COVID-19 Deaths and Vaccination in Nigeria

Emmanuel O. Okoro et al discuss COVID-19 Mortality and Vaccination Coverage in Nigeria (2020-2023).

BACKGROUND

The COVID-19 global pandemic reached Nigeria in early 2020 and triggered a series of responses from policy makers and stakeholders. Given the sustained pattern of low mortality which emerged early as the pandemic unfolded in Africa even before vaccines became available, the question as to whether, the country ought to continue vaccination towards 70% coverage as the only pathway to ending the emergency was never too far . While clinical trials results showed COVID-19 vaccines as very efficacious in diminishing the risk of severe disease from SARS-CoV-2 infection which informed their emergency use as global best practice; the impact of vaccination on COVID-19 deaths trajectory, were largely projections[1] as the pandemic unfolded; with one widely published estimates[2] indicating that by 2021 ending, more COVID-19 deaths as a share of the vulnerable population had occurred in countries in Africa, including Nigeria than elsewhere due to inadequate vaccination. With the global emergency declared over on 05 May 2023, we compared COVID-19 deaths before, and after vaccination commenced to explore whether there was any decline in COVID-19 mortality in the vaccination era relative to the pre-vaccination period. A preliminary communication was orally presented to Nigerian Academy of Science in Lagos, Nigeria, January, 2024.

METHOD

Data acquisition: COVID-19 cases, deaths, and vaccination rates from the Nigeria Centre for Disease Control, as recorded in the WHO database[3], from the date the first local case was documented on 29th February 2020 up to 7th June 202; nearly one month after the crisis was declared over globally. Other variables of interest in open-sources[4-5] were extracted and aggregated over the pre-vaccination and vaccination eras.

Simple statistics (percentages, case counts, death counts, and rates) were computed for the two periods. Case Fatality Rate (CFR) per 1,000 persons was also computed for the period prior to vaccination (CFR1) and the period after vaccination commenced (CFR2) to see how fatality reported from SARS-CoV-2 infections changed over the period of the emergency. The computation of the CFR was done this way for convenience because it captures the overall trajectory of the CFR computed for smaller periods (daily, weekly or monthly).

The case fatality rate for a specified period was computed as

$$CFR = \frac{Number\ of\ reported\ deaths}{Total\ number\ of\ reported\ cases} \times 1000$$

Statistical and graphical analyses of the data were carried out using IBM SPSS Version 23 and Microsoft Excel packages. The results of the analysis were summarized in Table 1 and Figure 1.

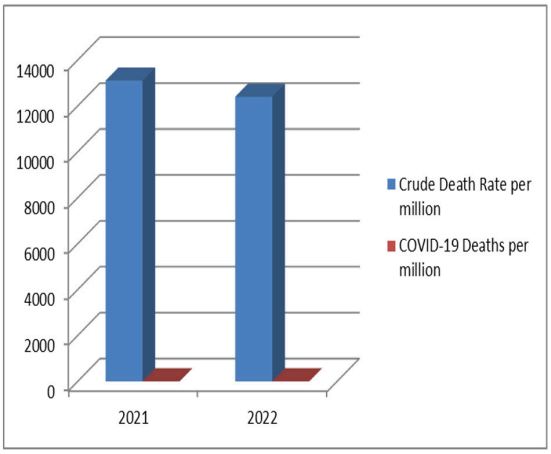


Figure 1: COVID-19 MORTALITIES VERSUS ANNUAL NATIONAL CRUDE DEATH RATES (CDR)

RESULT

Majority (61.84%) of the 3,155 COVID-19 deaths as at 07 June 2023 were recorded in the almost one year before vaccination commenced on 05 March 2021 i.e. after the first domestic case was reported on 29 February, 2020 (Table 1).

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TABLE 1: COVID-19 VACCINATION AND MORTALITY IN NIGERIA

VARIABLE	VALUE
Date first case was reported	29/02/2020
Date COVID-19 Vaccination started	05/03/2021
Cumulative cases at start of vaccination	157671
Cumulative cases as at June 7, 2023	266675
Cumulative deaths when vaccination commenced	1951
Cumulative deaths/ million when vaccination commenced	8.927
Duration of period before vaccination commenced (in months)	12 months
Duration of period after vaccination commenced up to June 7, 2023	27 months
Cumulative deaths, 1 year after vaccination started and the corresponding % change from deaths at the start of vaccination (in brackets)	3142 (61.04%)
Cumulative deaths, 2 years after vaccination started and the corresponding % change from deaths at the start of vaccination (in brackets)	3155 (0.67%)
Cumulative deaths as at June 7, 2023 since pandemic started and the corresponding % change from deaths at the start of vaccination (in brackets)	3155 (0%)
Cumulative deaths/ million at June 7, 2023 since pandemic started	14.437
Overall % change in deaths since vaccination started	61.71%
Persons with incomplete vaccination per 100	39.94
Persons vaccinated with a complete primary series per 100	33.86
Persons vaccinated with at least one booster or additional dose per 100	5.97
CFR1 per 1000	12.37
CFR2 per 1000	11.05

The percentage distribution of COVID-19 mortality by era was unchanged regardless of whether absolute mortality figures or after correction for population size (per million) were used in the calculation. The lower numbers of COVID-19 deaths recorded was over two years of mass vaccination which overlapped with partial, primary and booster rates of 39.94%, 33.86% and 5.97% respectively as at 07 June 2023 (Table 1). Of note, COVID-19 mortality of 8.93/million at the end of the pre-vaccination period (February 29th 2020 to March 5th 2021) jumped to 14. 44/ million as at 07 June 2023 (Table 1). Thus 5.51/million additional COVID-19 deaths accumulated over the vaccination era, showing a 38.3% decline in COVID-19 deaths relative to the pre-vaccines era. When disaggregated into the first year, second year, and third year up to June 7, 2023, the data revealed 98.92% of the additional COVID-19 deaths (1,191) occurred within the first year post-vaccination, with 13 deaths (1.08%) recorded subsequently (Table 1).

