Additional Information: Could widespread use of antiviral treatment curb the COVID-19 pandemic? A modeling study.

Laura Matrajt,[1*] Elizabeth R. Brown[1,2], Myron S. Cohen,[3], Dobromir Dimitrov[1,4], Holly Janes,[1]

[1]Vaccine and Infectious Disease Division, Fred Hutchinson Cancer Research Center, Seattle, WA, USA

[2]Department of Biostatistics, University of Washington, Seattle, WA, USA

[3] Institute of Global Health and Infectious Diseases, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

[4]Department of Applied Mathematics, University of Washington, Seattle, WA, USA

[*]To whom correspondence should be addressed; E-mail: laurama@fredhutch.org

Additional Tables

Table S1: Parameters used in the model.

Parameter	Distribution (mean, SD)	Reference
Latent period	lognormal(4.5, 1.5)	[1, 2]
Infectious period for asymptomatic and mild cases	lognormal(8, 2)	[1, 3]
Duration of presymptomatic period	lognormal(1.1, 0.9)	[1, 4]
Length of time from symptom onset to hospitalization	lognormal(6.6, 4.9)	[1, 4, 5]
Length of time from hospitalization to critically ill	lognormal(1.5, 1)	[1, 5, 6]
Length of time from critically ill to death	lognormal(10.7, 4.8)	[1, 7]
Time from onset of symptoms to recovery for severe and critically ill cases	lognormal(18.1, 6.3)	[1, 7]
Age-stratified mortality rates	varied by age	[1, 8, 9]
Age-stratified probability of developing symptoms	Table S3	[1, 7, 10]
Fraction of symptomatic infections $<$15 year old	0.25	[11]
Fraction of symptomatic infections $\geq$15 year old	0.6	[12–14]
Antiviral effect on viral transmission, AVT	25, 50, 75, 100	assumed
Antiviral effect on hospitalization, AVH,	50 or 80	[15, 16]

Table S2: Vaccine effectiveness values used in the model during the Delta and the Omicron waves. For the Delta wave, vaccine effectiveness assumes full coverage. For the Omicron wave, we assumed that boosted vaccinated individuals will get the same protection as that given by full coverage during the Delta wave.

Parameter	Delta	Omicron (full coverage)	Omicron (boosted)	References
Vaccine efficacy against infection, VE_{SUS}	59.6	10	59.6	[17–19]
Vaccine efficacy against symptomatic infection, VE_{DIS}	67.5	0.15	67.5	[17, 19]
Vaccine efficacy against Hospitalization, VE_{HOSP}	87.65	0.52	87.65	[17, 19]

Table S3: Age-specific parameters for disease progression.

Parameter	**0-9**	**10-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80-89**	**90+**
Probability of severe disease	0.0005	0.00165	0.0072	0.0208	0.0343	0.0765	0.1328	0.20655	0.2457	0.2457
Probability of critical disease	0.00003	0.00008	0.00036	0.00104	0.00216	0.00933	0.03639	0.08923	0.1742	0.1742
Probability of death	0.00002	0.00002	0.0001	0.00032	0.00098	0.00265	0.00766	0.02439	0.08292	0.1619

Table S4: Demographic distribution of the adult population

Location	Kenya	Mexico	US	Belgium
Percentage of adults ≥ 18	100	100	100	100
Percentage of adults ≥ 30	44	59	70	74
Percentage of adults ≥ 50	13	26	40	44
Percentage of adults ≥ 65	3	9	19	22

Table S5: Vaccine distribution in Belgium (values taken from [20, 21]). As of January 3rd, certain groups (e.g. children who just got vaccinated) in Belgium were were considered "highly protected" and were given the vaccine effectiveness of the boosted vaccinated individuals in the model.

Age group	Delta wave (full dosage)	Omicron wave (full dosage)	Omicron (highly protected)
12-15	0.6975	0.0194	0.74
16-17	0.7886	0.0351	0.81
18-24	0.7924	0.0805	0.76
25-34	0.7884	0.0809	0.75
35-44	0.8369	0.1257	0.74
45-54	0.887	0.2148	0.69
55-64	0.9154	0.1769	0.75
65-74	0.9317	0.09	0.85
75-85	0.9378	0.0753	0.87
$\geq$85	0.9139	0.11	0.81

Table S6: Vaccine distribution in US (values taken from [21, 22]). As of January 3rd, children under 18 years old were considered "highly protected" and were given the vaccine effectiveness of the boosted vaccinated individuals in the model.

Age group	Delta wave (full dosage)	Omicron wave (full dosage)	Omicron (highly protected)
5-11	-	-	0.156
12-15	0.446	-	0.536
16-17	0.524	-	0.536
18-24	0.528	0.389	0.20
25-39	0.57	0.417	0.215
40-49	0.658	0.471	0.243
50-64	0.737	0.431	0.353
65-74	0.86	0.36	0.539
$\geq$75	0.809	0.338	0.506

Table S7: Vaccine distribution in Mexico (values taken from [21, 23]). As of January 3rd, we found no data on boosted individuals in Mexico, so we did not considered boosted individuals in Mexico [21].

Age group	Delta wave (full dosage)	Omicron wave (full dosage)
18-39	0.493	0.83
40-49	0.735	0.735
50-59	0.785	0.785
60	0.824	0.824

