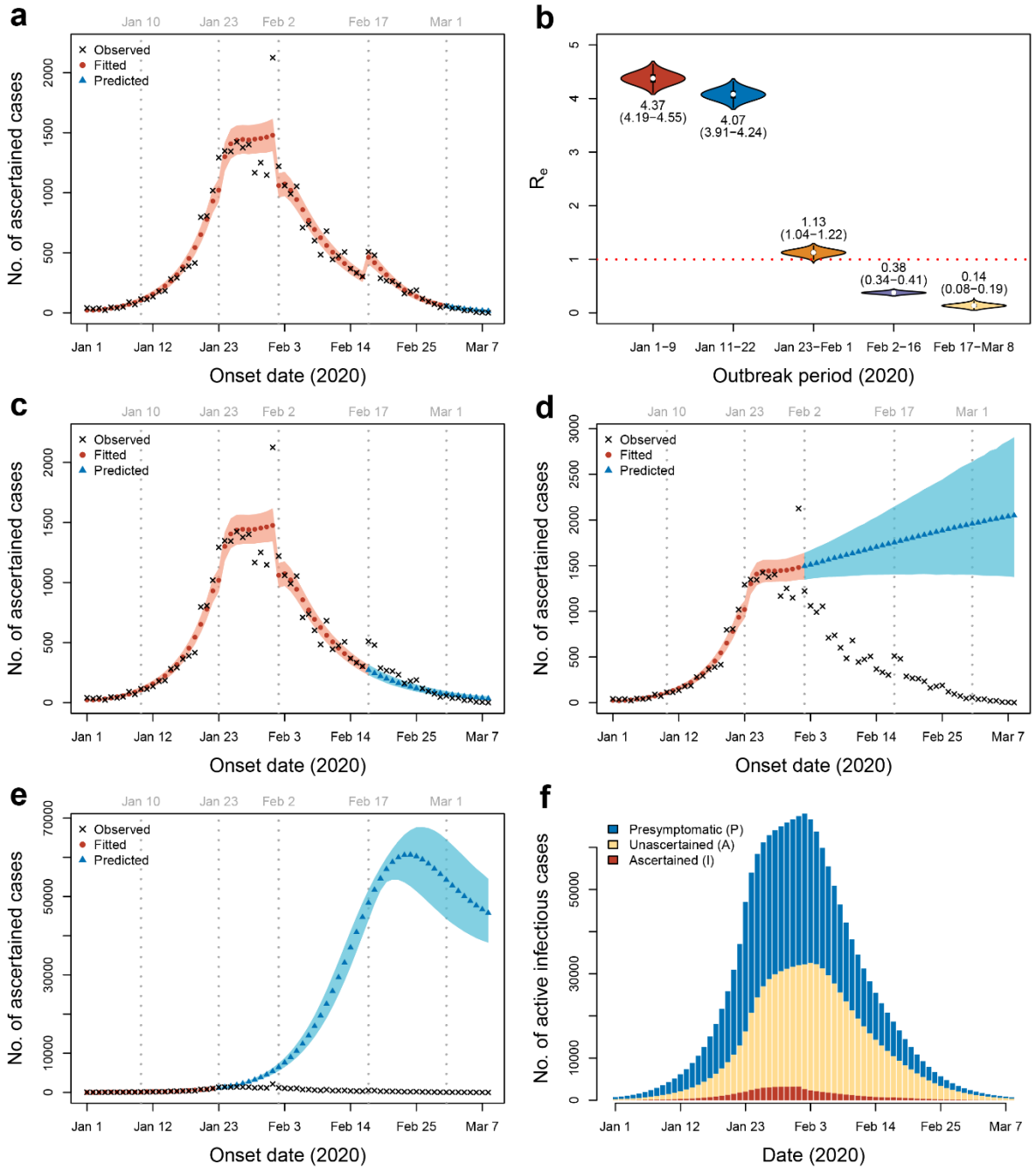
In the format provided by the authors and unedited



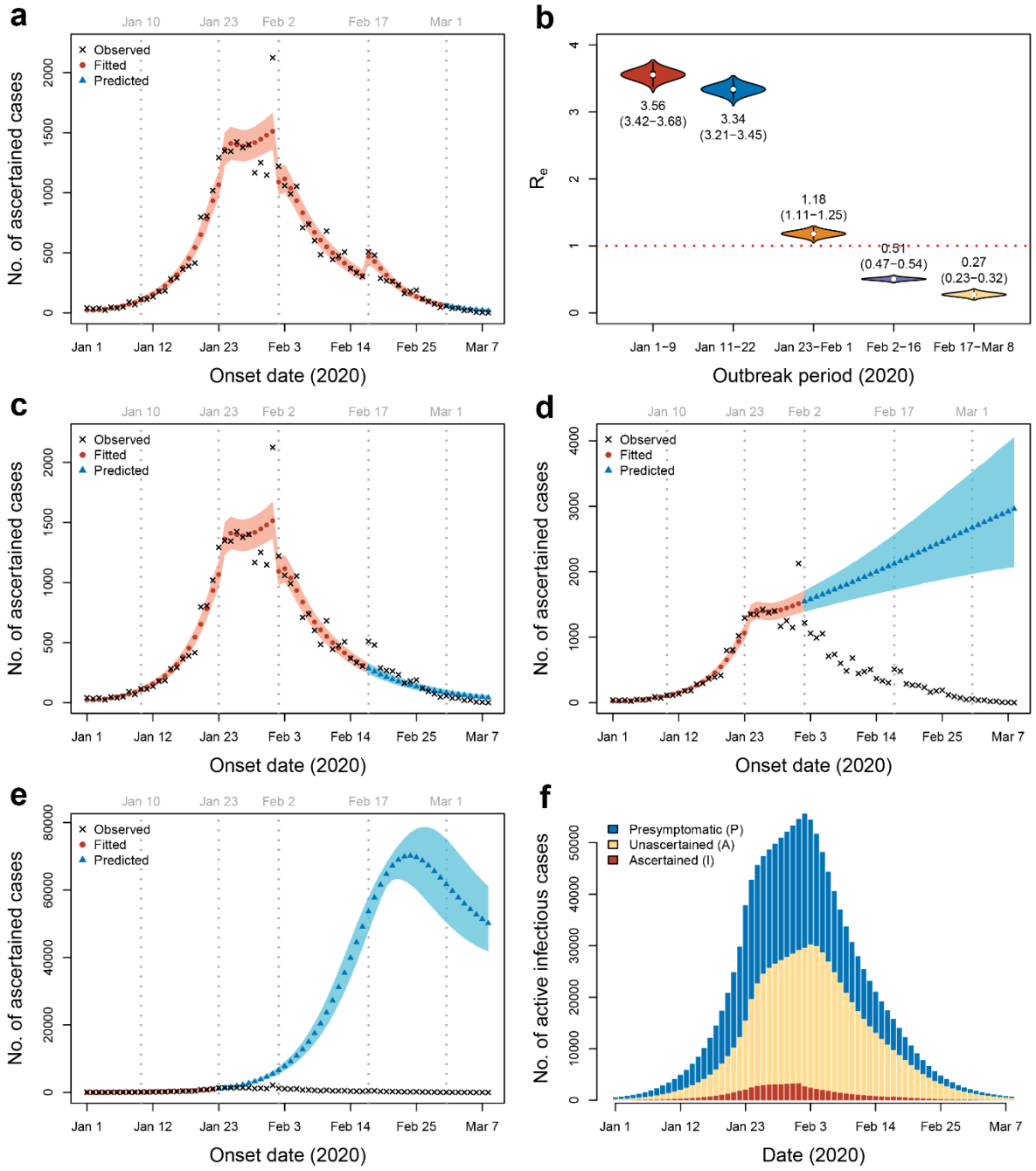
Supplementary Fig.1. Sensitivity analysis S1, adjusting the daily incidences from January 29 to February 1 to their average. Parameters were estimated by fitting data from January 1 to February 29. (a) Prediction using parameters from period 5 (February 17 to 29). (b) Distribution of R_e estimates from 10,000 MCMC samples. In each violin plot, the white dot represents the median, the thick bar represents the IQR, and the thin bar represents the minimum and maximum. The mean and the 95% CrI (in parentheses) are labelled below or above. (c) Prediction using parameters from period 4 (February 2 to 16). (d) Prediction using parameters from period 3 (January 23 to February 1). (e) Prediction using parameters from period 2 (January 10 to 22). The shaded areas in (a, c, d and e) are 95% CrIs and the colored points are the mean values based on 10,000 MCMC samples. (f) Estimated number of active infectious cases in Wuhan from January 1 to March 8.



