

Forecast of Complete Contamination by COVID-19 in the World, US and South America (April-28-2020)

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Initiating a study relative to a new mathematical modeling of coronavirus contamination, we will assume in this article that the number of infected by COVID-19, given by a real function of one real variable, $A(t)$, follows an exponential behavior of the form $A(t) = A_0 b^t$, $A_0, b \in \mathbb{R}$, where the time t is measure in days. This is a preliminary mathematical model that follows a geometric progression of ratio b .

We asked the question of when an entire population will have been infected by the coronavirus, in this COVID-19 pandemic, assuming that no vaccination or other form of preventive (or curative) medication exists until that day, and the population remains constant (births and deaths are not accounted for). We also assume that no change in social behavior occurs until that date, so that the ratio b is constant, for simplicity.

We are now interested only in data from the world as a whole, the United States of America and the countries of South America. The results are shown in table 1 next. Date zero was considered April 27, 2020. The symbol ∞ represents the infinite number of days, the case that there is never complete contamination.

We use

Confirmed Cases 1 as the number of Confirmed Cases of April-28-2020,
Confirmed Cases 2 as the number of Confirmed Cases of April-27-2020.

Summarizing, in approximate values, the world will have a complete contamination in 10 or 11 months, the USA in 8 months, Brazil in just 3 months and Paraguay in 3 years and 3 months (an exception for the world, obviously). On average, complete contamination by COVID-19 in a country will take place in about 10 months (around April 2021), not counting the countries with infinite values (Venezuela, Guyana, Suriname).

All primary data on COVID-19 was extracted from the Johns Hopkins University website, while data on population was extracted in pages

<https://countrymeters.info/pt/World> and

<https://countrymeters.info/pt/South America>,

both accessed in 04/29/2020.

Type	Confirmed Cases 1 (t = 1)	Confirmed Cases 2 (t = 0)	Contamination Ratio	Population	Complete Contamination Forecast (days)
Time	9:32:26 PM	9:31:21 PM	9:32:26 PM	Morning in São Paulo	9:32:26 PM
Date	April 28-2020	April 27-2020	April 28-2020	April 29-2020	April 28-2020
Country					
World	3.114.659	3.037.605	1,0254	7.794.352.585	313
US	1.012.399	987.467	1,0252	333.682.486	234
Brazil	72.899	66.501	1,0962	217.194.948	88
Peru	31.190	28.699	1,0868	33.428.991	85
Ecuador	24.258	23.240	1,0438	17.397.494	154
Chile	14.365	13.813	1,0400	18.894.024	184
Colombia	5.949	5.597	1,0629	50.572.835	149
Argentina	4.127	4.003	1,0310	45.638.947	306
Bolivia	1.014	950	1,0674	11.559.482	144
Uruguay	620	606	1,0231	3.487.288	379
Venezuela	329	329	1,0000	33.285.384	∞
Paraguay	230	228	1,0088	7.079.053	1.184
Guyana	74	74	1,0000	780.322	∞
Suriname	10	10	1,0000	568.118	∞

Table 1 – Forecast in days of complete contamination by COVID-19 in the world, US and South America. Origin of time (t = 0) is 04/27/2020. Decimal point is comma (,).