Additional Figures

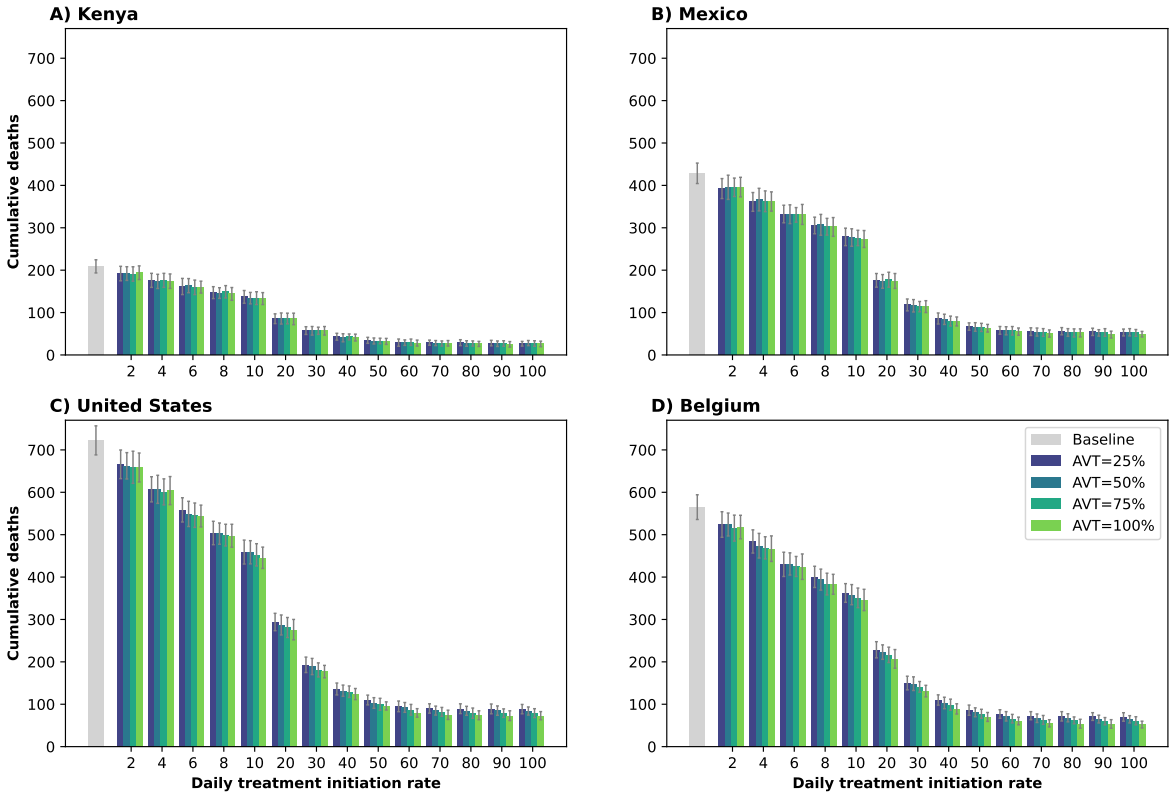

Figure S1: Cumulative deaths over next 6 months in A) Kenya, B) Mexico, C) United States and D) Belgium. Here, we assumed an epidemic wave with parameters similar to those of the Omicron epidemic wave (transmissibility, vaccine effectiveness, and vaccination coverage). For each country, the colors represent four possible values of AVT (25, 50, 75 or 100% reduction in viral transmission in treated symptomatic individuals) and a daily treatment initiation rate (DTIR) of 2-100% of adult symptomatic individuals within the first 5 days of symptoms. Gray bars represent baseline cumulative deaths in absence of antiviral treatment.

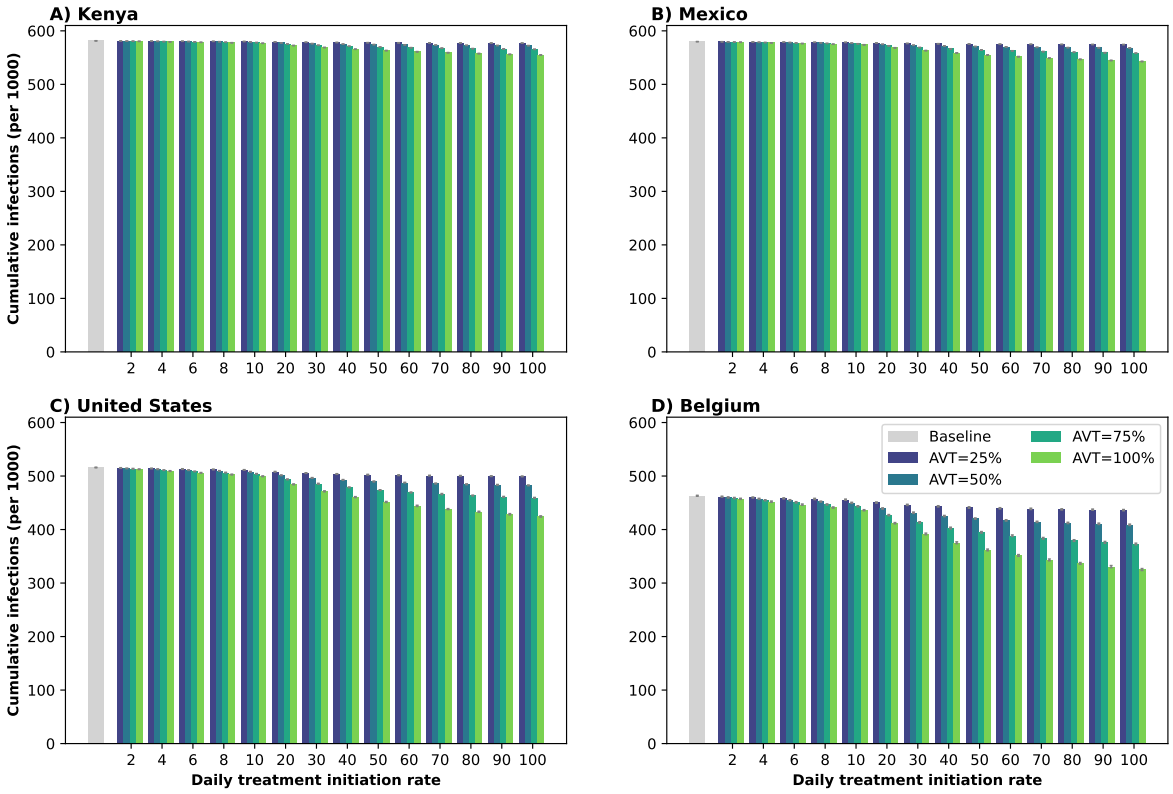

Figure S2: Cumulative infections over next 6 months for A) Kenya, B) Mexico, C) United States and D) Belgium. Here, we assumed an epidemic wave with parameters similar to those of the Omicron epidemic wave (transmissibility, vaccine effectiveness, and vaccination coverage). For each country, the colors represent four possible values of AVT (25, 50, 75 or 100% reduction in viral transmission in treated symptomatic individuals) and a daily treatment initiation rate (DTIR) of 2-100% of adult symptomatic individuals within the first 5 days of symptoms. Gray bars represent baseline cumulative infections in absence of antiviral treatment.

