# Project S: A Critical Analysis of the Effectiveness of CoronaVac in Reducing COVID-19 Deaths in Serrana, Brazil

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November 12, 2025

**Abstract**

This study critically analyzes the effectiveness of the CoronaVac vaccine in reducing COVID-19 deaths in the city of Serrana, Brazil, conducted within the scope of Project S, a large-scale vaccination initiative carried out in 2021. Utilizing primary data from the project and secondary information from official sources—including epidemiological bulletins and the IBGE and DataSUS databases—mortality outcomes in Serrana were examined and compared with those of the city of Botucatu (vaccinated with AstraZeneca), the national pattern, and Seychelles, a widely immunized country using vaccines of a similar platform. The findings indicate that, despite approximately 96% of Serrana's target population being immunized, 31 deaths occurred between weeks 6 and 19 of 2021, including 23 individuals from the non-fully vaccinated/non-eligible groups, resulting in a disproportionate mortality rate (1.17%) compared to the derived population risk (1,968 inhabitants). Regional comparisons demonstrate that Serrana did not isolate itself from the mortality dynamics of nearby areas, and excess deaths persisted into 2022, even following additional doses. While initial reports suggested complete pandemic control and indirect immunity, the present analysis reveals a more limited reduction in deaths than the 95% estimated by Project S's projections. Rather than challenging vaccine efficacy, this study emphasizes the importance of evaluations grounded in empirical evidence to improve immunization strategies and strengthen the formulation of evidence-based public health policies. The analysis focuses strictly on population-level associations between vaccination coverage and mortality reduction, without implying individual-level causality.

**Keywords:** CoronaVac, COVID-19, Mass Vaccination, Mortality, Project S, Herd Immunity.

# 1 Introduction

## 1.1 Brief History and Development of Vaccines

The practice of "variolation" possibly originated around 200 B.C., consisting of preventing smallpox through controlled exposure to the disease. In 1796, the English physician Edward Jenner (1749–1823) inoculated James Phipps (1788–1853), an 8-year-old boy, using material extracted from a bovine smallpox lesion on a milkmaid's hand, giving rise to the term *variolae vaccinae*, derived from *vacca* (Latin for cow). Despite experiencing a local reaction and feeling unwell for a few days, Phipps fully recovered and lived for another 57 years [1, 2].

The evolution of vaccines progressed over the centuries, allowing a correlation between the discovery of each pathogen (virus) and the development of its respective vaccine (Table 1). For instance, typhoid fever's pathogen was identified in 1883, but its vaccine was only developed in 1989, a gap of 106 years. With technological advances and improved knowledge of immunological approaches, this timeframe gradually decreased over the centuries, as seen with polio (46 years) and measles (11 years) [3]. An exceptional case is that of mumps, where an initial version developed between 1945 and 1948 in an even shorter period proved ineffective due to short-lived immunity, necessitating a new development between 1967 and 1970 [4].

Table 1: Pathogen Discovery and Vaccine Development According to Ball (2021)

| **Disease** | **Pathogen Discovery** | **Vaccine Development** | **Time from Discovery to Development** |
|---|---|---|---|
| Typhoid fever | 1883 | 1989 | 106 |
| Meningitis | 1889 | 1980 | 91 |
| Whooping cough | 1906 | 1948 | 42 |
| Polio | 1908 | 1954 | 46 |
| Mumps 1 | 1945 | 1948 | 3 |
| Mumps 2 | 1945 | 1967 | 22 |
| Measles | 1952 | 1963 | 11 |
| Hepatitis B | 1964 | 1980 | 16 |
| Ebola | 1975 | 2019 | 44 |
| COVID-19 | 2019 | 2020 | 1 |

## 1.2 The COVID-19 Pandemic and CoronaVac in Brazil

Through its vaccination policy, Brazil established itself as a key protagonist in the emerging revolution, implementing immunization programs that impacted generations. However, the COVID-19 pandemic appears to have introduced some instability into this trust relationship, as will be discussed later.

With the onset of the pandemic, various medical companies initiated studies to develop vaccines against COVID-19. Although the need for immunization was urgent, the accelerated pace of vaccine development was perceived by some segments of the population as exceptionally rapid. Optimists argued that such speed was feasible due to technological evolution, noting that in the 1960s, the mumps vaccine had been developed in just four years (from 1963 to 1967, following the unsuccessful earlier version).

The reality is that, thanks to a combination of favorable factors—such as the specific characteristics of the virus, accumulated knowledge of employed approaches, a climate of political goodwill, and substantial funding enabling parallel testing—the first vaccines were developed in about one year [3]. Nevertheless, the temporal disparity compared to other vaccines is considerable (Table 1), understandably generating distrust and questions among the population.

In this development context, the Instituto Butantan (https://butantan.gov.br/), a renowned center for biomedical research and immunobiological production, stands out in Brazil's vaccination landscape by proposing the use of CoronaVac, a vaccine developed by the Chinese company Sinovac in partnership with the institute. The process of studying and disseminating data related to CoronaVac was marked by somewhat inconsistent public communication, characterized by news of cancellations, rescheduling, and revisions (Table 2).

