A Statistical Analysis on COVID19 Global Vaccination by Best Fit Regression Method

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Method Article

Keywords: Covid19, Vaccination dosage, Best fit regression

Posted Date: May 10th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-512890/v1>

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Abstract

In this analysis a best fit regression is executed in between two variables - population of specific country in million vs percentage of first dosage vaccinated till 25.04.21. The analysis is carried out by a standard statistical software with a significant Pearson correlation (r) of 4th order polynomial fit. The basis of first dosage already vaccinated is 1030 million globally.

Introduction

During vaccination program the most important variable is population of the said country. From the standard database of world population (1) it is clear that China, India the population density is maximum with UK, Germany, the minimum population density is observed. A [9x2] table (1)(2)(Figure-1) is enclosed herewith as available bi-variant data available. Figure-2 shows an increasing trend of vaccination (in percentage) from Indonesia to U.S and finally rest of the world. Figure-3 and Figure-4 showing an area wise and PIE distribution of 1030 million (2) of dosage vaccinated.

The table in (Figure – 1) is constructed from REF (1) and (2) may be considered as availability of data under analysis.

Methods

Figure – 2, Figure – 3 and Figure-4 are considered as univariant methods of analysis ie percentage of vaccinated. The bi-variant data (Figure-1) is executed by Curve Finder V.1.4 with a 4th degree polynomial fit of best fit regression (3)(5)(6) with a square matrix called Covariance matrix [5x5] (4) significant Pearson Correlation of 0.9682 [$0 < r < 1.0$] Confidence interval (CI > 95%), standard error = $387 \times 10^{-3} = 0.387$ (Linear regression successfully completed without weighing). (X (% of vaccinated) - Y (population in millions) polynomial curve)

The two dimensional distribution (X, Y in Figure-5) can be presented as a contour distribution in three dimension of middle dense region.

Conclusion

The goodness of fit (3)(6) is significantly applied by polynomial regression to global vaccination statistics. The countries under interest of calculation are India, China, UK, Brazil, Germany, Turkey, France, Indonesia and other can be vaccinated up to 1030 million (2) of dosage with respect to the specific populations. The polynomial plot showing a significant trend of percentage of vaccination starting from Indonesia, France (272-67 million) reaches a maximum of China, India (1408-1392 million), declines to a value of US (331 million – 22% vaccinated), finally increasing a sharp trend of 3983 million (1) (26% vaccinated).

Declarations

Conflict of Interest: I shall hereby declare that I have no conflict / competing interest.

References

1. [https://www.worldometers.info/world-population/#:~:text=7.9%20Billion%20\(2021\),Nations%20estimates%20elaborated%20by%20Worldometer](https://www.worldometers.info/world-population/#:~:text=7.9%20Billion%20(2021),Nations%20estimates%20elaborated%20by%20Worldometer).
2. Freda Kreier, 'Unpredicted achievement': who received the first billion COVID vaccinations?, Nature, P.4, 29th April, 2021.
3. DATTA, J. A Statistical Analysis on Recovery Cases of Covid19 in India. Preprints 2020, 2020110284 (doi: 10.20944/preprints202011.0284.v1), 9th November, 2020.
4. DATTA J, https://www.researchgate.net/post/What_is_Co-Variance_Matrix-Explain_its_Utility
5. DATTA J, https://www.researchgate.net/post/Whether_Statistics_Teaching_Should_be_Necessary_in_Academics_Research_Industry_Real_life_Experience
6. JAYDIP DATTA. COVID19 - A Correlation Study of Infection Fatality Rate vs Age, 22 February 2021, PREPRINT (Version 3) available at Research Square [<https://doi.org/10.21203/rs.3.rs-85482/v3>]

Figures

	Basis = Total	1030 million of	first dosage
	on	25.04.21	
	%		
	Vaccinate	Population (million)	
Indonesia	1.806	272.25	
France	1.89	67	
Turkey	2.03	85.18	
Germany	2.475	83.21	
Brazil	3.689	212.78	
UK	4.495	67.61	
India	13.514	1392	
China	21.835	1408	
US	22.19	331.42	
(Rest of the World)	26	3983	
	(1st Dosage)		

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7