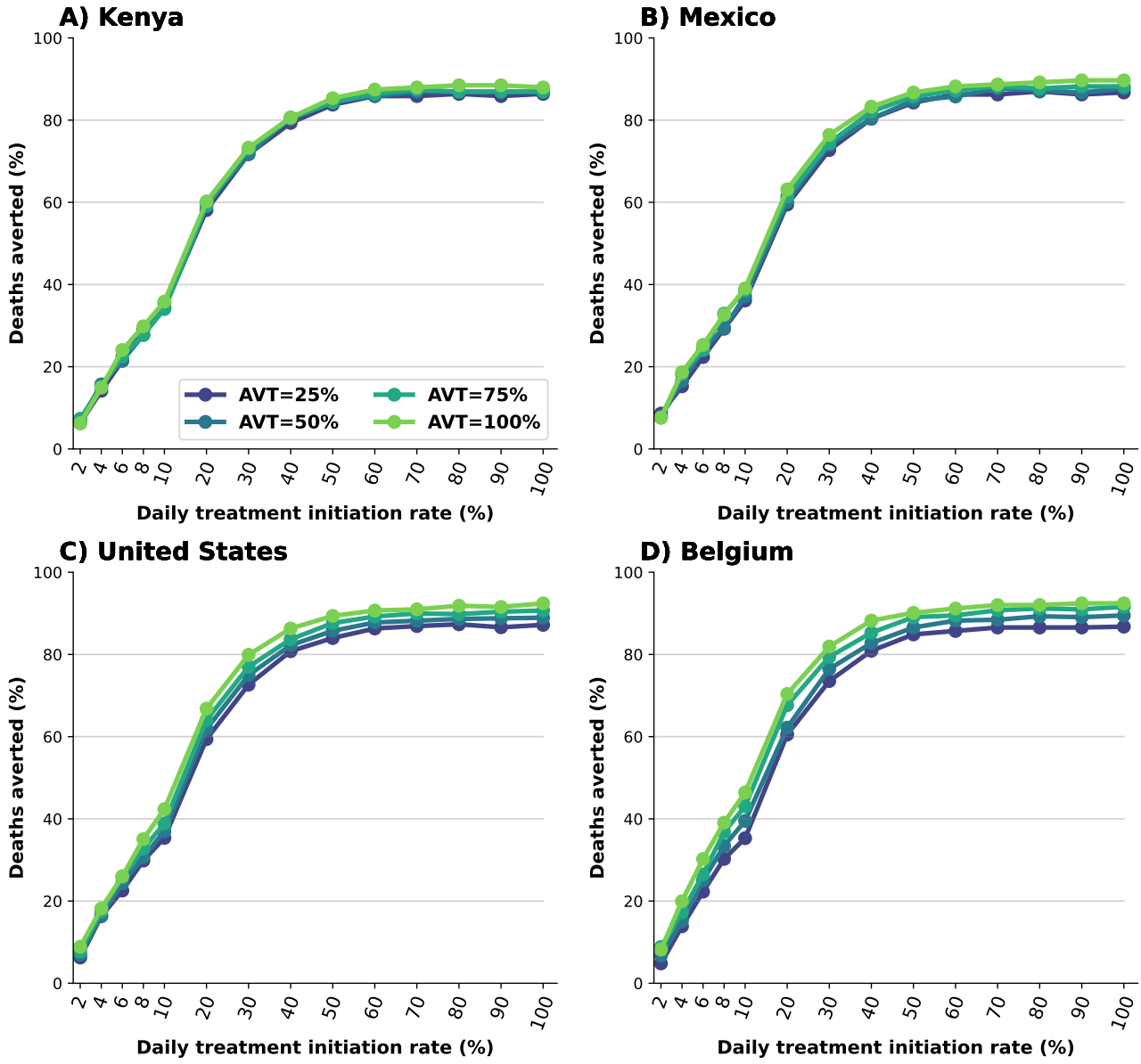

Figure S3: Percentage of deaths averted (compared to a baseline of no antiviral treatment) for A) Kenya, B) Mexico, C) United States and D) Belgium. Here, we assumed an epidemic wave with parameters similar to those of the Delta epidemic wave (transmissibility, vaccine effectiveness, and vaccination coverage). For each country, the colors represent four possible values of AVT (25, 50, 75 or 100% reduction in viral transmission in treated symptomatic individuals) and a daily treatment initiation rate (DTIR) of 2-100% of adult symptomatic individuals within the first 5 days of symptoms.

