

THE ESTIMATE OF THE TOTAL CORONAVIRUS CASES IN ALGERIA BY NEW MATHEMATICAL MODEL

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ABSTRACT:

In the present work, on the Feb 24, 2020, an outbreak of coronavirus disease 2019 (COVID-19) has resulted in 80 087 confirmed cases. The outbreak was first identified in Algeria, on Feb 24, 2020, with most early cases being reported in the city. In this work, we have used a mathematical model to estimate Total Coronavirus Cases in Algeria, which it is based on the worldometers. From our results, we have found that the all estimates values are proportional to the Real Cases (TCCA) with maximum value was 2800. Thus, the calculations by the proposed equations are in qualitative agreements with the TCCA data.

Key words: COVID-19, Algeria, TCCA, Mathematical model.

RÉSUMÉ: ESTIMATION DU NOMBRE TOTAL DE CAS DE CORONAVIRUS EN ALGÉRIE PAR NOUVEAU MODÈLE MATHÉMATIQUE.

Le 24 février 2020, la survenue de la maladie à coronavirus 2019 (COVID-19) a entraîné 80 087 cas confirmés. L'atteinte a été détectée pour la première fois en Algérie, le 24 février 2020, et la plupart des premiers cas ont été signalés en ville. Dans le cadre de ce travail, nous avons utilisé un modèle mathématique pour estimer le nombre total de cas de coronavirus en Algérie, basé sur les Worldometers. D'après nos résultats, nous avons constaté que les valeurs de toutes les estimations sont proportionnelles aux cas réels (TCAC) et que la valeur maximale était de 2800. Ainsi, les calculs effectués par les équations proposées font l'objet d'ententes qualitatives avec les données de TCAC.

Mots clés : COVID-19, Algérie, TCAC, Modèle mathématique.

INTRODUCTION

A novel coronavirus has resulted in an ongoing outbreak of viral pneumonia in China [1]. Person-to-person transmission has been demonstrated, but, to our knowledge, transmission of the novel coronavirus that causes coronavirus disease 2019 (COVID-19) from an asymptomatic carrier with normal chest computed tomography (CT) findings has not been reported [1]. The coronavirus COVID-19 is affecting 209 countries and territories around the world and 2 international conveyances [2]. As of Feb 24, 2020, an outbreak of coronavirus disease 2019 (COVID-19) has resulted in 80 087 confirmed cases [3]. The outbreak was first identified in Algeria, on Feb 24, 2020, with most early cases being reported in the city [3-5]. In the present work, we have used new mathematical model to estimate Total Coronavirus Cases in Algeria.

MATHEMATICAL METHODS

Through our observation about the spread of the Coronavirus (COVID-19), the spread of the enemy passes through four stages, the first stage is slow, the second stage is very fast and the third is similar to the second stage but the spreading speed is decreasing, the fifth of the last stage is where the spread is zero daily (see figure 1).

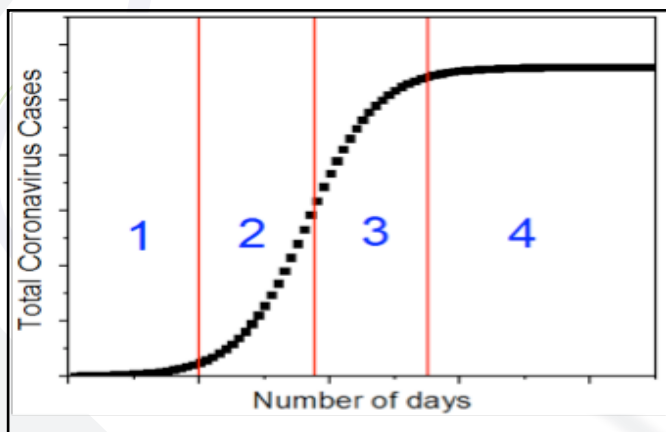


Figure 1. The variation of the various stage of the spread of the Coronavirus (COVID-19) in the world.

In this work, we have investigated a mathematical model to be used for estimated the Total Coronavirus Cases in Algeria (TCCA). We have detected the following equation of the estimate of the Total Coronavirus Cases in Algeria:

$$N_T = \frac{A}{1 + 906.84 e^{-0.18639 d}} \quad (1)$$

where: d is the number of days, A is a number it was equal to $A=30C = 2801.7$. C is the slope of the curve in the second stage (see figures 1 and 2).

RESULTS AND DISCUSSION

Figure 2 shows the variation of the Total Coronavirus Cases in Algeria in real cases, which it is observed from 1 March 2020 [2]. The Estimate Cases (TCCA) is presented in figure 3, the predicted values were scaled parameter values according to Eq. (1), as represented in Table 1, which was estimated as a function of number of days and the number of 2801.7 It is the slope of the curve in the second stage. As can be seen, found that the all estimates values are proportional to the The Real Cases (TCCA). Thus, the calculations by the proposed equations are in qualita-

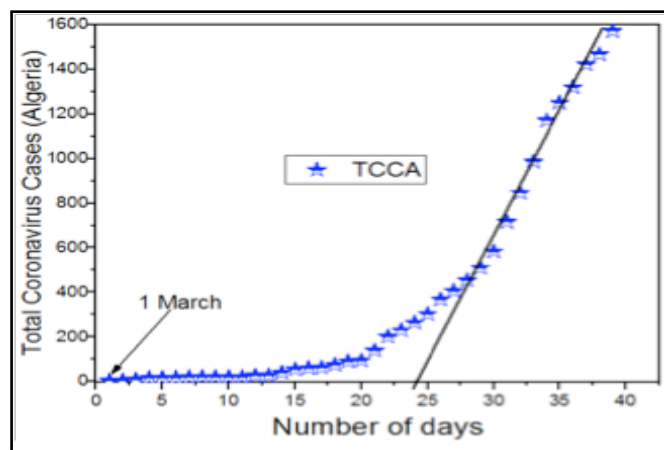


Figure 2. The variation of the Total Coronavirus Cases in Algeria in real cases from 1 March 2020.

