

Early Transmission Dynamics, Spread, and Genomic Characterization of SARS-CoV-2 in Panama

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We report an epidemiologic analysis of 4,210 cases of infection with severe acute respiratory syndrome coronavirus 2 and genetic analysis of 313 new near-complete virus genomes in Panama during March 9–April 16, 2020. Although containment measures reduced R_0 and R_t , they did not interrupt virus spread in the country.

Coronavirus disease (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first reported in December 2019 in Wuhan, China (1,2). Of ≈ 23 million confirmed cases worldwide, as of October 20, 2020, a total of 28% (>6 million) had been reported in Latin America. SARS-CoV-2 was first reported in this region in São Paulo, Brazil, on February 25, 2020 (3).

In Panama, the first confirmed COVID-19 case was reported on March 9, 2020. Although Panama rapidly implemented disease control strategies, it is among the countries in Latin America with the highest cumulative rates of incidence and death (4). To

elucidate the transmission and spread of SARS-CoV-2 in the region, we analyzed epidemiologic surveillance data and newly generated genetic data from Panama.

The Study

To perform molecular detection of SARS-CoV-2, the Panama Ministry of Health implemented a surveillance program on January 20, 2020. The National Committee on Bioethics of Research of Panama approved protocol EC-CNBI-202-04-46.

We evaluated the early transmission dynamics of COVID-19 in Panama for the first 62 days of the epidemic (February 15–April 16, 2020) based on reported dates of symptom onset. We estimated the daily growth rate, doubling time, and basic (R_0) and time-varying (R_t) effective reproduction numbers. We performed genome amplification and sequencing according to ARTIC Network protocol (<https://artic.network>) for Illumina Sequencing (<https://www.illumina.com>) (5). Details of epidemic parameters, sequencing, and genome analysis are described in Appendix 2 (<https://wwwnc.cdc.gov/EID/article/27/2/20-3767-App2.pdf>).

A total of 18,559 suspected cases of COVID-19 had been investigated in Panama by April 16. Of these, 4,210 (22.7%) patients tested positive for SARS-CoV-2 infection by qualitative reverse transcription PCR. The first confirmed case, on March 9, corresponded to a patient who had arrived in Panama from Spain on March 8 and had exhibited symptoms beginning on March 6. The first case not related to travel was

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confirmed after the death on March 7 of a patient in whom symptoms first appeared on February 22. Epidemiologic investigation showed that the date of onset of symptoms for the earliest local case related to that fatal case dates back to February 15, 2020 (Figure 1). In most locally detected cases, patients had mild disease symptoms (Appendix 2 Figure 1, panel A).

By April 16, a total of 341 patients had been hospitalized (77 at time of diagnosis confirmation) and 116 had died (31 by time of diagnosis confirmation) (Appendix 2 Figure 1, panels B, C). The highest proportion of confirmed cases was observed in the 20–59 year age group (Appendix 2 Figure 2, panel A). A higher proportion (55.3%) of patients tested were female, but among those with positive results, 1.45 times more were male (Appendix 2 Figure 2, panel B). A rapid growth rate of 0.13 cases/day (Appendix 2 Figure 3, panel A) and a short doubling time were observed during the early stages of the epidemic; doubling time increased over the study period (Appendix 2 Figure 3, panel B). We estimated an R_0 for SARS-CoV-2 in Panama of 2.22 (95% CI 2.08–2.37).

Panama was the 11th country in Latin America to report SARS-CoV-2 and implemented epidemic control strategies rapidly compared with other countries in the region (Appendix 2 Figure 4). After the first confirmed case (March 9), school closures were implemented within 1 day, social distancing measures within 6 days, and 24-hour stay-at-home curfew within 14 days. Over the course of the next 17 days, R_t dropped to 1.08 (95% CI 1.00–1.17) (Appendix 2 Table 1, Figure 3, panel C). However, until April 16, Panama remained the country in Central America with the highest proportional number of cases and fatalities (Appendix 2 Figure 5).