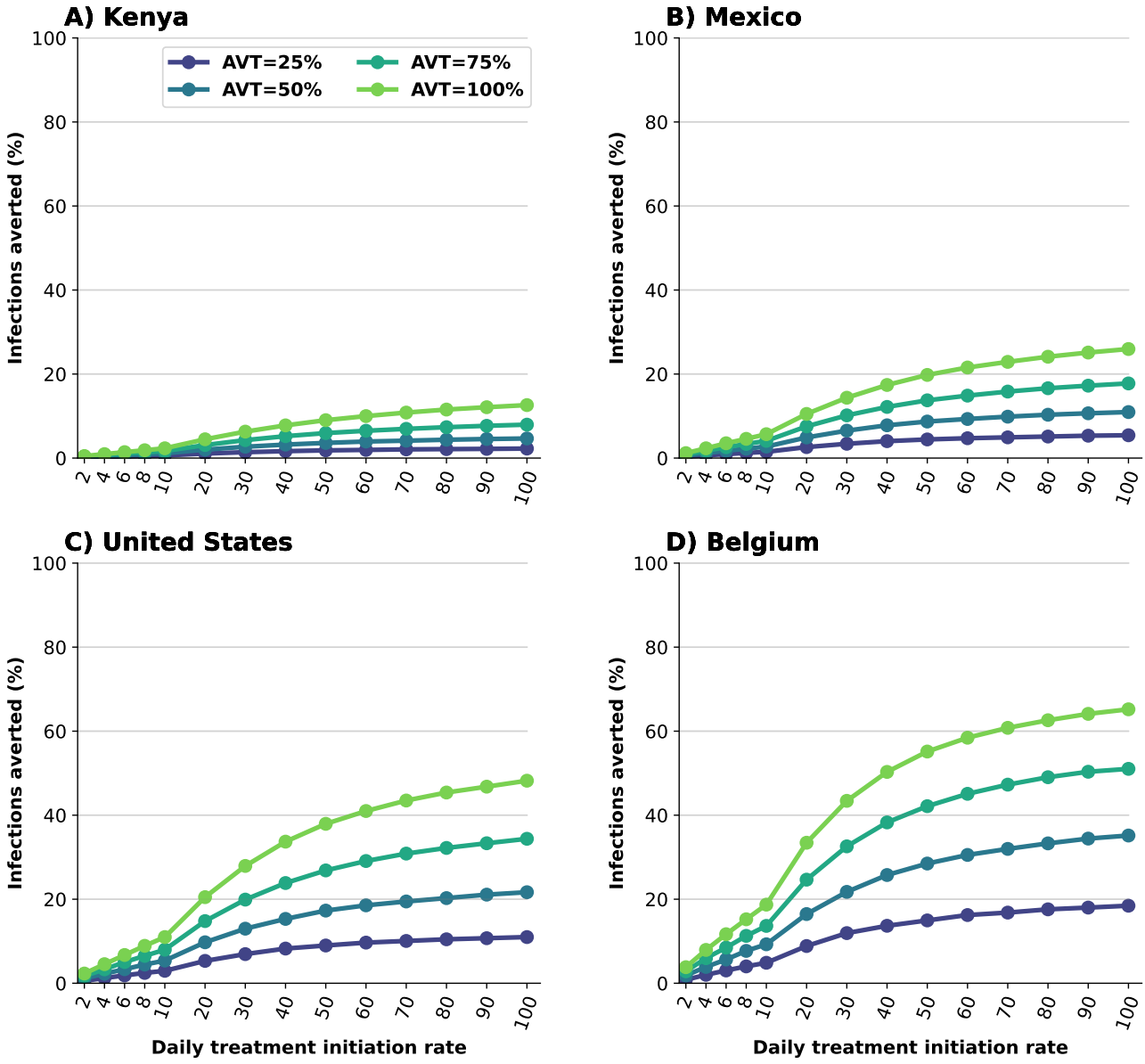

Figure S4: Percentage of infections averted (compared to a baseline of no antiviral treatment) for A) Kenya, B) Mexico, C) United States and D) Belgium. Here, we assumed an epidemic wave with parameters similar to those of the Delta epidemic wave (transmissibility, vaccine effectiveness, and vaccination coverage). For each country, the colors represent four possible values of AVT (25, 50, 75 or 100% reduction in viral transmission in treated symptomatic individuals) and a daily treatment initiation rate (DTIR) of 2-100% of adult symptomatic individuals within the first 5 days of symptoms.