Table 2: News About CoronaVac (Links Available in Data Statement)

| **Date** | **News Headline** |
|---|---|
| 09/10/2020 | CoronaVac showed 98% efficacy in the elderly, says Doria. |
| 09/23/2020 | Study with 50,000 people indicates safety of the Chinese vaccine. About 94.7% of the over 50,000 volunteers tested in China showed no adverse symptoms. |
| 11/23/2020 | CoronaVac efficacy study expected in December. |
| 12/08/2020 | CoronaVac efficacy results expected this Wednesday (09/12). The expectation is that the efficacy of the vaccine developed by Sinovac with Instituto Butantan will be between 70% and 80%. |
| 12/08/2020 | Indonesia says preliminary data from CoronaVac tests indicate efficacy of up to 97%. |
| 12/14/2020 | After another delay in announcing CoronaVac efficacy, Doria says registration will be requested on the 23rd. |

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| Date | News Headline |
|---|---|
| 12/14/2020 | São Paulo government changes strategy to obtain definitive CoronaVac registration and delays submission of results to Anvisa. |
| 12/23/2020 | Butantan again delays disclosure of vaccine efficacy. |
| 12/24/2020 | Turkey says China's CoronaVac efficacy is 91.25%, and the rate should increase. |
| 12/28/2020 | CoronaVac efficacy results in Turkey are preliminary, confirms Turkish researcher. |
| 01/07/2021 | Butantan vaccine: efficacy is 78% in mild cases and 100% in severe cases. |
| 01/07/2021 | CoronaVac: reasons for delaying the emergency use request. |
| 01/09/2021 | "It's not the time to be as scientific as we are being now," says São Paulo Health Secretary. |
| 01/09/2021 | Doria shares, with an altered title, a critical Science report on CoronaVac. |
| 09/01/2021 | After omitting criticism, Doria publishes the full text on CoronaVac. |
| 01/11/2021 | Vaccine efficacy of 78% is from part of the study, says scientist; overall CoronaVac efficacy to be released this week. |
| 01/11/2021 | Indonesia announces 65.3% efficacy of CoronaVac and approves emergency use. |
| 01/11/2021 | Overall CoronaVac efficacy below 60%, but within acceptable limits (according to sources). |
| 01/11/2021 | São Paulo blames China for lack of CoronaVac data. |
| 01/12/2021 | CoronaVac global efficacy is 50.38%, announces São Paulo government. |

On January 12, 2021, during a press conference [5], detailed data from the CoronaVac study were presented [6]. The study involved 9,252 participants divided into two groups: one receiving the vaccine (n=4,653) and the other a placebo (n=4,599). Regarding case incidence, 85 individuals in the vaccinated group developed COVID-19, compared to 167 in the placebo group, resulting in an efficacy of 50.38% (calculated based on $\alpha$ spending, $p = 0.049$). The reduction in mild cases was 77.96% (from 31 to 7, $p = 0.0029$), while the decrease in moderate to severe cases reached 100% (0 versus 7, $p = 0.467$), with no deaths recorded during the study. The article detailing the efficacy evaluation, titled "Efficacy and safety of a COVID-19 inactivated vaccine in healthcare professionals in Brazil: The PROFISCOV study" [7], remains, as of now

(2025), in preprint status.

## 1.3 Press Conference - Presentation of Project S

On February 12, 2021, a press conference [8] announced what became known as Project S [6], a pioneering milestone in immunization with CoronaVac. According to Dimas Covas, director of Butantan, Serrana would serve as the setting to assess whether vaccination would indeed have an immediate and lasting effect on the pandemic. Dr. Marcos C. Borges highlighted an epidemiological survey conducted in 2020, which revealed that 5% of the city's population had active disease, one of the highest rates in São Paulo state. Given this concerning situation, the proposal emerged to implement a mass vaccination process, as the impact of immunization on a population of tens of thousands was still unknown.

State and municipal schools were designated to receive the project's volunteers, consisting of individuals over 18 years old, totaling approximately 30,000 people from a population of about 45,000. By February 12, 2021, 23,000 registrations had been recorded, with organizers expecting this number to increase significantly by the start of activities.

A journalist inquired about then-Health Minister Marcelo Queiroga's projection of vaccinating 100% of the population (over 17 years old) by the end of 2021. Dimas countered that this goal seemed challenging, noting that achieving 80% coverage—necessary for so-called herd immunity—would require 340 million doses, an unfeasible amount at the time given the available vaccine supply.

Another reporter asked about differences compared to Israel's mass vaccination. Dimas responded that, although Israel was a state implementing a broad vaccination program, Serrana differed because it involved a controlled study. In a short period, they aimed to provide an effective response to what all countries were awaiting: whether the results would align with Israel's (a country with a high percentage of vaccinated individuals) in terms of reduced hospitalizations and deaths. According to him, Serrana's scope was broader, evaluating transmission, indirect vaccination effects, adherence, previously unidentified adverse reactions, and impacts on the local economy.

Dr. Covas emphasized that Serrana became a laboratory for epidemiological studies, generating a vast dataset that would help understand the pandemic's dynamics and effective control methods. He noted that the data available at that point were secondary, such as those from Israel, Chile, and Brazil as a whole, but Serrana's study provided primary data, marking its significant differentiator. This distinction drew international media attention to the event for further details.

During the presentation, he also introduced several digital tools that would facilitate the research endeavors and document the facts associated with the event, such as the official website of Project S (https://projeto-s.butantan.gov.br).

## 1.4 Press Conference - Preliminary Results of Project S

The press conference presenting the preliminary results of Project S [9] was held on May 31, 2021, with São Paulo state governor João Doria [10] as the master of cere-

monies. In his opening remarks, the governor stated that Butantan had vaccinated the entire adult population of Serrana, that the study indicated that with 75% of the target population fully immunized with two doses of CoronaVac, the pandemic was controlled, and that this could be replicated across Brazil. He claimed that the Butantan vaccine created an immunological protective belt across the city's entire population, safeguarding both vaccinated adults and unvaccinated children and adolescents. According to Doria, there was only one way to control the pandemic: "vaccine, vaccine, and vaccine."

Dr. Borges, continuing the explanations, reported that a census was necessary in Serrana, estimating a 2020 population of 45,644, of whom 28,380 were adults (62.20% of the total), forming the project's target population. The study involved vaccinating distinct groups over weeks 6 to 19 of 2021, with weeks 6 to 14 dedicated to the immunization phase and weeks 15 to 19 to result analysis. The first dose was administered to 27,722 people, equivalent to 97.7% of the target population, and the second dose to 27,160 individuals, corresponding to 95.7% of this group. It was noted that between the first and second doses, 7 deaths occurred among the vaccinated (5 over 60 years old and 2 under); 14 days after the second dose, there was 1 death among the vaccinated, and from 14 days after the second dose onward, deaths ceased entirely.

