**Supplementary Table 1. Spearman’s correlation coefficients () between Ct and the natural log-transformed incidence-based over the third and fourth waves of COVID-19 in Hong Kong.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Wave 3  (Jul - Aug 2020) | | Wave 4  (Nov 2020 – Mar 2021) | | |
|  |  | P-value |  | P-value | |
| Ct mean | -0.79 | <0.001 | -0.52 | | <0.001 |
| Ct skewness | 0.80 | <0.001 | 0.27 | | <0.001 |

**Supplementary Table 2. Associations between population Ct distributions and incidence-based .**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **(95% confidence intervals)** | **P-value** | **Adjusted R square\*** |
| **Main model (training period between 6 Jul to 31 Aug 2020)** | | | |
| Ct mean | 0.86 (0.81,0.92) | <0.001 | 0.72 |
| Ct skewness | 1.75 (1.11,2.75) | 0.02 |
| **Validation model (training period between 20 Nov to 31 Dec 2020)** | | | |
| Ct mean | 0.89 (0.84,0.94) | <0.001 | 0.74 |
| Ct skewness | 1.54 (1.14,2.07) | 0.01 |  |

\*Adjusted R square of the corresponding model.

**Supplementary Table 3. Comparing Akaike information criterion (AIC) of regression models using different measurements for population-level Ct distributions.**

|  |  |  |
| --- | --- | --- |
| Covariates included | Log-linear model\* | Linear model\* |
| Daily mean of Ct | 36.93 | 56.35 |
| Daily median of Ct | 35.52 | 60.96 |
| Daily skewness of Ct | 52.25 | 84.97 |
| Daily mean and skewness of Ct | 32.75 | 57.77 |
| Daily median and skewness of Ct | 35.44 | 62.96 |

\* For linear models, we used incidence-based as the dependent variable; for log-linear models, we used natural log-transformed incidence-based as the dependent variable.