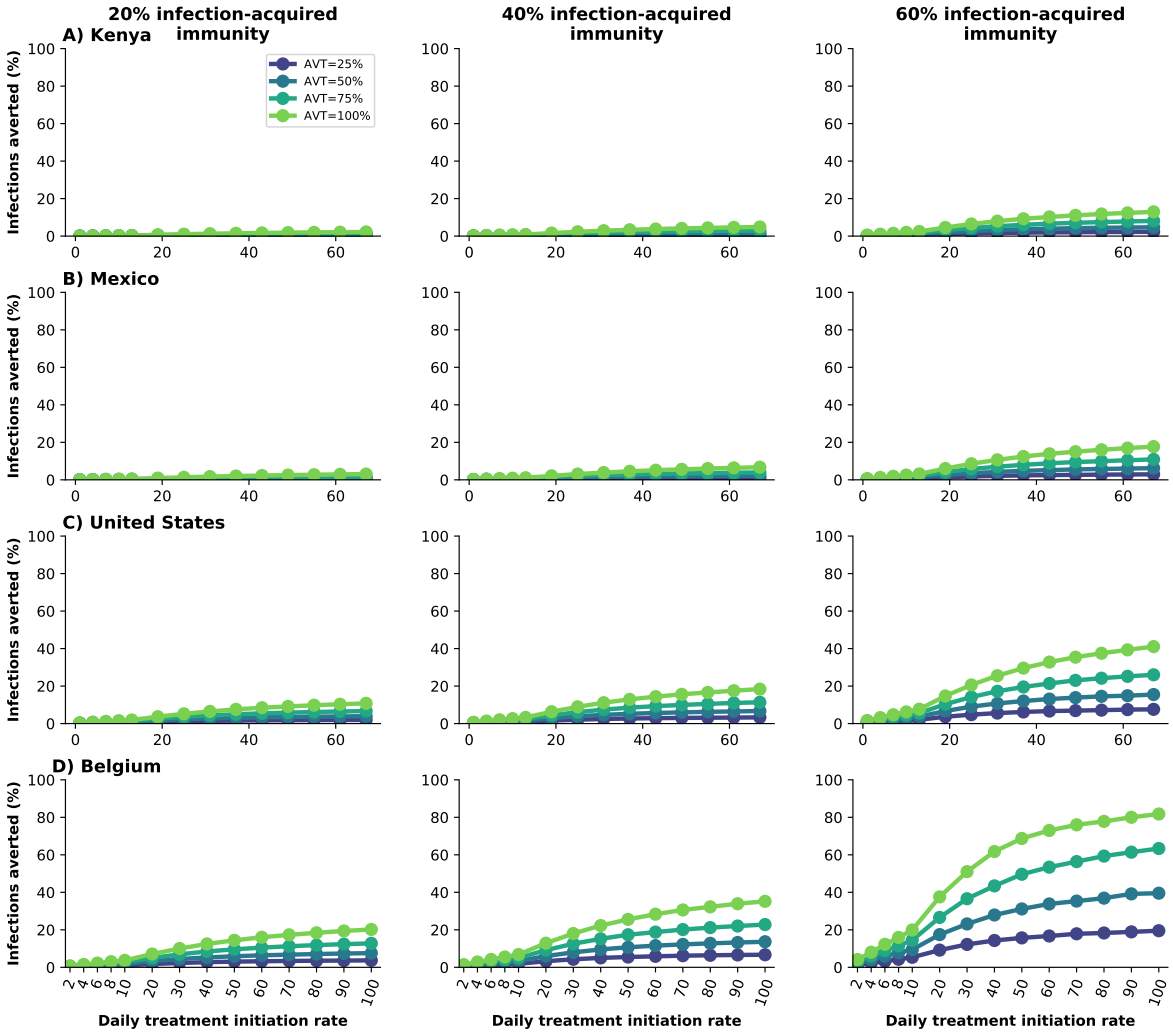

Figure S5: Percentage of deaths averted for A) Kenya, B) Mexico, C) United States and D) Belgium assuming 20 (left), 40 (middle) or 60% (right) of the population has been previously infected and is currently immune. For each country, the colors represent four possible values of AVT (25, 50, 75 or 100% reduction in viral transmission in treated symptomatic individuals) and a daily treatment initiation rate (DTIR) of 2-100% of adult symptomatic individuals within the first 5 days of symptoms.

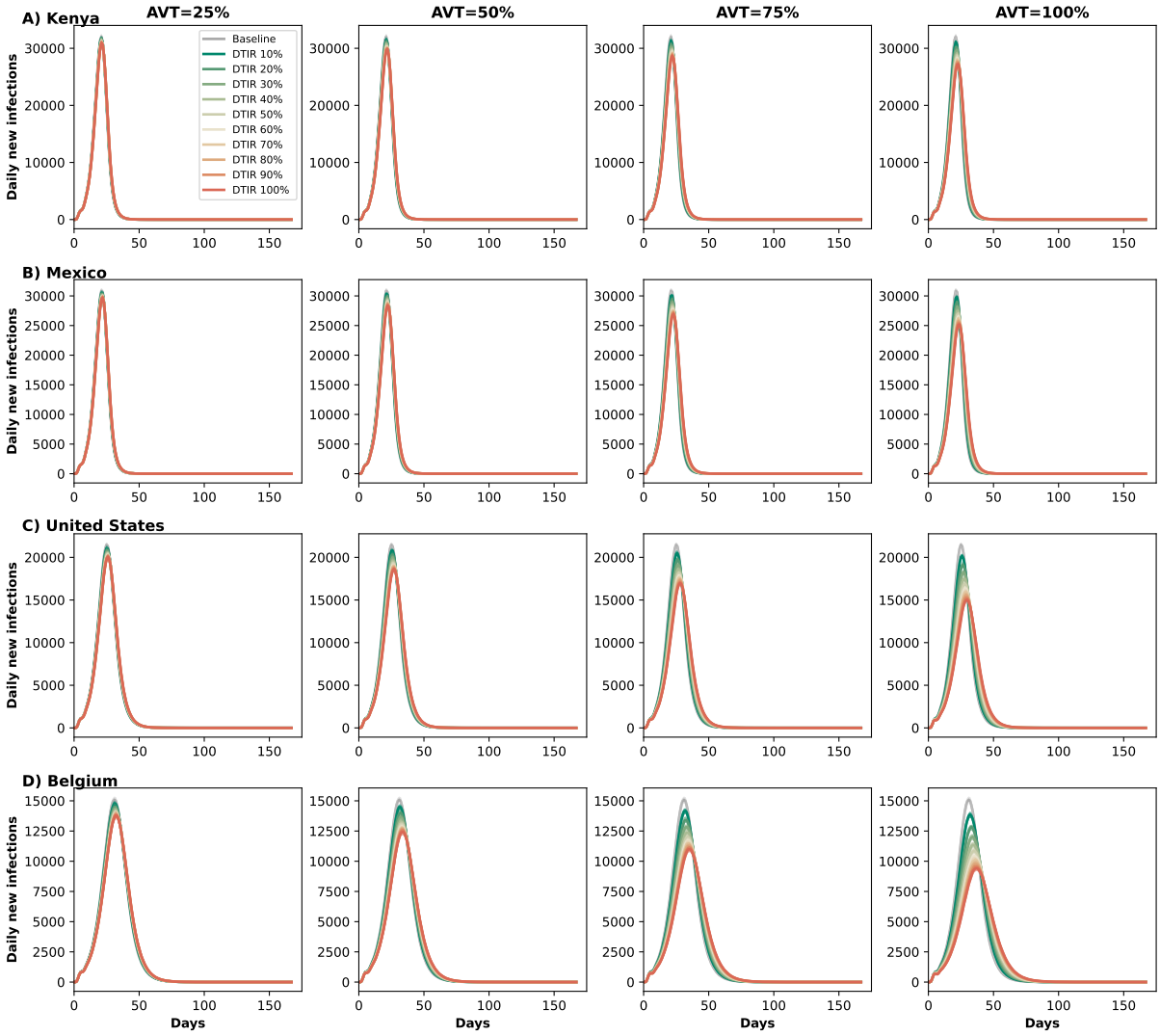

Figure S6: Daily new infections assuming no antiviral treatment (Baseline) or assuming a daily treatment initiation rate of of 10-100% of eligible symptomatic individuals in A) Kenya, B) Mexico, C) United States and D) Belgium assuming 20% of the population has been previously infected and is now recovered. For each location, each column represents a different value of AVT (25, 50, 75 or 100% reduction in viral transmission in treated symptomatic individuals).