Dr. Ricardo Palácios addressed the vaccine's effectiveness, stating that symptomatic cases dropped by 80%, regardless of vaccination status. Hospitalizations fell by 86%, and the reduction in deaths reached 95%. According to him, these figures reflected the combined direct and indirect effects of the vaccine. Dr. Palácios noted that these effects aligned with what is called herd immunity, though he preferred the term "indirect immunity." This situation helped reduce symptomatic cases and hospitalizations (which were very few) among individuals under 18, suggesting that vaccinating children might not be necessary for them to return to school. He emphasized that studying only symptomatic cases was insufficient; hospitalizations and deaths needed to be addressed, leaving no doubt about the vaccine's importance for older individuals. He also indicated that with 40% of the total population vaccinated, a positive effect was observed one week earlier than expected. To validate the results, Serrana's figures were compared with 16 neighboring municipalities, where the pandemic remained uncontrolled. In his closing remarks, he asserted that it was no longer a hope but a fact: "It is possible to control the epidemic through vaccination; we don't need to isolate, quarantine, or restrict movement to control the epidemic—vaccination is the key."

The study's results were made available as a preprint manuscript titled "Projeto S: a stepped-wedge randomized trial to assess CoronaVac effectiveness in Serrana, Brazil" [11].

## 1.5 Analytical Rationale and Study Scope

Although phase 3 studies on the efficacy of COVID-19 vaccines generally indicate protection against symptomatic to severe cases ranging from 65% to 95%, with the exception of two publications by the same lead author [12, 13], the other reviewed studies [14, 15, 16, 17, 18, 19, 20, 21] did not present fully consistent data regarding death analysis.

This study focuses on evaluating deaths, using as a basis an event where the population of specific cities or even a country was widely immunized. This context provides parameters for applying vaccines in a real-world situation involving thousands of individuals, with the administration of all initial doses and, in some cases, booster doses. The transparency of available data allowed for establishing a correlation between mass vaccination and its impact on the most critical outcome for those involved: mortality.

This study does not aim to oppose vaccination practices, which have historically played a fundamental role in reducing diseases and protecting humanity, as evidenced by the success of vaccines against smallpox, polio, and measles. On the contrary, it recognizes the value of vaccines as an essential public health tool. However, given the numbers observed in Serrana and other locations such as Botucatu and Seychelles, a transparent and data-driven discussion of the population-level outcomes of large-scale COVID-19 vaccine application, particularly concerning mortality, is warranted. This analysis seeks to contribute to improving immunization strategies, promoting a critical evaluation that can guide future policies based on solid evidence.

## 2 Materials and Methods

This study adopted a methodological approach based on the collection, organization, and analysis of primary and secondary data related to Project S. The objective was to assess the outcomes of CoronaVac immunization in terms of COVID-19 deaths, comparing officially reported results with data observed over time.

A census-level ecological study design was selected because the phenomenon under investigation involves the entire population of the municipality of Serrana, therefore precluding the need for sampling or probabilistic inference. Consequently, the mortality indicators reflect the totality of the observed events.

Data were obtained from multiple sources, including official documents, public databases, scientific publications, and municipal records. The collection was divided into four main stages:

- **Primary Data from Project S:** Information related to Project S was extracted from official Instituto Butantan and Serrana City Hall sources, such as press conference minutes available on video platforms and official documents published on the project's website. These records provided details on the number of vaccinated participants and recorded deaths. Additionally, the preprint manuscript "Projeto S: A Stepped-Wedge Randomized Trial to Assess CoronaVac Effectiveness in Serrana, Brazil" [11] was consulted to corroborate the preliminary numbers presented at the press conferences.

- **Secondary Data on COVID-19 Deaths:** Death records in Serrana and neighboring cities were obtained from municipal epidemiological bulletins (e.g., http://www.serrana.sp.gov.br/media/uploads/be_6_12_22_versao.pdf) and the COVID-19 Brasil portal (https://covid.saude.gov.br/). For national comparisons, the Boletim Epidemiológico COVID-19 from the Ministry of Health (No. 90, 30/11/2021) provided mortality rates by age group in Brazil in 2021. Excess

mortality data were extracted from IBGE (https://cidades.ibge.gov.br/brasil/) and DataSUS (http://tabnet.datasus.gov.br/), covering 2012 to 2022, enabling the identification of atypical annual variations associated with the pandemic. The mortality data for the period from 2020 to 2023 were extracted from extensive data files available on the COVID-19 NO BRASIL portal (https://infoms.saude.gov.br/extensions/covid-19_html/covid-19_html.html).

- **Comparative Regional and International Data:** To contextualize Serrana's results, monthly and weekly death data were collected from cities such as Sinop (Mato Grosso) and Botucatu (São Paulo), the latter also subject to a mass vaccination project with the AstraZeneca vaccine. Sinop's data were based on prior studies by the author, who resides there, a central Brazilian urban hub whose death waves aligned with national patterns, adjusted for scale [22, 23]. Botucatu's data were sourced from local reports and publications. Internationally, Seychelles' data were obtained via Our World in Data (https://ourworldindata.org/coronavirus/country/seychelles) and Worldometers (https://www.worldometers.info/coronavirus/country/seychelles), covering vaccination and deaths up to 2024.

- **Complementary Sources:** News published on journalistic portals (listed in Complementary Data) were used to trace the history of CoronaVac efficacy disclosure, while peer-reviewed studies (e.g., [7, 17]) provided technical grounding on vaccine effectiveness against symptomatic and severe cases.