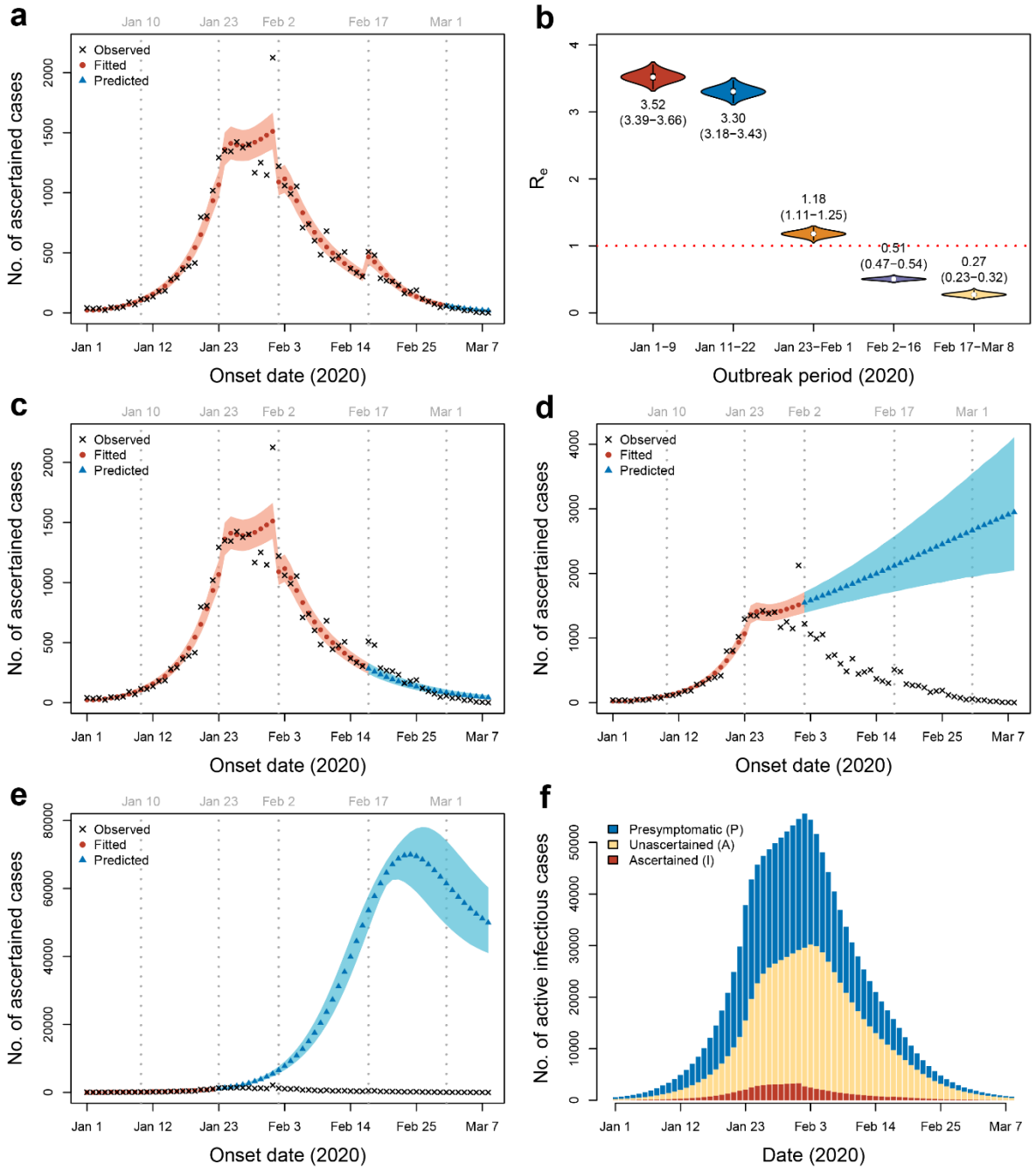
Supplementary Fig. 2. Sensitivity analysis S2, assuming an incubation period of 4.1 days and a presymptomatic infectious period of 1.1 days. Parameters were estimated by fitting data from January 1 to February 29. (a) Prediction using parameters from period 5 (February 17 to 29). (b) Distribution of R_e estimates from 10,000 MCMC samples. In each violin plot, the white dot represents the median, the thick bar represents the IQR, and the thin bar represents the minimum and maximum. The mean and the 95% CrI (in parentheses) are labelled below or above. (c) Prediction using parameters from period 4 (February 2 to 16). (d) Prediction using parameters from period 3 (January 23 to February 1). (e) Prediction using parameters from period 2 (January 10 to 22). The shaded areas in (a, c, d and e) are 95% CrIs and the colored points are the mean values based on 10,000 MCMC samples. (f) Estimated number of active infectious cases in Wuhan from January 1 to March 8.