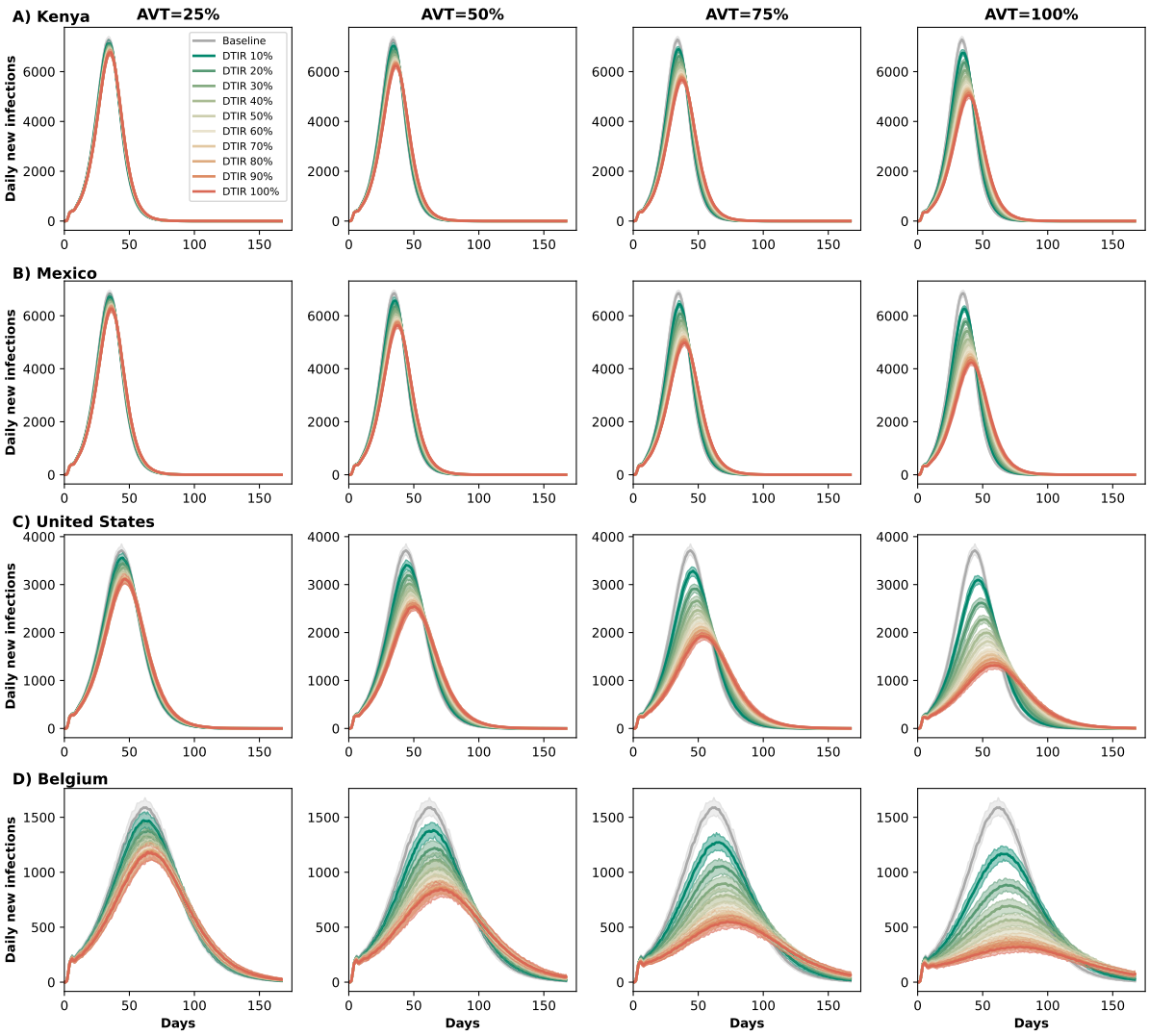

Figure S7: Daily new infections assuming no antiviral treatment (Baseline) or assuming a daily treatment initiation rate of of 10-100% of eligible symptomatic individuals in A) Kenya, B) Mexico, C) United States and D) Belgium assuming 60% of the population has been previously infected and is now recovered. For each location, each column represents a different value of AVT 25, 50, 75 or 100% reduction in viral transmission in treated symptomatic individuals).