To determine the diversity of SARS-CoV-2 in Panama and Latin America, we generated SARS-CoV-2

genomes from 313 patients, representing 7.4% of the total confirmed cases by April 16, 2020 (Appendix 2 Figure 6, panel A). We obtained complete genome coverage for samples using reverse transcription PCR cycle threshold values <25 (Appendix 2 Figure 6, panel B) and found circulation of ≥ 10 virus lineages (Figure 2, panel A; Appendix 2 Figure 7) (6). The most frequently identified was A.2 (71.2%), followed by B.1 (16.7%) and A.1 (3.5%), in contrast to other studies in Latin America, where B-like lineages largely predominate (7,8). Lineages A.3, B, and B.1.5 were identified in 79 cases detected early on in the epidemic, 11 (13.9%) of the cases imported (Figure 2, panel A; Appendix 2 Figure 7). Lineage A.2 was found in 51 patients; 4 (7.8%) belonged to a cluster (Appendix 2 Table 2) from a school outbreak associated with the first detected local case and 9 (17.6%) were police officers (Figure 2, panel C).

Phylogenetic analysis identified 3 main virus lineages (Figure 2). Lineage A.2.1/19B ($n = 60$; posterior support = 0.69; C12815T) comprised 54.3% of the sequenced cases in the study (Appendix 2 Figure 8, panel A); lineage B.1/20A ($n = 15$; posterior support = 0.97; G26143A) and lineage A.3/19B ($n = 12$; posterior support = 1.00; C3177T, T26729C) was third. Molecular clock estimates of the time to most recent common ancestor calculated from lineage A.2.1, made up just of cases with local transmission, placed the median time of mutation during February 19–March 9, 2020, just 2 weeks before the first COVID-19 case was confirmed, and in line with the time of onset of symptoms of the first case of local transmission (Figures 1, 2).

Central and western Panama had more diverse lineage distributions (Figure 2, panel B). Those regions encompass the capital and its surroundings, where more than 50% of the national population lives and the main international airport is located. Lineage A.2.1

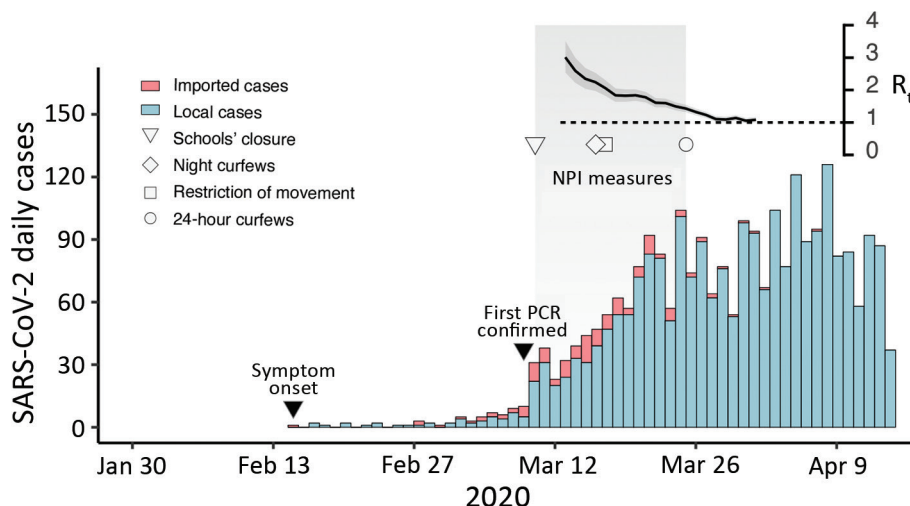


Figure 1. Epidemic curve of SARS-CoV-2 cases in Panama showing daily incidence of confirmed imported and local infections detected through April 16, 2020, with symptom onset during February 15–April 13, 2020. Gray shaded area indicates time period during which nonpharmaceutical interventions measures were initiated. Inset at top right shows the time-varying effective reproduction number (R_t) for a time frame of 45 days (x-axis); dark gray shading indicates 95% CI, and dashed line indicates threshold value $R_t = 1$. SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