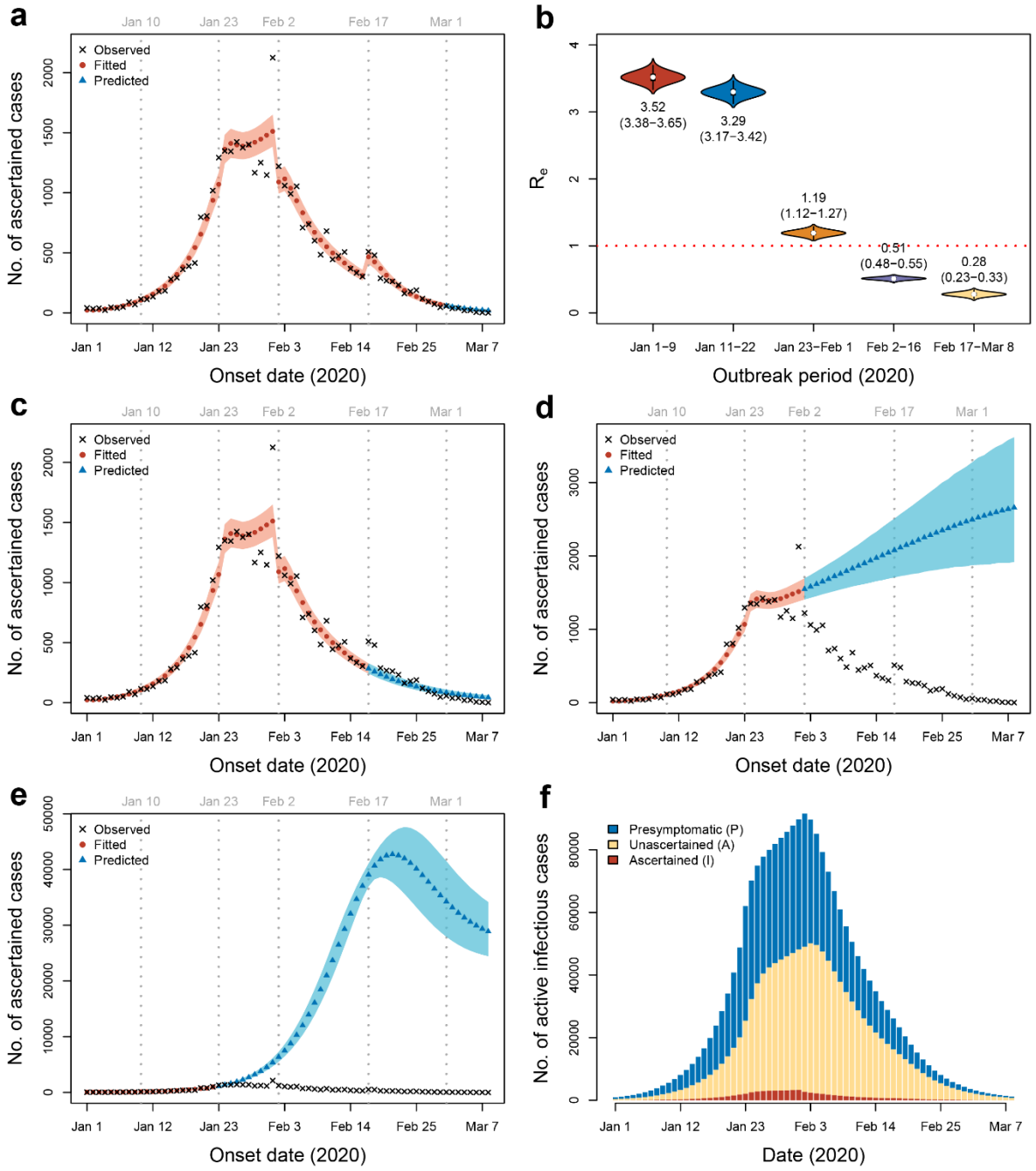
Supplementary Fig. 3. Sensitivity analysis S3, assuming an incubation period of 7 days and a presymptomatic infectious period of 3 days. Parameters were estimated by fitting data from January 1 to February 29. (a) Prediction using parameters from period 5 (February 17 to 29). (b) Distribution of R_e estimates from 10,000 MCMC samples. In each violin plot, the white dot represents the median, the thick bar represents the IQR, and the thin bar represents the minimum and maximum. The mean and the 95% CrI (in parentheses) are labelled below or above. (c) Prediction using parameters from period 4 (February 2 to 16). (d) Prediction using parameters from period 3 (January 23 to February 1). (e) Prediction using parameters from period 2 (January 10 to 22). The shaded areas in (a, c, d and e) are 95% CrIs and the colored points are the mean values based on 10,000 MCMC samples. (f) Estimated number of active infectious cases in Wuhan from January 1 to March 8.8.