The collected data were organized into electronic spreadsheets to facilitate quantitative analysis and graph generation. For equitable comparisons, populations were adjusted to match Serrana's inhabitants.

# 3 Results and Discussion

During weeks 6 to 19 of 2021, 31 COVID-19 deaths occurred in Serrana [24]. Of these, 8 were vaccinated individuals [25], leaving 23 unvaccinated or non-eligible (Table 3). These deaths involved the 0–18 age group (18,481 inhabitants), which represented less than 0.38% of COVID-19 deaths in 2021 [26], and the 1,220 adults who did not complete the vaccination schedule.

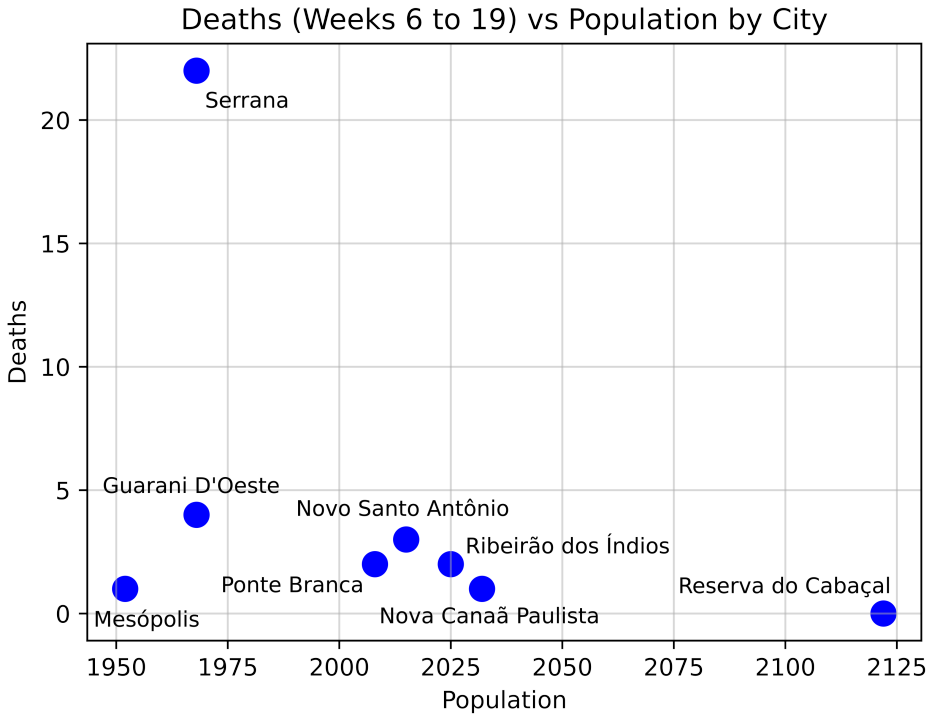
Table 3: Death Data Between Weeks 6 and 19

| **Weeks** | **Deaths (Vaccinated)** | **Deaths (Non-Vaccinated/Non-Eligible)** |
|---|---|---|
| 6 a 14 | 7 | 11 |
| 15 e 16 | 1 | 6 |
| 17 a 19 | 0 | 6 |
| **Total** | **8** | **23** |

It is crucial to note that the 23 deaths (the numerator) include both the 0-18 age population (18,481 inhabitants) and the 1,220 non-adherent adults. However, the denominator of 1,968 was derived primarily from the adult at-risk population, adjusted proportionally, based on evidence that the 0-18 age group accounted for only 0.38%[1] of national COVID-19 deaths in 2021 (1 in 263), far below Serrana's total pandemic deaths (153[2]). This adjustment scales the 1,220 adults—representing about 62% of the adjusted risk population—to a base of 1,968, serving as a conservative proxy to highlight the observed 1.17% mortality anomaly in the short term.

A survey on the COVID-19 Brasil portal [27] showed an average of 2 deaths between weeks 6 and 19 in seven municipalities in São Paulo and Mato Grosso (states with evaluated cities) with populations close to the projected figure, ranging from 0–4 deaths. The evaluated municipalities were Nova Canaã Paulista - SP (2,032 inhabitants), Ribeirão dos Índios - SP (2,025 inhabitants), Guarani D'Oeste - SP (1,968 inhabitants), Mesópolis - SP (1,952 inhabitants), Reserva do Cabaçal - MT (2,122 inhabitants), Novo Santo Antônio - MT (2,015 inhabitants), and Ponte Branca - MT (2,008 inhabitants).

Figure 1: Deaths of Unvaccinated Individuals in Serrana, Adjusted to Cities with Similar Populations (Individuals Aged 0–19 Accounted for 0.38% of COVID-19 Deaths in Brazil in 2021)



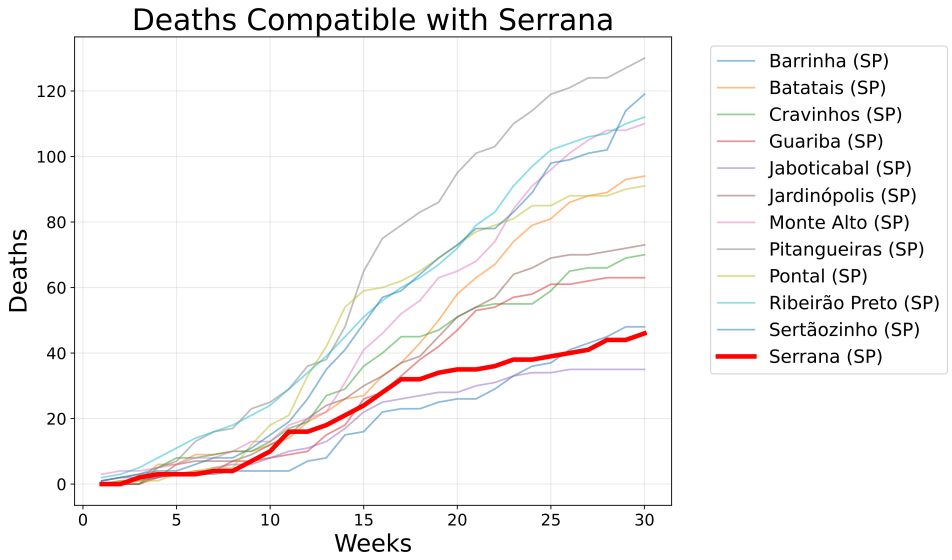

Discrepancies are observed when comparing the number of deaths with expected values from demographically similar municipalities. First, the recorded deaths significantly exceed the expected number for the analyzed population (4.3% of unvaccinated adults, plus those aged 0–18). Second, these observations differ from the

