

**Table S1 Factors that lead to synchrony or asynchrony of disease dynamics in space and time.**

<b>Causes of spatial synchrony</b>	<b>Causes of spatial asynchrony</b>
Rates of movement between populations that are high relative to the infectious period	Host populations that are patchy and isolated
Environmental synchrony caused by extreme weather	Environmental asynchrony and local feedbacks in disease dynamics
Spatially homogenous resources	Spatial variability in resources
Infectious periods that are long relative to the life span of hosts	Infectious periods that are short relative to the life span of hosts
Short-lived immunity that allows rapid reinfection	Strong, enduring immunity (e.g., measles virus in humans).
Pathogens with frequency-dependent dynamics	Pathogens with density-dependent dynamics
Low host specificity	High host specificity
<b>Causes of temporal consistency</b>	<b>Causes of temporal variability</b>
Infectious periods that are long relative to the life span of hosts	Infectious periods that are short relative to the life span of hosts
Persistent infections or rapid recovery and reinfection rates	Enduring immunity, particularly when transmission is density dependent
Pathogens with frequency-dependent dynamics	Pathogens with density-dependent dynamics in conjunction with seasonal aggregations of hosts or births
Host density dependence that operates by suppressing birth rates	Host density dependence that operates by increasing adult mortality and allowing higher birth rates