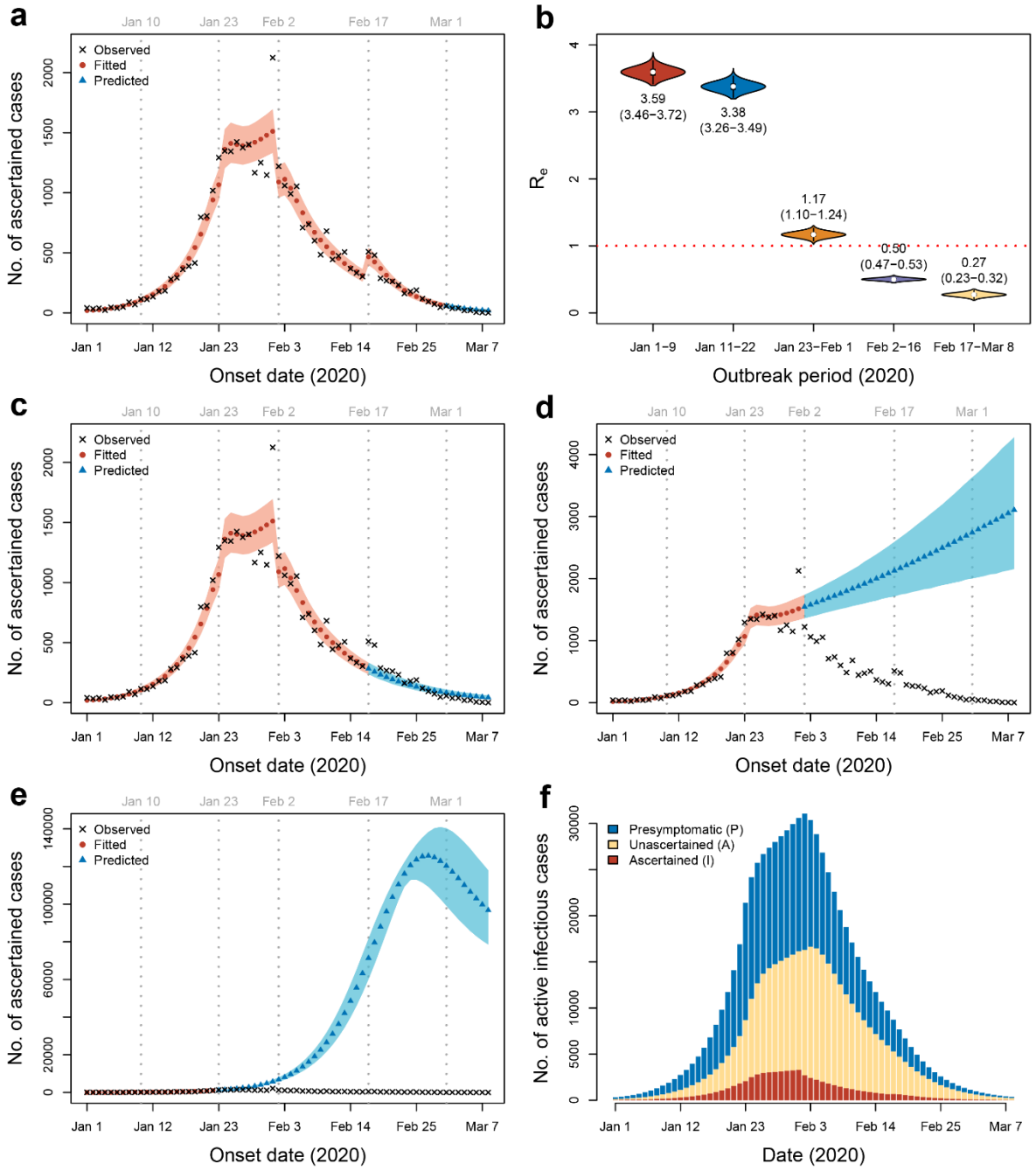
Supplementary Fig. 4. Sensitivity analysis S4, assuming the transmissibility of the unascertained cases is 0.46 of the ascertained cases. Parameters were estimated by fitting data from January 1 to February 29. (a) Prediction using parameters from period 5 (February 17 to 29). (b) Distribution of R_e estimates from 10,000 MCMC samples. In each violin plot, the white dot represents the median, the thick bar represents the IQR, and the thin bar represents the minimum and maximum. The mean and the 95% CrI (in parentheses) are labelled below or above. (c) Prediction using parameters from period 4 (February 2 to 16). (d) Prediction using parameters from period 3 (January 23 to February 1). (e) Prediction using parameters from period 2 (January 10 to 22). The shaded areas in (a, c, d and e) are 95% CrIs and the colored points are the mean values based on 10,000 MCMC samples. (f) Estimated number of active infectious cases in Wuhan from January 1 to March 8.