[1] https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/covid-19/2021/boletim_epidemiologico_covid_90_30nov21_eapv5.pdf p. 38

[2] https://www.serrana.sp.gov.br/media/uploads/be_6_12_22_versao.pdf

interpretation presented during the Serrana press conference, which described the city as an "immunological protective belt encompassing the entire local population, safeguarding both vaccinated adults and unvaccinated children and adolescents."

Figure 2: Accumulated Deaths in Neighboring Cities, Adjusted to Serrana




Examining the data (Figure 1), were substantially higher than the expected average, suggesting that indirect protection linked to high vaccination coverage may not have fully materialized in this context.

Following the approach proposed in the May 2021 press conference and [11], the number of deaths was compared with neighboring cities (Figure 2). Two observations emerge: Serrana did not isolate itself from all neighboring municipalities, and the other municipalities apparently did not benefit from Serrana's mass vaccination, as deaths continued to rise.

A preliminary version of this manuscript, shared on social media, sparked a debate regarding the presented figures and, given the anomalous characteristics of the event, raised concerns about its statistical robustness. To assess the rarity of the occurrence, the exact binomial confidence interval (Clopper–Pearson) was calculated for the 23 deaths observed among 1,968 individuals, yielding a proportion of 1.17% (95% CI: 0.74–1.75%).

Subsequently, COVID-19 deaths were extracted from the Brazil COVID-19 database for 50 cities with populations ranging from 1,868 to 2,068 inhabitants, encompassing the full period from 2020 to 2023, with the aim of comparing four years of mortality data against the 11-week observations in Serrana.

The mean number of deaths in the analyzed cities was 5.38 (±3.4), corresponding to 0.27% (±0.17) of the population. The city of Torre de Pedra exhibited the highest individual value (14 deaths), which did not exceed the lower bound of the Serrana interval (14.6) (Figure 3). Thus, the rate observed in Serrana (1.17%) was 4.33 times greater than the average over four years of the pandemic in cities of equivalent population size ($\sim 2,000$ inhabitants).

Figure 3: COVID-19 Mortality Anomaly in Serrana's Population at Risk (Weeks 6–19, 2021) Compared to Aggregate Mortality in 50 Control Municipalities (2020–2023).

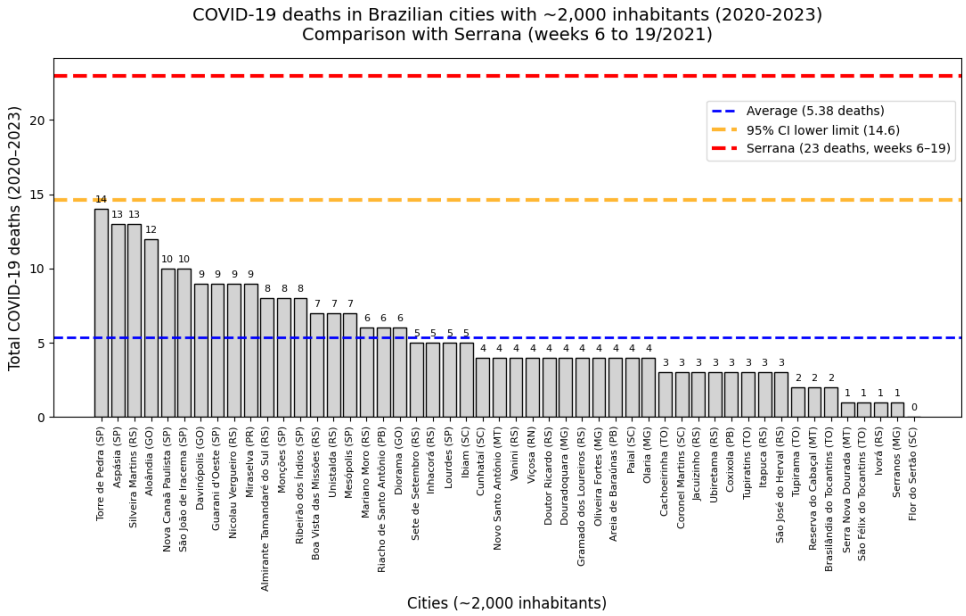
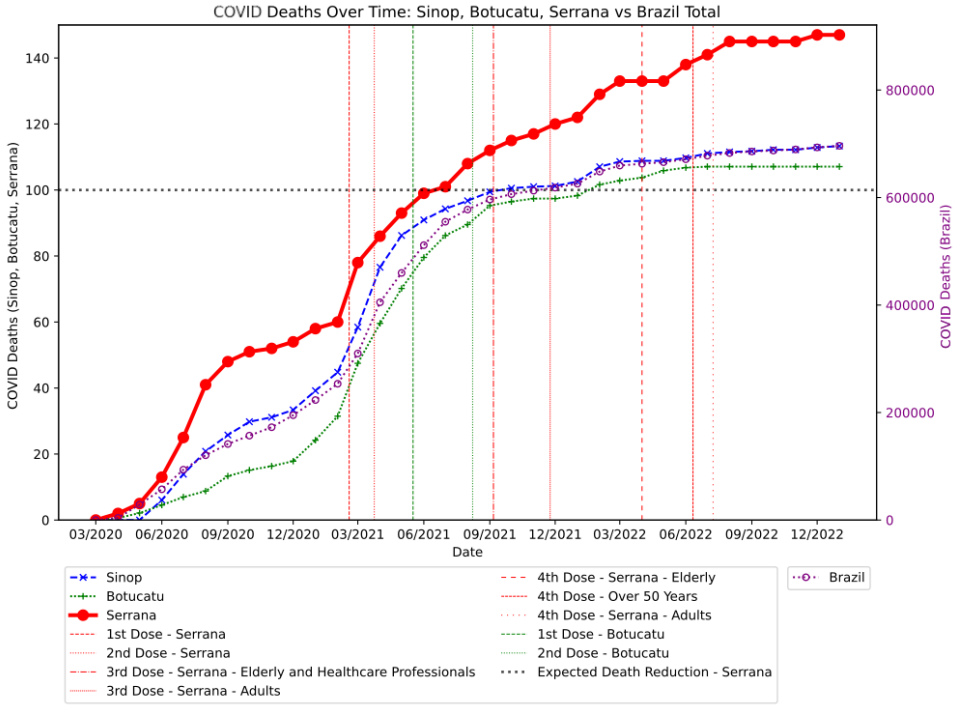



