

## Supplementary Materials

### Article: Ecological Study on COVID-19: associations between the early exponential growth rate and historical environmental and socio-economic factors in 96 countries using GAM (Generalized Additive models)

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Outcome: growth rate since 50 <sup>th</sup> case (7 days) N=96 countries	Coefficients	Estimate	Std. error	T value	P-value
<b>Model 1</b>  <b>Deviance explained: 43.4%</b> <b>AIC=-226.8</b>	Intercept	-3.26377	0.38962	-8.377	<0.0001
	Air passengers (log)	0.09578	0.02367	4.047	0.0001
		<b>edf</b>	<b>Ref. df</b>	<b>F</b>	<b>p-value</b>
	Spline: temperature	1.982	9	0.68	0.03
	Spline: PM2.5 air pollution	0.000028	9	0.000	0.4
	Spline: GDP per capita	0.00015	9	0.000	0.4
	Spline: UHC Index	1.262	9	0.280	0.1
	Spline: Overweight	3.961	9	2.304	0.0001
	Spline: Undernutrition	0.0000216	9	0.000	0.9
<b>Model 2</b>  <b>Deviance explained: %</b> <b>AIC=</b>	Intercept	-3.26377	0.38962	-8.377	<0.0001
	Air passengers (log)	0.09578	0.02367	4.047	0.00001
		<b>edf</b>	<b>Ref. df</b>	<b>F</b>	<b>p-value</b>
	Spline: temperature	1.9820	9	0.680	0.03
	Spline: PM2.5 air pollution	0.0000145	9	0.000	0.5
	Spline: GDP per capita	0.000177	9	0.000	0.4
	Spline: UHC Index	1.262	9	0.280	0.1
	Spline: Overweight	3.961	9	2.304	0.0001
	Spline: Undernutrition	0.0000115	9	0.000	0.9
	Spline: population density	0.000006558	9	0.000	0.9
Spline: old people	0.00000665	9	0.000	0.5	

Table S1: parameter estimates for the GAM models for the growth rate since 50<sup>th</sup> case on a seven days period

Model 1: adjusted on air passengers, temperature, air pollution, GDP per capita, UHC Index, prevalence of overweight and undernutrition

Model 2: Model 1+ adjusted on population density and proportion of old people

Outcome: growth rate since 100 <sup>th</sup> case (14 days) N=83 countries	Coefficients	Estimate	Std. error	T value	P-value
<b>Model 1</b>	Intercept	-4.13991	0.33877	-12.220	<0.0001

<b>Deviance explained:</b> <b>62.8%</b> <b>AIC=-267.87</b>	Air passengers (log)	0.13816	0.02011	6.871	<0.0001
		<b>edf</b>	<b>Ref. df</b>	<b>F</b>	<b>p-value</b>
	Spline: temperature	1.679	9	0.672	0.02
	Spline: PM2.5 air pollution	0.0000486	9	0.000	0.51563
	Spline: GDP per capita	0.5424	9	0.090	0.19670
	Spline: UHC Index	1.987	9	0.954	0.005
	Spline: Overweight	2.560	9	2.221	<0.00001
	Spline: Undernutrition	0.09748	9	0.013	0.2
<b>Model 2</b> <b>Deviance explained:</b> <b>62.1%</b> <b>AIC=-272,83</b>	Intercept	-4.13991	0.33877	-12.220	<0.0001
	Air passengers (log)	0.13816	0.02011	6.871	<0.0001
		<b>edf</b>	<b>Ref. df</b>	<b>F-test</b>	<b>p-value</b>
	Spline: temperature	1.679	9	0.627	0.02
	Spline: PM2.5 air pollution	0.0000645	9	0.000	0.5
	Spline: GDP per capita	0.5424	9	0.090	0.2
	Spline: UHC Index	1.987	9	0.954	0.005
	Spline: Overweight	2.560	9	2.221	<0.0001
	Spline: Undernutrition	0.0974	9	0.013	0.2
	Spline: population density	0.0000352	9	0.000	0.5
	Spline: old people	0.00004663	9	0.000	0.3

Table S2: parameter estimates for the GAM models for the growth rate since 100<sup>th</sup> case on a 14 days period

Model 1: adjusted on air passengers, temperature, air pollution, GDP per capita, UHC Index, prevalence of overweight and undernutrition

Model 2: Model 1+ adjusted on population density and proportion of old people