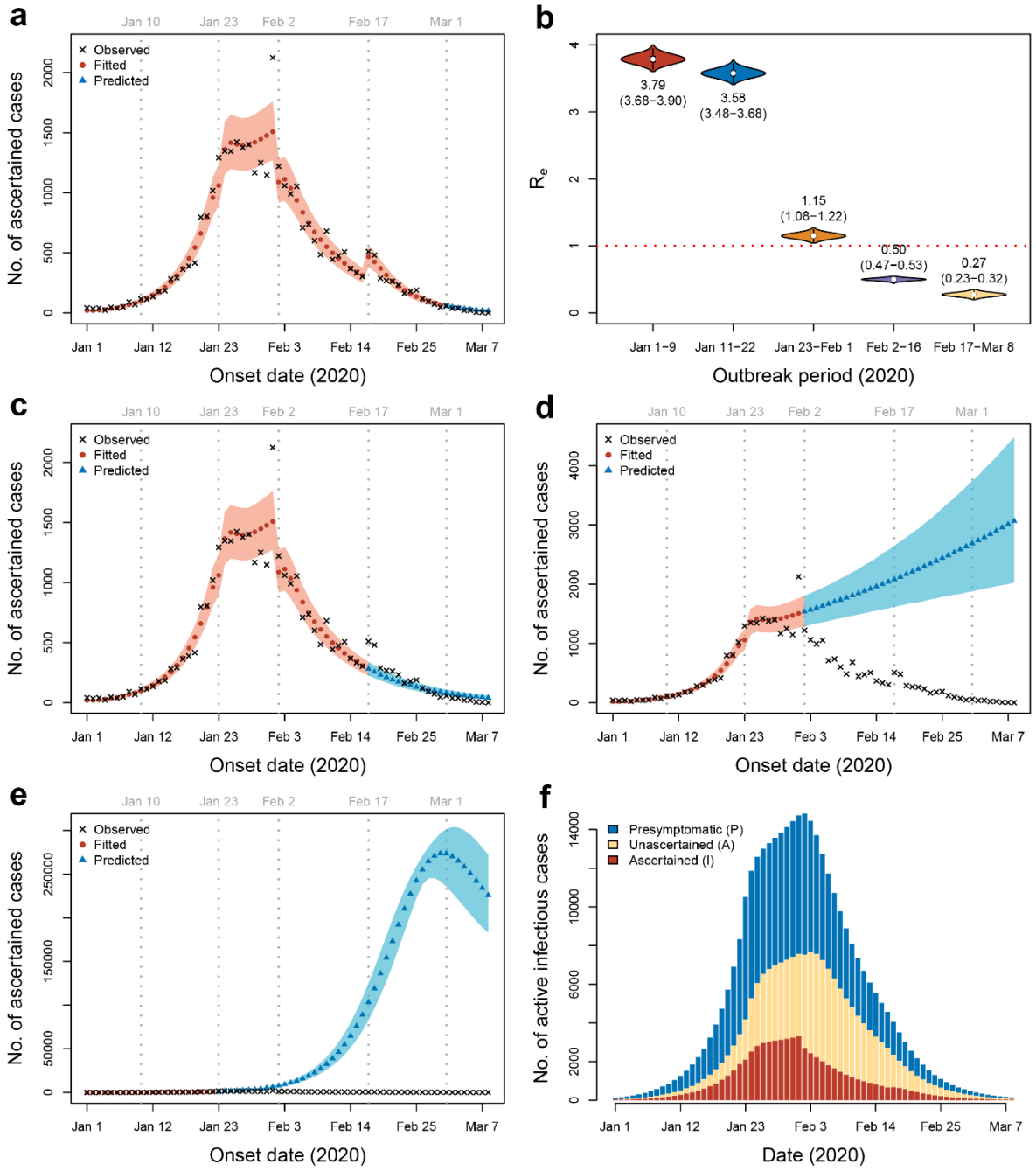
Supplementary Fig. 5. Sensitivity analysis S5, assuming the transmissibility of the unascertained cases is 0.62 of the ascertained cases. Parameters were estimated by fitting data from January 1 to February 29. (a) Prediction using parameters from period 5 (February 17 to 29). (b) Distribution of R_e estimates from 10,000 MCMC samples. In each violin plot, the white dot represents the median, the thick bar represents the IQR, and the thin bar represents the minimum and maximum. The mean and the 95% CrI (in parentheses) are labelled below or above. (c) Prediction using parameters from period 4 (February 2 to 16). (d) Prediction using parameters from period 3 (January 23 to February 1). (e) Prediction using parameters from period 2 (January 10 to 22). The shaded areas in (a, c, d and e) are 95% CrIs and the colored points are the mean values based on 10,000 MCMC samples. (f) Estimated number of active infectious cases in Wuhan from January 1 to March 8.



