**Supplementary Material 6**. Re-analysis of Morand et al. (2014)

Our results suggest that population density can sometimes have counter-intuitive effects on disease burden. For example, in our analysis, densely populated countries had lower per-capita disease burdens than sparsely populated countries. Two diseases declined in burden in response to increasing population density over time, even though these diseases are expected to be transmitted in a density-dependent manner (i.e., measles, varicella). We sought to compare these unexpected results to those of an earlier paper. We used Morand et al.’s (2014) published dataset to re-analyze the link between the number of outbreaks of infectious disease in Southeast Asia and population density of Southeast Asian nations. (Originally, Morand et al. [2014] had used number of outbreaks of infectious disease as a response, rather than per-capita number of outbreaks of infectious disease.) Morand et al.’s (2014) dataset reveals that per-capita outbreaks are negatively associated with increasing population (t25 = –3.22, p = 0.0040), consistent with our results. We speculate that this might be due to an encounter-dilution effect or to non-linear scaling of contact rates with population density (see main text). Note that Morand et al.’s (2014) dataset also reveals a positive relationship with gross domestic product, probably because surveillance increases with increasing wealth.

**Summary of Fit**

|  |  |
| --- | --- |
| RSquare | 0.487382 |
| RSquare Adj | 0.440781 |
| Root Mean Square Error | 3.659e-6 |
| Mean of Response | 3.231e-6 |
| Observations (or Sum Wgts) | 25 |

**Analysis of Variance**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Source** | **DF** | **Sum of Squares** | **Mean Square** | **F Ratio** |
| Model | 2 | 2.8008e-10 | 1.4e-10 | 10.4585 |
| Error | 22 | 2.9459e-10 | 1.339e-11 | **Prob > F** |
| C. Total | 24 | 5.7467e-10 |  | 0.0006\* |

**Parameter Estimates**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Term** |  | **Estimate** | **Std Error** | **t Ratio** | **Prob>|t|** |
| Intercept |  | 7.8683e-6 | 2.016e-6 | 3.90 | 0.0008\* |
| Log(Density) |  | -1.419e-6 | 4.413e-7 | -3.22 | 0.0040\* |
| GDP |  | 2.638e-10 | 8.32e-11 | 3.17 | 0.0044\* |