Figure 4: Accumulated Monthly Deaths Adjusted to Serrana, Horizontal Evolution. Vertical Lines Mark Doses Administered in Serrana and Botucatu; in the Rest of Brazil, Doses Were More Spread Out Across Different Professions and Age Groups. The Black Horizontal Line Shows an Expected Death Limit Based on the Optimism Expressed in Project S Press Conferences

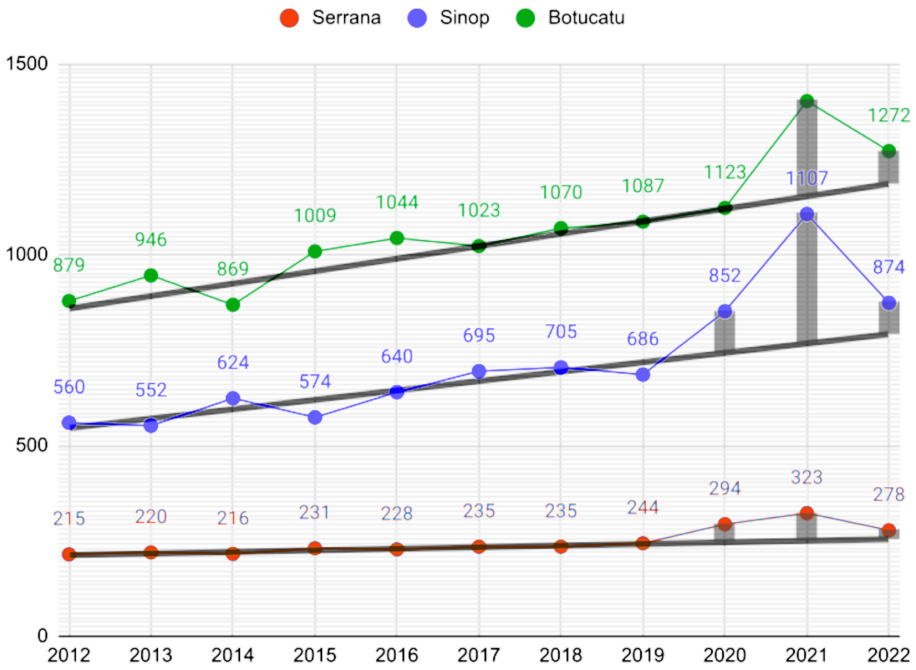



The author had previously studied the pandemic's effects in Sinop, Mato Grosso [22], where death waves aligned with the national pattern [26], allowing for a more coherent observation of the broader scenario. Botucatu, São Paulo, was also included

for comparison, as it underwent a mass vaccination project similar to Serrana's, but with the AstraZeneca vaccine.

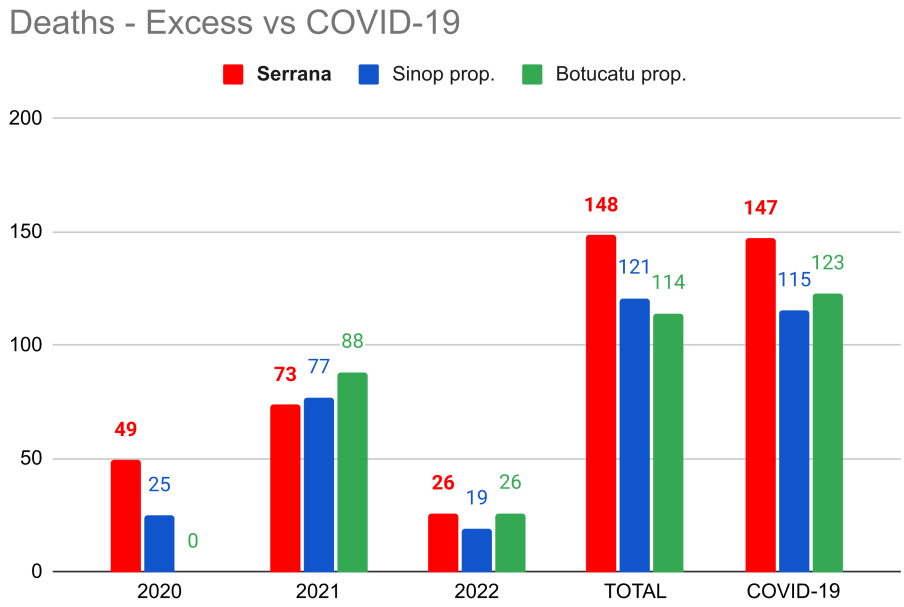
The generated graph (Figure 4) illustrates months and years, as well as the periods when initial and booster doses were administered [11, 28, 29, 30, 31, 32, 33]. Death data on the left were adjusted to Serrana, except for national figures on the right. A significant peak in deaths occurred from June to August, aligning with the initial planning period for Project S, as explained in the press conferences. Vaccination dates from [11] correspond to the vertical lines, alongside booster doses in 2021 and 2022. Vaccination in Brazil began on January 17, 2021 [34], in a more fragmented and widespread manner compared to the mass vaccinations in Serrana and Botucatu [35, 36], also included in the graph. When comparing deaths over time, Serrana shows no perceptible advantage over other cities, exceeding all; Sinop and Botucatu exhibit a proportional evolution to national deaths, while Serrana, with populations adjusted, diverges significantly, with deaths rising even with additional doses, far from an approximately estimated horizontal line reflecting the notably optimistic discourse from Project S press conferences.