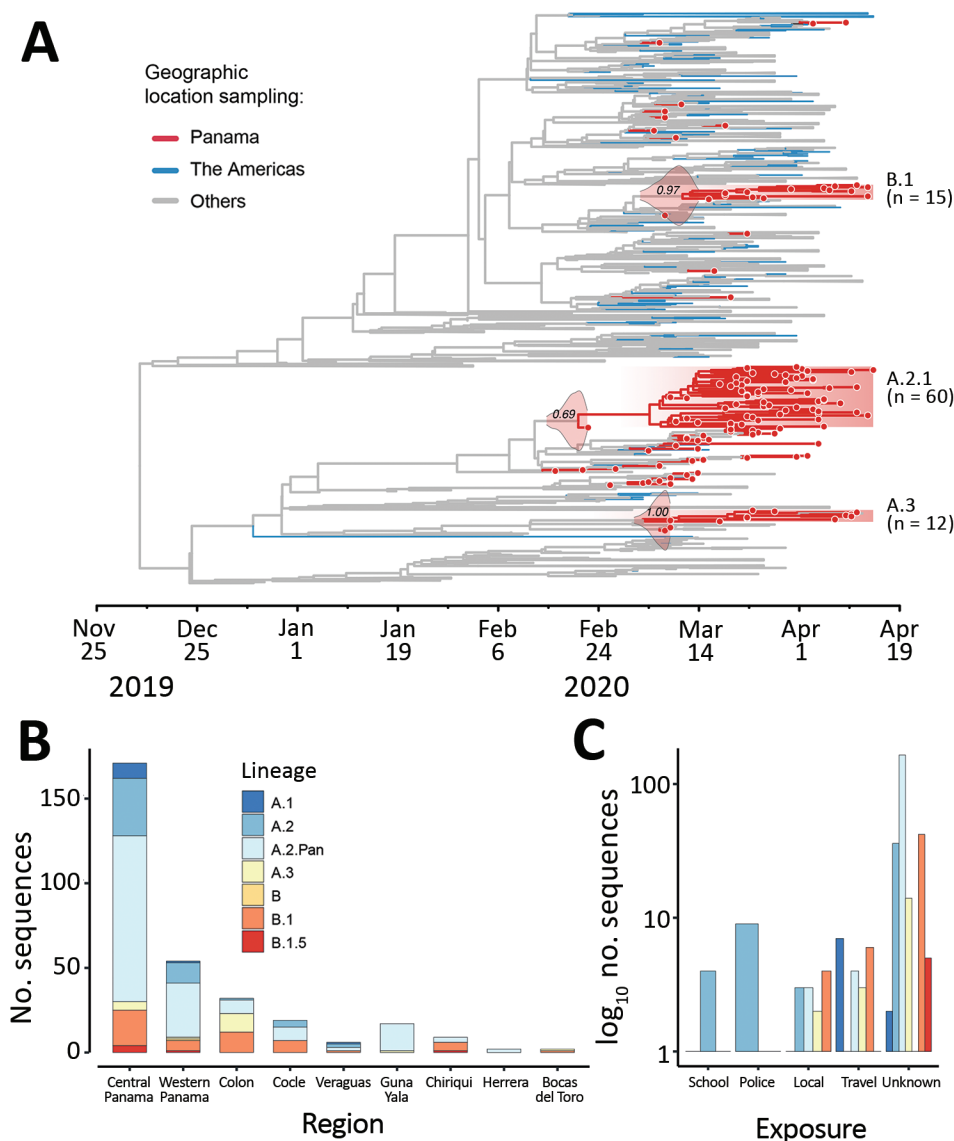


Figure 2. Genetic diversity of SARS-CoV-2 in Panama. A) Bayesian maximum clade credibility tree of 1,261 SARS-CoV-2 sequences: 133 from Panama; 492 from North or South America (443 genomes are from Brazil, 41 from the United States, 7 from Chile, 6 from Mexico, 3 from Argentina, 1 from Peru, and 1 from Canada); and 636 are from other locations. Posterior density estimates of time of the most recent common ancestor of each lineage with local transmission are shown in their branches. B) Distribution of lineages among regions in Panama. C) Distribution of lineages by channel of exposure detected by the surveillance system. SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

was found in all regions across the country with no obvious spatial pattern; according to a global analysis of SARS-CoV-2 lineages (<https://cov-lineages.org>), this lineage is composed of sequences predominantly from Panama. We also found that the spike glycoprotein variants D614 and G614 (9,10) were cocirculating early in the epidemic among all the regions analyzed and were comprised of multiple lineages (Appendix 2 Figure 8, panel B), but the G614 variant potentially associated with infectivity (9) was detected in only 18.8% of the sequenced cases (Appendix 2 Figure 8, panel C).