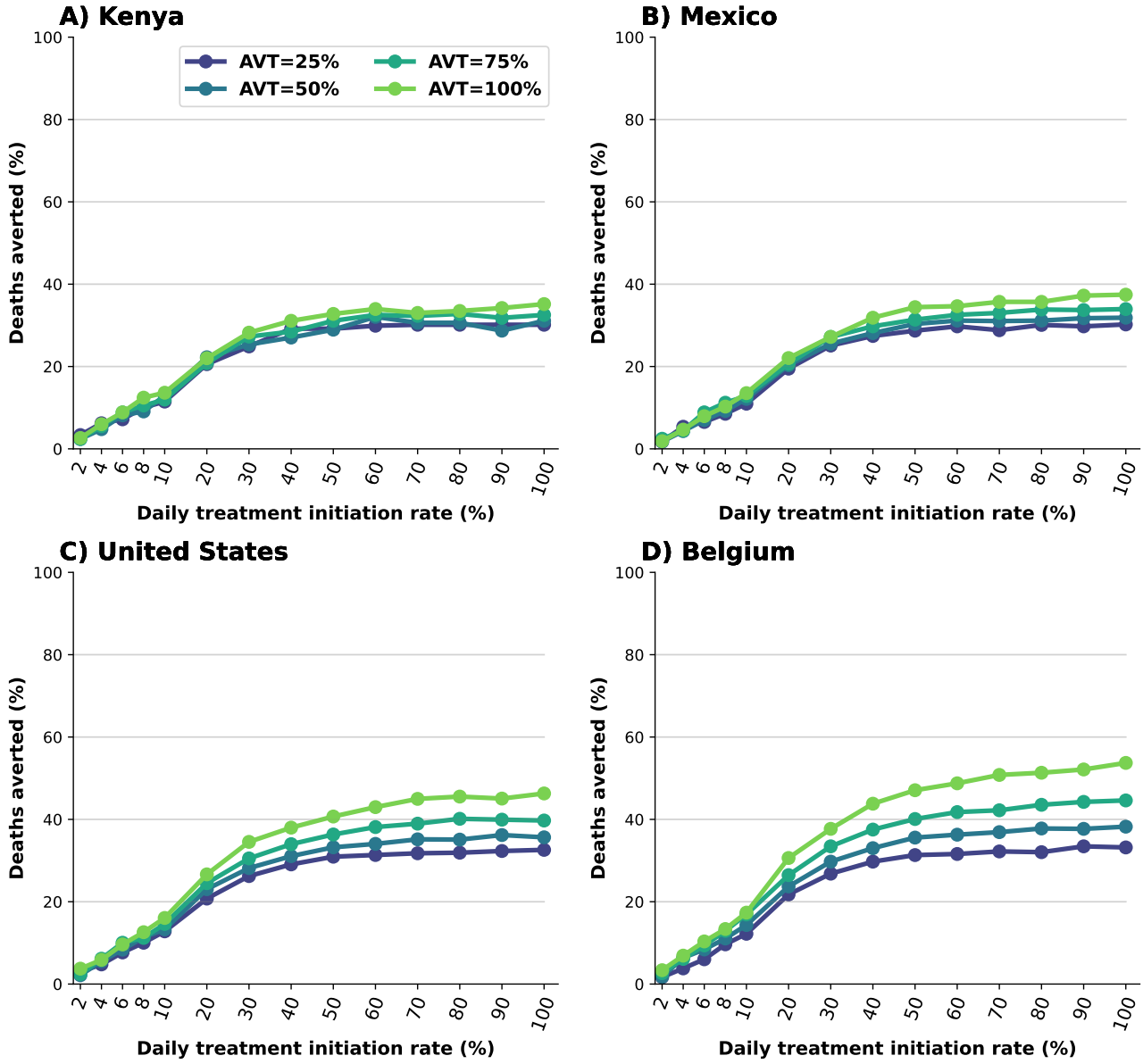

Figure S8: Percentage of deaths averted (compared to a baseline of no antiviral treatment) for A) Kenya, B) Mexico, C) United States and D) Belgium assuming antiviral treatment would reduce hospitalizations by 30%. Here, we assumed an epidemic wave with parameters similar to those of the Omicron epidemic wave (transmissibility, vaccine effectiveness, and vaccination coverage). For each country, the colors represent four possible values of AVT (25, 50, 75 or 100% reduction in viral transmission in treated symptomatic individuals) and a daily treatment initiation rate (DTIR) of 2-100% of adult symptomatic individuals within the first 5 days of symptoms.