Figure 5: Total Deaths in Each Municipality from 2012 to 2022, with a Trend Line and Excess Deaths Extracted in Gray Bars




To ensure data consistency, annual deaths in each municipality (Serrana, Sinop, and Botucatu) from 2012 to 2022 were compiled using IBGE (https://cidades.ibge.gov.br/brasil/) and DataSUS (http://tabnet.datasus.gov.br/cgi/deftohtm.exe?sim/cnv/obt10br.def), enabling the extraction of excess deaths likely strongly correlated with COVID-19 (Figure 5).

Figure 6: Excess Deaths Adjusted to Serrana vs. COVID-19 Deaths




The data were then adjusted to Serrana's population, reaffirming a higher proportional death count in that city. Moreover, excess deaths persisted into 2022, indicating that COVID-19 deaths continued despite the vaccination project (Figure 6).

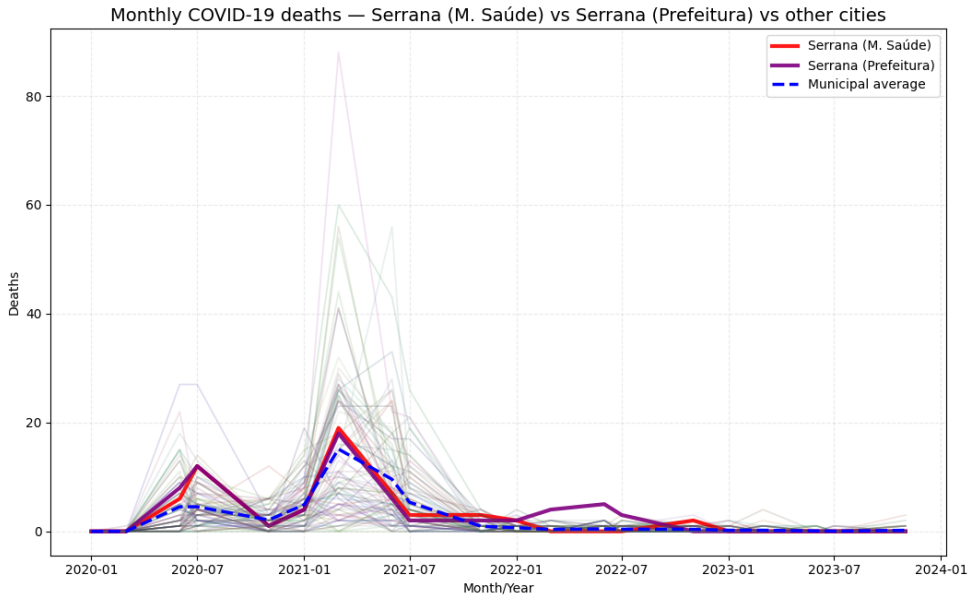
Data on COVID-19 deaths in Brazil were also extracted for 85 cities with populations ranging from 42,000 to 47,000 inhabitants, covering the period from 2020 to 2023, with the objective of comparing mortality curves with those of the city of Serrana. The overall mean was 106 deaths (±58.5), corresponding to 0.24% (±0.13) of the population (Figure 7).

Additionally, data from the official bulletin of the Serrana Municipal Government, extracted directly from municipal reports (Table 4), were integrated into the dataset for comparison with records from the Ministry of Health. In the graph, this series is represented by the purple line, alongside the red series from the Ministry. The inclusion of these data reveals that, longitudinally, Serrana exhibited an even poorer performance, with a noticeable elevation in the curve throughout 2022, suggesting sustained mortality at levels higher than anticipated.

The comparative graph demonstrates that Serrana did not distinguish itself from the other cities, presenting post-vaccination mortality rates that were even higher than the average for municipalities of similar size, indicating inferior epidemiological performance.

Even when analyzing Serrana's data in isolation, comparing the pre- and post-mass vaccination periods, a modest and gradual reduction is observed, far removed from the 95% decline in deaths announced during the 2021 press conference. Between March 2020 and May 2021, 93 deaths were recorded over 15 months (average of 6.2 per month), while from June 2021 to December 2022, 65 deaths occurred over 19 months (average of 3.4 per month).

Figure 7: COVID-19 Deaths in Cities with Populations Ranging from 42,000 to 47,000 Inhabitants, According to Data from the Brazilian Ministry of Health and the Serrana Municipal Government




However, the decline in mortality mirrored the national pattern of the pandemic, suggesting a systemic trend rather than an isolated effect. Attributing the reduction in deaths entirely to the unvaccinated fraction would imply a statistical anomaly incompatible with patterns observed in other localities.