Conclusions

Epidemiologic evidence suggested cryptic circulation of SARS-CoV-2 in Panama with a probable introduction during early February. A high median trans-

mission potential of SARS-CoV-2 was estimated at $R_0 = 2.22$ (2.08–2.37), similar to estimates from China, Brazil, and Europe (11–13). R_t rapidly dropped to 1.08 after implementation of control strategies.

Phylogenetic analysis detected circulation of ≥ 10 virus lineages, although the number of detected lineages could be underestimated because we did not sequence each positive case and there is a possibility of uncommon undetected lineages due to sample bias. Most of the lineages associated with imported cases (A.1, A.3, B, B.1, B.2.1) were detected and transmission controlled through active contact tracing. However, we detected early transmission of the lineage A.2.1/19B, which was introduced into the country ≥ 3 weeks before the first detected case. This lineage rapidly became widespread in Panama.

We conjecture that efforts to identify early suspected cases, which focused mainly in symptomatic travelers returning from China, precluded the opportunity to detect earlier cases imported from Europe and the United States, where the virus was already circulating at that time (11,14,15). Moreover, undetected early transmission occurring before control measures were implemented could help to explain the widespread distribution of SARS-CoV-2 across Panama.

Our findings on growth rates and R_t show that mitigation measures undertaken shortly after the first reported case in March helped to reduce virus transmission. Measures such as active contact tracing and isolation, social distancing, and quarantine targeted to regions where active transmission clusters are found will help to effectively control the spread of SARS-CoV-2 in Panama.

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Appendix 2

Methods

Additional Details of COVID-19 Surveillance and Laboratory Diagnosis in Panama

The surveillance program for COVID-19 was implemented by the Panama Ministry of Health (MoH) on January 20, 2020. Suspected cases were actively sought at international airports using World Health Organization/Pan American Health Organization case definitions and recommendations (1). In this first stage, suspected cases were defined by symptoms and signs from influenza-like illness (ILI) and severe acute respiratory infections (SARI), as well as patients coming into Panama from China. On March 4, the list of countries from which travellers were monitored was expanded to include Italy, Iran, South Korea, and Japan. Travelers from these countries, confirmed cases, and their contacts were isolated in home or hotel quarantine for 14 days. Clinical evaluation and temperature measurement were done every day; if symptoms developed, nasopharyngeal or oropharyngeal swabs were taken by MoH and sent for laboratory diagnosis. For confirmed cases, contact tracing was performed by MoH.

The Gorgas Memorial Institute for Health Studies (GMI) is the national reference laboratory of Panama and is recognized as a World Health Organization National Influenza Center (2). The National Laboratory Network for Surveillance of Respiratory Viruses collects data from 16 sentinel sites through the national territory and 3 laboratories (Obaldia Hospital in Chiriqui province for eastern Panama, Chicho Fabrega Hospital in Veraguas province for Central Panama, and GMI in Panama City). The National COVID-19 Laboratory Network was built from the National Laboratory Network for Surveillance of Respiratory Viruses, but after increasing equipment capacity and training laboratory personnel intended to perform the molecular diagnosis of SARS-CoV-2, this network was extended to include more public health laboratories (from MoH as well as from the social security system and private hospitals).

Through April 16, 12 laboratories were part of the network; this was expanded to ≥ 20 laboratories for molecular diagnosis around the country.

Nasopharyngeal and oropharyngeal samples were collected in 503CS01 nasopharyngeal nylon swabs (Copan Diagnostics, <https://www.fishersci.com>) in 305C viral transport medium (Copan Diagnostics) to preserve the integrity of the viral particles. The collected samples were sent to GMI for laboratory confirmation beginning January 23 and to additional laboratories from the National COVID-19 Laboratory network beginning March 16. Samples were sent with a surveillance form with demographic, clinical, and contact tracing information (date of onset of symptoms, description of symptoms, age, sex, district of residence, district of employment, travel in or outside the country ≤ 15 days before symptom onset; if the person had contact with a positive patient: name and phone number of that person were also recorded).