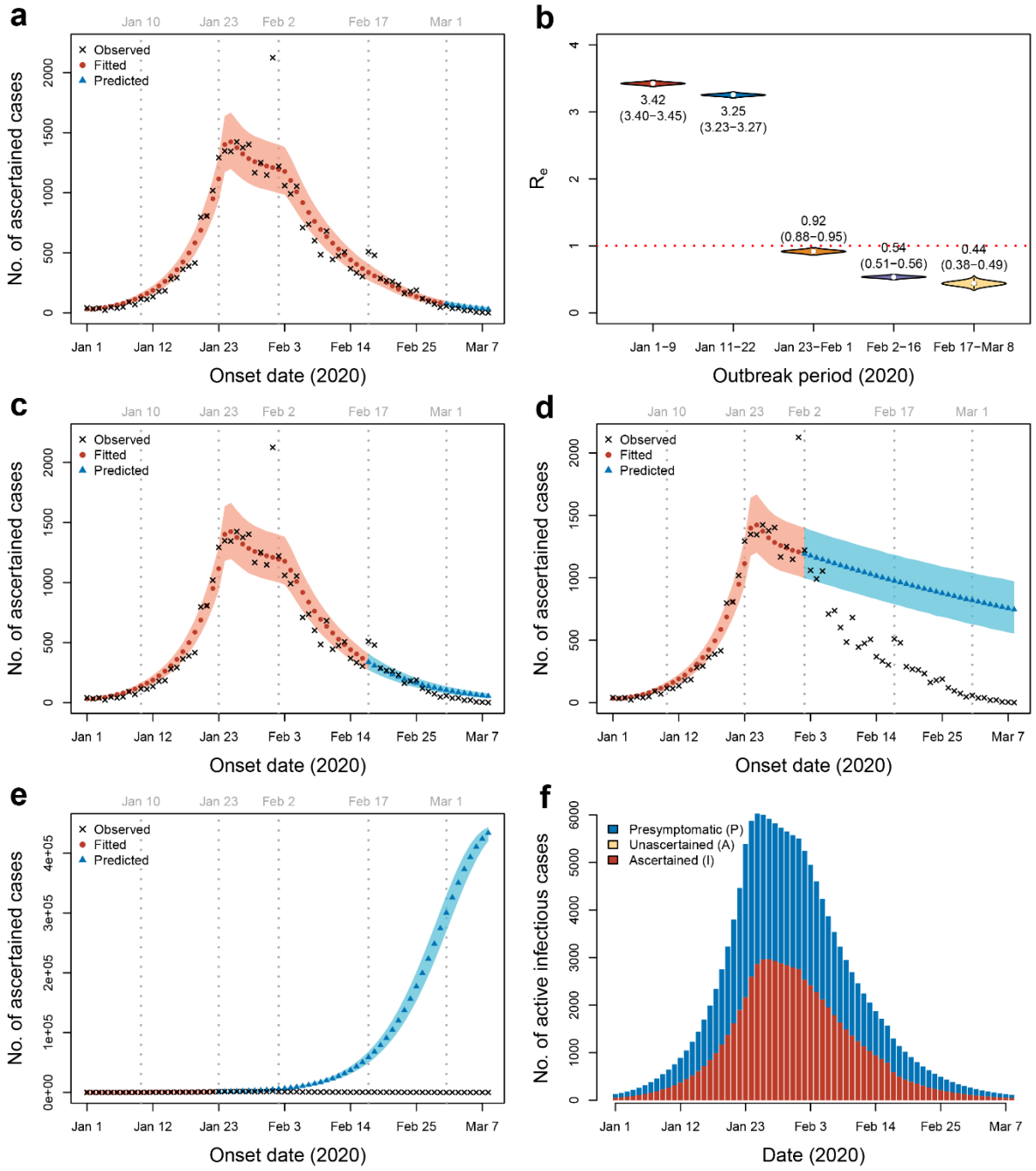
Supplementary Fig. 6. Sensitivity analysis S6, assuming the initial ascertainment rate is r_0=0.14. Parameters were estimated by fitting data from January 1 to February 29. (a) Prediction using parameters from period 5 (February 17 to 29). (b) Distribution of R_e estimates from 10,000 MCMC samples. In each violin plot, the white dot represents the median, the thick bar represents the IQR, and the thin bar represents the minimum and maximum. The mean and the 95% CrI (in parentheses) are labelled below or above. (c) Prediction using parameters from period 4 (February 2 to 16). (d) Prediction using parameters from period 3 (January 23 to February 1). (e) Prediction using parameters from period 2 (January 10 to 22). The shaded areas in (a, c, d and e) are 95% CrIs and the colored points are the mean values based on 10,000 MCMC samples. (f) Estimated number of active infectious cases in Wuhan from January 1 to March 8.