Compared against the average national crude death rate (CDR) of 13.5 deaths per 1,000 persons for 2011-2022, the reported COVID-19 deaths (Table 1, Fig.1) approximated 1,000 folds less than the annual CDRs of years 2011 to 2022, just as the calculated CFR1 and CFR2 were 12.37 and 11.04 deaths per 1,000 respectively.

COMMENT

Unlike previous studies[1-2] on the impact of vaccination on COVID-19 deaths based on mathematical modeling with their inherent limitations and biases[6], this analysis utilized actual cases and deaths uploaded to WHO databases by observers on ground in Nigeria as the pandemic unfolded which also informed decision-making. The results showed majority (61.8%) of cumulative COVID-19 deaths up to 07 June 2023 were before vaccination commenced. And at the time pandemic emergency was declared over in 2023, vaccination rates in Nigeria (Table 1) was low and far below the 70% coverage prescribed[2] to end COVID-19 emergency everywhere. This observation raises the question as to whether mass vaccination as deployed in March 2021 contributed anything further in bending a COVID-19 death trajectory already on a downward trend soon after the first wave as the CFR1 versus CFR2 values (Table 1) also suggest.

Specifically, the 38.3% less COVID-19 deaths over the vaccination era relative to the pre-vaccination mortality can accentuate the hypothesis that vaccination may have contributed to the declining COVID-19 mortality in the population (Table 1, Figure 1); and further promote a

patently flawed narrative that only vaccination could have been effective in driving the COVID-19 mortality down. The counter-argument is that the very low vaccination coverage in Nigeria could not have elicited the needed reduction in COVID-19 mortality going by expert body prescription. Incidentally, a similar reduction (33%) in COVID-19 deaths as in Table 1 had been projected to occur pre-vaccines[2] while others attributed such mortality reduction to the over two years of public vaccination in Nigeria. Significantly, between December 2020 and March 2021 when vaccination commenced, almost 8 out of 10 individuals surveyed had tested positive to SARS-CoV-2 antibodies[7] suggesting recent exposure with the possibility of high population immunity acquired naturally that is known to be as protective as 70% vaccination coverage; if not more so[8]. This position is reinforced by a pattern of low COVID-19 mortality throughout the global health crisis with one study[1] reporting a 44.4% sero-prevalence by 31 December 2021 in Nigeria when vaccination rate was barely 2.2% while another[2] reported a 78.9% sero-prevalence rate nationwide when just 5.2% of the households were vaccinated. Further, despite widespread apprehension of an impending doom before the first case was documented in Nigeria, COVID-19 emergency largely played out in the population in accordance with widely published data at the start of the pandemic showing over 80% of deaths from SARS-CoV-2 infection were among the elderly (≥ 65 years) especially men with pre-existing chronic conditions. Of note, the entire cumulative COVID-19 deaths (Table 1) in over three years (2020-2023) of the global emergency, relative to Nigeria's background death rates progressively declining since 2011[5] and mortality from major pre-existing public health conditions like Malaria seem almost unobservable [Fig.1]. This has since been confirmed by emerging global data showing COVID-19 mortality was about the lowest in Africa, Nigeria inclusive with largely no impact on life expectancies in the region which actually increased even at the peak of the pandemic unlike other jurisdictions despite high vaccination.

Given the foregoing and Nigeria's predominantly young population, and data available throughout to guide policy choices, the national COVID-19 response including pursuing a one-size–fits-all vaccination approach made in the image of other people's need would seem at variance with the foreseeable risk the population faced from the virus. The response was draconian, and wasteful including diverting badly needed funding away from conditions killing more Nigerians, disrupted regular health services and economic activities. Especially as the data to tailor response to local needs were consistently available and repeated calls[2] made to that effect. Put differently, the impact of COVID-19 on all-cause-mortality is sometimes overstated and ought not to be a public health priority in Nigeria as the evidence was available for policy makers and decision-makers at the start of the outbreak and as the pandemic progressed.

CONCLUSION

Nigeria's cumulative COVID-19 mortality was mostly pre-vaccines and minimal, despite low vaccination coverage far under the 70% target prescribed everywhere at the time the global emergency was declared over. This outcome aligned with a pattern of minimal COVID-19 mortality evident throughout the crisis, therefore, future unified approach aimed at decelerating global health risk would require re-calibration to local realities, if such interventions are to represent the best-value for money from available options and minimize severe unintended consequences, if not averted.

DATA AVAILABILITY

The datasets for this analysis are open-sources as defined in the method section; but the combined dataset for the analysis is also available on request.

AUTHORS CONTRIBUTION

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Further reading

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