Both Serrana and Botucatu underwent mass vaccination, yet the dynamics of deaths either do not differ or are higher than those in Sinop (numerical comparison) and the Brazilian pattern (visual). Another way to assess vaccination's impact on deaths is through the experience of countries that fully vaccinated their populations and whose size and population allow for pandemic progression evaluation. In this regard, Seychelles fits well. The archipelago, comprising 11 inhabited islands with approximately 99,000 people, began its mass vaccination with two doses of Sinopharm and AstraZeneca. However, despite widespread vaccination (https://ourworldindata.org/coronavirus/country/seychelles), it saw increases in COVID-19 cases [37] and deaths. By 2024, total COVID-19 deaths reached 172 (https://www.worldometers.info/coronavirus/country/seychelles).

A similar situation of deaths in a supposedly vaccinated population was also evident in another study by the author addressing vaccines, concerning deaths in Sinop, Mato Grosso, in 2021 [23]. In Sinop, at one point, a series of individuals (72.72%) who died in an older age group had received both CoronaVac doses and passed the 14-day tolerance period. The article cites a report where Dimas Covas admits that elderly individuals with comorbidities could die even after receiving all doses [38].

The discrepancy between the empirical results and the official statements underscores the necessity for rigor in the dissemination of public health data, particularly in contexts of population-level experimentation. Scientific communication must be based on auditable verifications and not merely on indirect inferences of efficacy.

Table 4: Distribution of COVID-19 Deaths in Residents of Serrana (Mar/20 to Dec/22). Source: Prefeitura Municipal de Serrana

| **Period 1 (17 Months)** | | **Period 2 (17 Months)** | |
|---|---|---|---|
| **Month** | **Deaths** | **Month** | **Deaths** |
| Mar/20 | 0 | Aug/21 | 7 |
| Apr/20 | 2 | Sep/21 | 4 |
| May/20 | 3 | Oct/21 | 3 |
| Jun/20 | 8 | Nov/21 | 2 |
| Jul/20 | 12 | Dec/21 | 3 |
| Aug/20 | 16 | Jan/22 | 2 |
| Sep/20 | 7 | Feb/22 | 7 |
| Oct/20 | 3 | Mar/22 | 4 |
| Nov/20 | 1 | Apr/22 | 0 |
| Dec/20 | 2 | May/22 | 0 |
| Jan/21 | 4 | Jun/22 | 5 |
| Feb/21 | 2 | Jul/22 | 3 |
| Mar/21 | 18 | Aug/22 | 4 |
| Apr/21 | 8 | Sep/22 | 0 |
| May/21 | 7 | Oct/22 | 0 |
| Jun/21 | 6 | Nov/22 | 0 |
| Jul/21 | 2 | Dec/22 | 0 |

# 4 Conclusion

Based on what was proclaimed in the press conferences and studies published by the Project S team, and drawing on the collected and analyzed data, a more detailed overview of the observed results post-project can be outlined (Table 5).

While some studies address reduced death rates due to immunization, the cases of Serrana, Botucatu, and Seychelles suggest that, although vaccines demonstrated protection against symptomatic and severe cases, the number of deaths remained high compared to initial expectations.

Table 5: Observations from the Press Conferences vs Apparent Result

| **Observations from the Press Conferences** | **Apparent Result** |
|---|---|
| With 75% of the target population vaccinated, the pandemic would be under control. | Data indicate the pandemic persisted, with deaths exceeding projections, suggesting challenges in achieving full control through vaccination. |
| Vaccination created an immunological protective belt for the city, protecting adults, children, and adolescents. | Deaths continued, leading to vaccination expansion to adolescents and children, indicating partial rather than total protection. |
| 19 deaths occurred between weeks 6 and 19. | 31 deaths occurred between weeks 6 and 19. |
| Death reduction reached 95%. | Observed deaths exceeded those in cities without mass vaccination, pointing to lower efficacy than initially reported. |
| Herd/indirect immunity was achieved. | The persistence of new cases and deaths suggests this goal was not fully met in the analyzed period. |
| Vaccinating children would not be necessary for them to return to school. | Vaccination was later extended to children, and by 2024, it became mandatory in the National Immunization Program (PNI) for ages 6 months to 5 years [39]. |
| With 40% of the total population vaccinated, a positive effect was observed one week earlier than expected. | In subsequent months, deaths increased, and additional doses were needed but did not halt the death curve. |
| The official website of Project S was launched to centralize reports, news, and press releases (https://projeto-s.butantan.gov.br/. | The site was discontinued without any official announcement around October 2024 (https://web.archive.org/web/20240908171346/https://projeto-s.butantan.gov.br/). |

# 5 Editorial Context and Rationale for Public Scrutiny

Upon completion of the manuscript, the study was submitted to various international scientific journals, but rejections occurred recurrently and, generally, without the provision of specific justifications. Consequently, a formal clarification was requested from the last responsible editor, affiliated with a journal of recognized relevance in the field. The response received revealed weak and inconsistent motivations, suggesting a thematic resistance rather than a technical evaluation. Among the points raised, the editor stated, for instance, that the identity of 'Serrana' was unclear—even though the manuscript explicitly details it as a city in the state of São Paulo, with approximately 45,000 inhabitants, and presents methodologically grounded comparisons with other municipalities of similar characteristics. Arguments of this nature, coupled with observations that could be easily resolved during the revision process, suggest that the rejection was not due to substantial flaws but rather to discomfort with the object of analysis. This situation implies that the study touches upon aspects sensitive to the involved editorial community, potentially by questioning institutionalized narratives concerning vaccine effectiveness.

Given this scenario, the author opted to reinforce and expand the previous text, publicly disclosing the process of the study's formulation and revision, in alignment with the principle of 'open science' and the approach of exposure to public scrutiny as an essential condition for the validation of scientific knowledge. Thus, transparency ceases to be a mere formal requirement and becomes a central methodological component, ensuring that the arguments, data, and interpretations presented can be critically examined by the entire academic community.

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# Data Statement

Sources of news about CoronaVac efficacy listed in Table 2:

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