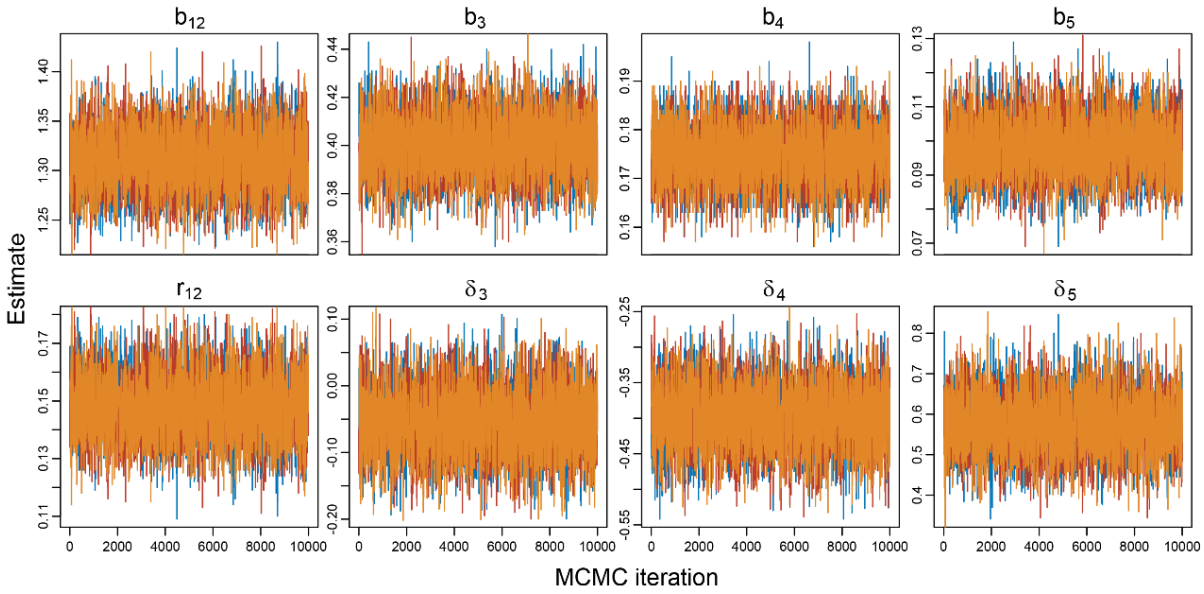
Supplementary Fig. 7. Sensitivity analysis S7, assuming the initial ascertainment rate is r_0=0.42. Parameters were estimated by fitting data from January 1 to February 29. (a) Prediction using parameters from period 5 (February 17 to 29). (b) Distribution of R_e estimates from 10,000 MCMC samples. In each violin plot, the white dot represents the median, the thick bar represents the IQR, and the thin bar represents the minimum and maximum. The mean and the 95% CrI (in parentheses) are labelled below or above. (c) Prediction using parameters from period 4 (February 2 to 16). (d) Prediction using parameters from period 3 (January 23 to February 1). (e) Prediction using parameters from period 2 (January 10 to 22). The shaded areas in (a, c, d and e) are 95% CrIs and the colored points are the mean values based on 10,000 MCMC samples. (f) Estimated number of active infectious cases in Wuhan from January 1 to March 8.



Supplementary Fig. 8. Sensitivity analysis S8, assuming the initial ascertainment rate is r_0=1. Parameters were estimated by fitting data from January 1 to February 29. (a) Prediction using parameters from period 5 (February 17 to 29). (b) Distribution of R_e estimates from 10,000 MCMC samples. In each violin plot, the white dot represents the median, the thick bar represents the IQR, and the thin bar represents the minimum and maximum. The mean and the 95% CrI (in parentheses) are labelled below or above. (c) Prediction using parameters from period 4 (February 2 to 16). (d) Prediction using parameters from period 3 (January 23 to February 1). (e) Prediction using parameters from period 2 (January 10 to 22). The shaded areas in (a, c, d and e) are 95% CrIs and the colored points are the mean values based on 10,000 MCMC samples. (f) Estimated number of active infectious cases in Wuhan from January 1 to March 8.



Supplementary Fig. 9. Sensitivity analysis S9, assuming complete ascertainment at any time. Parameters were estimated by fitting data from January 1 to February 29. Compared to the full model, this simplified model fit the data significantly worse (Bayes factor, BF=2.95× 10^{51}). (a) Prediction using parameters from period 5 (February 17 to 29). (b) Distribution of R_e estimates from 10,000 MCMC samples. In each violin plot, the white dot represents the median, the thick bar represents the IQR, and the thin bar represents the minimum and maximum. The mean and the 95% CrI (in parentheses) are labelled below or above. (c) Prediction using parameters from period 4 (February 2 to 16). (d) Prediction using parameters from period 3 (January 23 to February 1). (e) Prediction using parameters from period 2 (January 10 to 22). The shaded areas in (a, c, d and e) are 95% CrIs and the colored points are the mean values based on 10,000 MCMC samples. (f) Estimated number of active infectious cases in Wuhan from January 1 to March 8.



Supplementary Fig. 10. Trace plots of MCMC for the main analysis of real data. Each panel represents the trajectory of 10,000 sampled values for a parameter indicated on the top of the panel. We generated three Markov chains with different initial values, which were colored by orange, red, and blue. The Gelman-Rubin diagnostic is 1.00, indicating convergence of MCMC.