The processing of SARS-CoV-2 suspected samples was performed in a BSL-2 facility with negative pressure. After viral inactivation, viral RNA was obtained by using QIAamp Viral Mini kit (QIAGEN, <https://www.qiagen.com>) according to the manufacturer's recommendations. During January 23–February 16, for SARS-CoV-2 suspected cases, the presence of viral RNA from coronavirus was detected using a generic reverse transcription PCR (RT-PCR) (3) and Sanger sequencing of the fragment as confirmation. Charité Institute's SARS-CoV-2–specific real time RT-PCR was implemented, using the E gene as screening and the RdRp gene of SARS-CoV-2 as confirmation (4), by using the One-Step RT-PCR kit AgPath-ID (Applied Biosystems, <https://www.thermofisher.com>) or the Invitrogen SuperScript III One-Step RT-qPCR (ThermoFisher, <https://www.thermofisher.com>) and the ABI 7500 Fast computer platform v1.4.0 System (Applied Biosystems). The fluorescence was read at the annealing/extension step and the threshold cycle (C_t) value for each PCR reaction was recorded. Samples with C_t values ≤ 40 were considered positive.

Additional Information of Epidemiologic Investigation and Epidemic Parameters Estimation

Epidemiologic data on suspected cases and their contacts were recorded by physicians, using a standardized epidemiologic form for surveillance of respiratory viruses, at the airport, health facilities, or at home or hotel during quarantine, when nasopharyngeal and oropharyngeal swabs were taken. Data entry was independently undertaken by GMI and the laboratories from the National COVID-19 Laboratory network, and then checked by the National Department of

Epidemiology of MoH to confirm the accuracy of the information. A dataset of daily incidence based on the date of symptom onset was created, for samples reported through April 16 with the dates of first onset of symptoms during February 15–April 14. Data on delay in notification of patients was corrected by using the median of delay between onset of symptoms and report of confirmed cases. After the epidemic curve correction was done, the first 61 days of COVID-19 epidemic in Panama, February 15–April 13, were analyzed.

General Description

Data on the demographics (age, sex, region) and clinical condition (ambulatory, for asymptomatic, presymptomatic, or mildly symptomatic outpatient patients; hospitalized; or fatal) of suspected patients were collected from MoH's respiratory virus surveillance sheet through the COVID-19 surveillance laboratory network. Data were evaluated until April 13 to correct reporting delay. We undertook several epidemiologic analyses.

We estimated the basic reproductive number (R_0) using the time series of confirmed cases with likelihood-based estimation using a branching process, following Poisson likelihood standards (5). A serial interval mean of 4.7 days, SD 2.9 was used for the estimation (6). The time-variant effective reproductive number (R_t) was estimated in a Bayesian framework because the cumulative number of cases reached 25 as described elsewhere (6), serial interval with 95% confidence intervals (95% CI), using the EpiEstim package (<https://cran.r-project.org>) implemented in R (5).

Epidemic Curve

The number of confirmed cases reported through April 15 reflects the number of cases per day using the date of symptom onset reported by the patient to the clinician or, when necessary, extrapolated from the date of sample receipt by GMI (6).

Transmission Dynamics

To analyze local transmission dynamics through April 13, imported cases were removed from the epidemic curve. In addition, to avoid giving a false impression of decreasing transmissibility by a potential delay in the appearance and detection of cases because of the artificial drop in the epidemic curve from removing imported cases, the curve was corrected by removing the last 4 days of observations in the epidemic curve.

Daily Growth Rate and Doubling Time

The daily growth rate was estimated using the formula $\log(I) = r * t + b$, where r is the incidence based on dates of symptom onset, t is the length of time since onset, and b is the intercept. The doubling time was calculated using $Dt = \frac{\log(2)}{r}$ in an interval of 7.7 days. The growth rate with 95% confidence intervals was visualized using the Incidence package.

