A New Forecast of Total Deaths by COVID-19
in the World, US and Countries of South America (May-04-2020)

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In previous article we report a result on the total deaths in a country by COVID-19 which resulted in 100 % of population's deaths (Ecuador). This does not seem reasonable. The purpose of this article is to recalculate this value, using a more plausible model.

We will assume in this article that the number of resolved cases by COVID-19 is given by a real function of one real variable, $A(t)$, and 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. The number of resolved cases will be the number of recovered cases plus the number of deaths, both by the COVID-19 pandemic in a same date. This is yet a preliminary mathematical model, that follows a geometric progression of ratio b, value b calculated using only the first two dates registered, i.e., $b = \frac{A(t=1)}{A(t=0)}$. Looking at the graph available for the number of confirmed cases on the Johns Hopkins University website, it is possible to see that the most recent behavior of this pandemic has been linear, rather than exponential.

Then we asked the following questions:

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

2) What will be the total number of deaths by COVID-19 on that date?

Here we are 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 tables 1, 2 and 3 next. Date zero was considered May 03, 2020.

We use in the tables

Confirmed Cases 1, Deaths 1, Recovered 1 and Resolved Cases 1 as the number of Confirmed Cases, Deaths, Recovered and Resolved Cases of May-04-2020, respectively, and

Confirmed Cases 2, Deaths 2, Recovered 2 and Resolved Cases 2 as the number of Confirmed Cases, Deaths, Recovered and Resolved Cases of May-03-2020, respectively.

Summarizing the table 2, in approximate values, the world will have the number of resolved cases equal to the current population in 12 months, the USA in 10 months, Brazil in 6 months and Uruguay in 5 years and 6 months (a great exception for the world, obviously). On average, complete resolution of cases by COVID-19 in a country will take place in about 11 months (around April 2021), not counting Guyana (no new cases of contamination and deaths).

Table 3 suggests that the COVID-19 pandemic will be the most terrible pandemic we have ever had, which I certainly hope is not. Nevertheless, Uruguay, Paraguay, Venezuela, Guyana and Suriname recorded no deaths.

The number of deaths is calculated using the lethality percentage, which was calculated by dividing deaths by the number of cases resolved on date $t = 1$. With this new calculation, the number of deaths estimated for Ecuador is 5,595,282 (32.15 % of the population), instead of 17,398,970 (100 % of the population).

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/en/World and
https://countrymeters.info/en/South_America,
in May/04/2020.

Type	Confirmed Cases 1 (t = 1)	Confirmed Cases 2 (t = 0)	Deaths 1 (t = 1)	Deaths 2 (t = 0)	Recovered 1 (t = 1)	Recovered 2 (t = 0)
Time	6:32:29 AM	6:32:27 AM	6:32:29 AM	6:32:27 AM	6:32:29 AM	6:32:27 AM
Date	May 04-2020	May 03-2020	May 04-2020	May 03-2020	May 04-2020	May 03-2020
Country						
World	3.519.901	3.444.236	247.744	244.084	1.129.834	1.099.866
US	1.158.341	1.133.069	67.682	66.385	180.152	175.382
Brazil	101.826	97.100	7.051	6.761	42.991	40.937
Peru	45.928	42.534	1.286	1.200	13.550	12.434
Ecuador	29.538	27.464	1.564	1.371	3.300	2.132
Chile	19.663	18.435	260	247	10.041	9.572
Colombia	7.668	7.285	340	324	1.722	1.666
Argentina	4.783	4.681	246	237	1.354	1.320
Bolivia	1.594	1.470	76	71	166	159
Uruguay	655	652	0	0	442	440
Paraguay	396	370	0	0	126	119
Venezuela	357	345	0	0	158	148
Guyana	82	82	0	0	22	22
Suriname	10	10	0	0	9	8

Table 1 – Confirmed cases, deaths and recovered cases by Covid-19 in 05/04/2020 and 05/03/2020. Thousands separator is point (.).

Type	Resolved Cases 1 (t = 1)	Resolved Cases 2 (t = 0)	Resolved Cases Ratio	Population	Estimative for all population be Resolved Case (days)	Lethality %
Time	6:32:29 AM	6:32:27 AM	6:32:29 AM	6:38:32 AM	6:32:29 AM	6:32:29 AM
Date	May 04-2020	May 03-2020	May 04-2020	May 04-2020	May 04-2020	May 04-2020
Country						
World	1.377.578	1.343.950	1,0250	7.795.459.713	351	17,98
US	247.834	241.767	1,0251	333.716.821	292	27,31
Brazil	50.042	47.698	1,0491	217.221.942	176	14,09
Peru	14.836	13.634	1,0882	33.435.005	92	8,67
Ecuador	4.864	3.503	1,3885	17.401.183	26	32,15
Chile	10.301	9.819	1,0491	18.896.776	158	2,52
Colombia	2.062	1.990	1,0362	50.579.609	285	16,49
Argentina	1.600	1.557	1,0276	45.645.408	378	15,38
Bolivia	242	230	1,0522	11.561.943	213	31,40
Uruguay	442	440	1,0045	3.487.448	1.980	0,00
Paraguay	126	119	1,0588	7.080.343	192	0,00
Venezuela	158	148	1,0676	33.291.761	188	0,00
Guyana	22	22	1,0000	780.361	0	0,00
Suriname	9	8	1,1250	568.191	95	0,00

Table 2 – Estimative in days for that all population be resolved case and lethality percentage in complete contamination by COVID-19 in the world, US and countries of South America. Origin of time (t = 0) is 05/03/2020. Decimal point is comma (,). Thousands separator is point (.).

Type	Population	Estimative for all population be Resolved Case (days)	Lethality %	Deaths
Time	6:38:32 AM	6:32:29 AM	6:32:29 AM	6:38:32 AM
Date	May 04-2020	May 04-2020	May 04-2020	May 04-2020
Country				
World	7.795.459.713	351	17,98	1.401.937.583
US	333.716.821	292	27,31	91.136.091
Brazil	217.221.942	176	14,09	30.606.928
Peru	33.435.005	92	8,67	2.898.181
Ecuador	17.401.183	26	32,15	5.595.282
Chile	18.896.776	158	2,52	476.960
Colombia	50.579.609	285	16,49	8.339.994
Argentina	45.645.408	378	15,38	7.017.981
Bolivia	11.561.943	213	31,40	3.631.023
Uruguay	3.487.448	1.980	0,00	0
Paraguay	7.080.343	192	0,00	0
Venezuela	33.291.761	188	0,00	0
Guyana	780.361	0	0,00	0
Suriname	568.191	95	0,00	0

Table 3 – Deaths number estimative in the world, US and countries of South America in complete contamination by COVID-19. Decimal point is comma (,). Thousands separator is point (.).