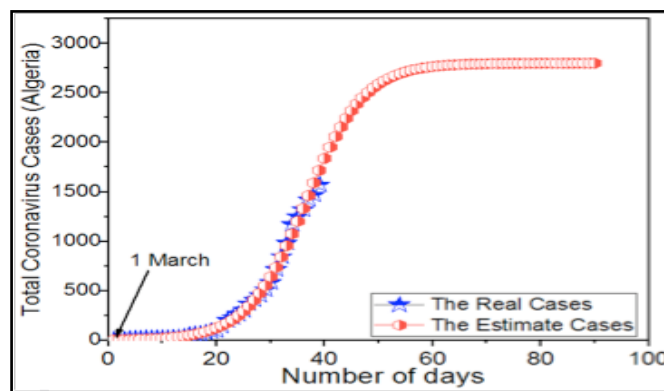


Figure 3. The Total Coronavirus Cases in Algeria real and estimated from 1 March 2020.

tive agreements with the TCCA data with maximum value was 2800.

CONCLUSION

In summary, the coronavirus COVID-19 is affecting 209 countries and territories around the world and as of Feb 24, 2020, an outbreak of coronavirus disease 2019 (COVID-19) has resulted in 80 087 confirmed cases. The outbreak was first identified in Algeria, on Feb 24, 2020, with most early cases being reported in the city. In this work, we have used a mathematical model to estimate Total Coronavirus Cases in Algeria. From our results we have found that the all estimates values are proportional to the Real Cases (TCCA). Thus, the calculations by the proposed equations are in qualitative agreements with the TCCA data with maximum value was 2800.

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Table 1. The Total Coronavirus Cases in Algeria real and estimated from 1 March 2020.

Number of days	The Real Cases (TCCA)	The Real Cases by day	The Estimate Cases (TCCA)	The Estimate Cases by day
1	3	2	3,71759828	
2	5	2	4,47808724	
3	8	3	5,39384542	
4	17	9	6,49643903	
5	17	0	7,82379088	
6	17	0	9,42143303	
7	19	2	11,343994	
8	20	1	13,6569586	
9	20	0	16,438743	
10	20	0	19,7831282	
11	20	0	23,8020983	
12	26	6	28,6291255	
13	26	0	34,4229357	
14	39	13	41,3717734	
15	54	15	49,6981565	
16	60	6	59,6640664	
17	61	1	71,5764504	
18	75	14	85,792817	
19	90	15	102,726564	
20	94	4	122,851498	
21	139	45	146,704757	
22	201	62	174,887086	
23	230	29	208,059046	
24	264	34	246,931476	
25	302	38	292,248235	
26	367	65	344,759214	
27	406	42	405,181914	
28	454	45	474,150683	
29	511	57	552,154299	
30	584	73	639,464886	
31	716	132	736,064189	
32	847	131	841,57639	
33	986	139	955,219178	
34	1171	185	1075,78546	
35	1251	80	1201,66595	
36	1320	69	1330,91749	
37	1423	103	1461,37383	
38	1468	45	1590,78681	
39	1572	104	1716,97929	126,192473
40			1837,98781	121,008519
41			1952,17614	114,188335
42			2058,30685	106,130714
43			2155,56713	97,2602743
44			2243,55313	87,9860011
45			2322,22288	78,6697517
46			2391,82999	69,6071062
47			2452,85003	61,0200454
48			2505,90907	53,059039
49			2551,72045	45,8113752
50			2591,03314	39,3126971
51			2624,59249	33,5593453
52			2653,11239	28,5199008
53			2677,25744	24,1450503
54			2697,63289	20,375448
55			2714,7805	17,1476103
56			2729,17858	14,3980793

SUIVE DU TABLEAU I.

Number of days	The Real Cases (TCCA)	The Real Cases by day	The Estimate Cases (TCCA)	The Estimate Cases by day
57			2741,24475	12,0661718
58			2751,34039	10,095637
59			2759,7759	8,43551464
60			2766,81634	7,04043418
61			2772,68688	5,87054341
62			2777,57809	4,89120766
63			2781,65067	4,07258084
64			2785,03979	3,38911801
65			2787,85886	2,8190757
66			2790,20289	2,34402895
67			2792,15131	1,94842184
68			2793,77047	1,61916005
69			2795,11572	1,34524837
70			2796,23319	1,11747287
71			2797,16132	0,92812519
75			2799,5447	0,44119383
76			2799,91098	0,36627439
77			2800,21504	0,30406216
78			2800,46745	0,2524065
79			2800,67697	0,20951929
80			2800,85088	0,17391432
81			2800,99524	0,14435656
82			2801,11506	0,11982001
83			2801,21451	0,09945238
84			2801,29706	0,08254585
85			2801,36557	0,06851261
86			2801,42243	0,05686458
87			2801,46963	0,0471965
88			2801,5088	0,03917194
89			2801,54131	0,03251158
90			2801,5683	0,02698355