Basic Reproductive Number

Daily reported incidence based on dates of symptom onset was used to estimate R_0 and R_t . To estimate R_0 , several methods were explored, using serial intervals reported elsewhere (6), of mean 4.7 days, SD 2.9 days, according to gamma distribution (shape = 0.118, scale = 39.52). Early R_0 with likelihood-based estimation using a branching process follows Poisson likelihood standards described elsewhere (5). R_0 was estimated from data collected during February 28–March 24, 2020, to avoid variation due to implementation of control strategies.

Effective Reproductive Number

We undertook approaches to estimate the time-varying effective reproductive number R_t , with a serial interval distribution described elsewhere (6), using a Bayesian framework. For this, the R_t since the cumulative incidence reached 25 cases was obtained to reduce the coefficient of variation to 0.2. After 25 cases, the final time range analyzed included 31 days (March 13–April 13). R_t with 95% confidence intervals (95% CI), was estimated every 7 days using the EpiEstim package implemented in R (5).

SARS-CoV-2 Genomic Characterization

To genetically characterize the SARS-CoV-2 strains introduced in Panama, as well as to analyze their distribution, samples were selected from areas where new cases were confirmed by laboratory during March 8–April 16, taking into account the cumulative number of cases for regions, as described elsewhere (7). In total, we selected 421 confirmed cases. Besides the clinical, epidemiologic, and demographic data, the C_t values of the diagnostic RT-qPCR were also recorded (Appendix 2 Table 2).

Viral RNA extraction was performed and the RNA was transcribed to cDNA using the reverse transcription protocol by using Invitrogen SuperScript III First-Strand Synthesis System (ThermoFisher) with random hexamers and a pool of ARTIC reverse primers (<https://artic.network>) set to 50 μ m. To amplify SARS-CoV-2-specific cDNA, a PCR reaction

was done by using Invitrogen Platinum Taq HiFi (ThermoFisher) with ARTIC Network protocol (8). PCR products were confirmed by agarose gel electrophoresis with evidence of a band of ≈ 450 bp.

Amplicons generated were pooled and prepared for Illumina sequencing with the Nextera XT (<https://www.illumina.com>) library, according to the manufacturer's standard protocol. All samples were sequenced with MiSeq V2 (<https://www.illumina.com>) reagent kits for 500 cycles.

Bioinformatics Analysis

The reads obtained were filtered with a minimum quality score of Q30 and 120 bp length, with Quasitools-hydra pipeline (<https://github.com>) (9) using the SARS-CoV-2 reference sequence MN908947.3. Variants were determined using a consensus based on a predetermined error rate of 0.0021, a minimum read depth of 10 \times , an allele count of 5, and a variant quality score of Q30. The average coverage obtained was 92.9%, IQR 0.05.

Quality Control of Genome Consensus Sequences

A total of 365 PCR fragments were sequenced. To verify their quality for downstream analysis a quality control step was included; briefly, consensus sequences were filtered according to a genome coverage $>75\%$ and region-spanning nucleotide positions were masked with a python script (<https://github.com>) used elsewhere (10). After these steps, a total of 313 sequences were included in the phylogenetic analysis (Appendix 2 Figure 7). To maximize phylogenetic signal and reduce masked regions for Bayesian analysis (Figure 2, panel A), only sequences with $>29,000$ bp ($\sim 97\%$ of coverage compared with MN908947.3 reference strain) were included (133 sequences).

SARS-CoV-2 Global Dataset

The dataset used for Bayesian analysis was made up of 433 genomes from Brazil previously described (7), and genomes retrieved from gisaid.org; of these, 41 genomes were from the United States, 7 from Chile, 6 from Mexico, 3 from Argentina, 1 from Peru, 1 from Canada, and 636 from countries outside of the Americas (Appendix 2 Table 3), corresponding to a global subsampling of sequences including 1 genome per country per day (based on sampled collection day). This global dataset was retrieved on April 24, 2020. We sequenced genomes from Panama, Brazil, and from other parts of the world in the dataset used for this analysis.