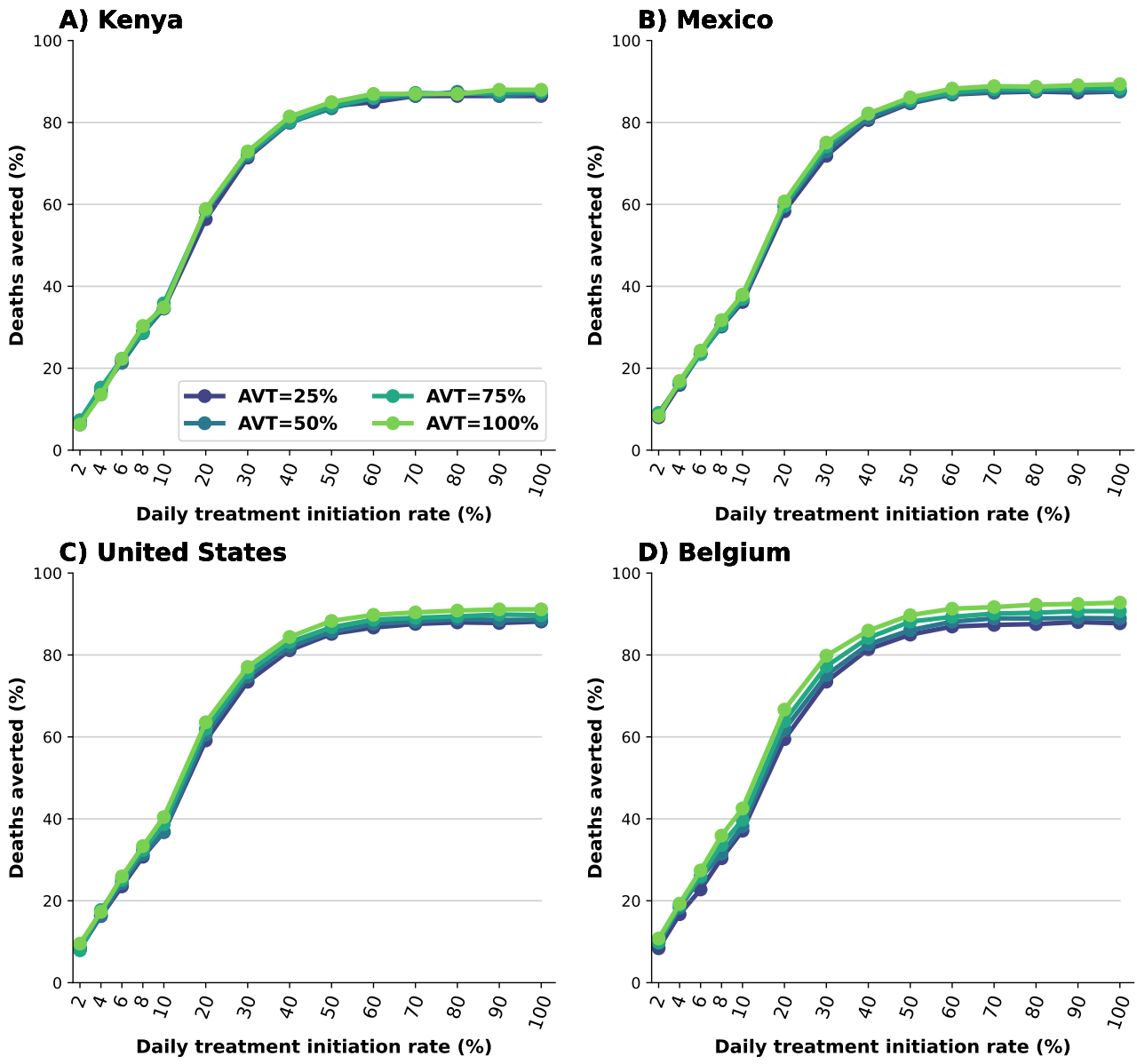

Figure S9: Percentage of deaths averted (compared to a baseline of no antiviral treatment) for A) Kenya, B) Mexico, C) United States and D) Belgium assuming asymptomatic infections are 50% less infectious. Here, we assumed an epidemic wave with parameters similar to those of the Omicron epidemic wave (transmissibility, vaccine effectiveness, and vaccination coverage). For each country, the colors represent four possible values of AVT (25, 50, 75 or 100% reduction in viral transmission in treated symptomatic individuals) and a daily treatment initiation rate (DTIR) of 2-100% of adult symptomatic individuals within the first 5 days of symptoms.

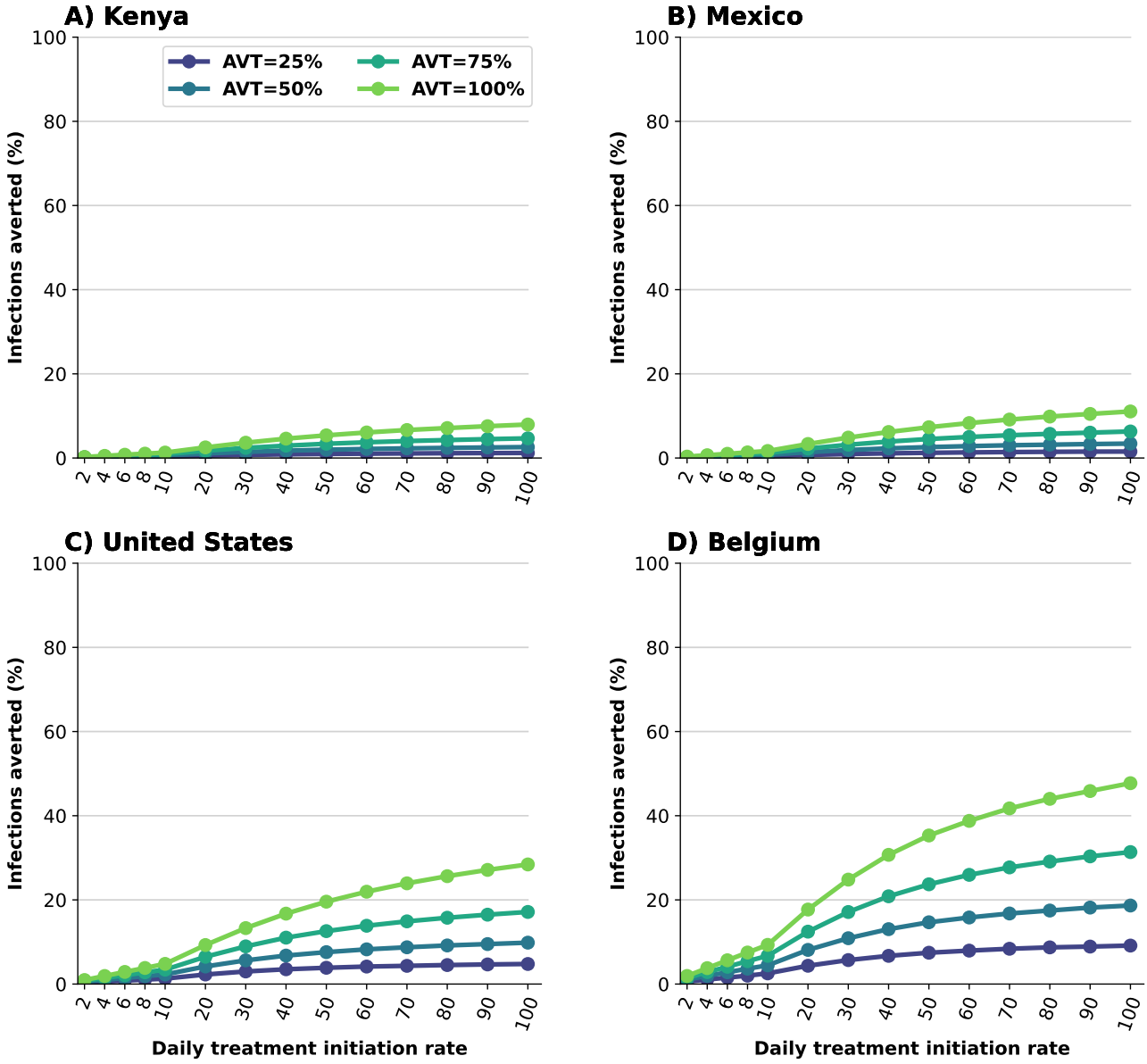

Figure S10: Percentage of infections averted (compared to a baseline of no antiviral treatment) for A) Kenya, B) Mexico, C) United States and D) Belgium assuming asymptomatic infections are 50% less infectious. Here, we assumed an epidemic wave with parameters similar to those of the Omicron epidemic wave (transmissibility, vaccine effectiveness, and vaccination coverage). For each country, the colors represent four possible values of AVT (25, 50, 75 or 100% reduction in viral transmission in treated symptomatic individuals) and a daily treatment initiation rate (DTIR) of 2-100% of adult symptomatic individuals within the first 5 days of symptoms.

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