Phylogenetic Analysis of Panamanian SARS-CoV-2 Sequences

To perform the phylogenetic analysis, we adopted nomenclature described elsewhere (11), which was based on the dynamics of propagation of the virus according to the country of origin of the strain, with the objective of evaluating the lineage distribution in the country over time (11). The pangoleARN pipeline, version 2020-08-29_3 (<https://github.com>) was used to assign lineage. To review the phylogenetic structure of SARS-CoV-2 virus in Panama, sequences were aligned using mafft v7.445 (<https://mafft.cbrc.jp>) (12), a high speed multiple sequence alignment program, and the maximum likelihood tree was inferred with IQTREE (<http://www.iqtree.org>) (13) using a substitution model (HKY + [4 gamma variation) suggested previously (7,14-16) and visualized in FigTree 1.14 (<http://tree.bio.ed.ac.uk>) (Appendix 2 Figure 7).

Temporal Signal of SARS-CoV-2 in Panama

To explore the temporal signal of SARS-CoV-2 in Panama, a Bayesian coalescent phylogeny was calculated using BEAST v.1.10.4 (<https://beast.community>) (17), using the same substitution model as in the maximum likelihood analysis, under an uncorrelated lognormal molecular clock, with a noninformative continuous-time Markov chain reference prior distribution (18). The exponential population growth tree model was implemented as in previous studies (14,15). The analysis was run for 250 million chains using BEAGLE v3 (<https://github.com>) (19) to enhance computational speed, writing to log every 25,000 chains. Convergence of the MCMC chains was inspected using Tracer v.1.7.1 (<https://beast.community>) (20). After removal of 10% burn-in, tree files were resampled using LogCombiner v.1.10.4 (<https://beast.community>) (17) to obtain a posterior sample of 1,000 dated phylogenetic trees. Maximum clade credibility summary trees were generated using TreeAnnotator v.1.10.4 (<https://beast.community>) (65). Time of the most recent common ancestor was calculated for each monophyletic lineage formed by sequenced with confirmed only local transmission from the same posterior tree distribution. Sequence mutations were annotated using the pipeline implemented in (16) and plotted with ggplot2 suite (<https://rstudio.com>) (21).

Data and Materials Availability

Control Measures in Latin America

Reports from the World Health Organization and the Organisation for Economic Co-operation and Development, and official communications from ministries of health were used to obtain data on control and mitigation strategies at the country level to reconstruct a timeline representing the strategies adopted by Latin American countries. Only if no official information was found, were press articles from local newspapers consulted.

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Appendix 2 Table 1. Estimates of the reproductive number (R_t) over time.

| Observations | t_start | t_end | Mean(R_t) | Std(R_t) | Quantile 0.025 (R_t) | Quantile 0.975 (R_t) | Dates |
|--------------|---------|-------|---------------|--------------|--------------------------|--------------------------|-----------|
| 1 | 2 | 9 | 3.01 | 0.25 | 2.54 | 3.52 | 3/13/2020 |
| 2 | 3 | 10 | 2.59 | 0.20 | 2.22 | 2.99 | 3/14/2020 |
| 3 | 4 | 11 | 2.35 | 0.16 | 2.04 | 2.68 | 3/15/2020 |
| 4 | 5 | 12 | 2.24 | 0.14 | 1.97 | 2.53 | 3/16/2020 |
| 5 | 6 | 13 | 2.06 | 0.12 | 1.82 | 2.30 | 3/17/2020 |
| 6 | 7 | 14 | 1.84 | 0.11 | 1.64 | 2.05 | 3/18/2020 |
| 7 | 8 | 15 | 1.82 | 0.10 | 1.64 | 2.02 | 3/19/2020 |
| 8 | 9 | 16 | 1.84 | 0.09 | 1.67 | 2.02 | 3/20/2020 |
| 9 | 10 | 17 | 1.78 | 0.08 | 1.62 | 1.94 | 3/21/2020 |
| 10 | 11 | 18 | 1.61 | 0.07 | 1.47 | 1.76 | 3/22/2020 |
| 11 | 12 | 19 | 1.60 | 0.07 | 1.47 | 1.73 | 3/23/2020 |
| 12 | 13 | 20 | 1.49 | 0.06 | 1.37 | 1.62 | 3/24/2020 |
| 13 | 14 | 21 | 1.43 | 0.06 | 1.32 | 1.55 | 3/25/2020 |
| 14 | 15 | 22 | 1.32 | 0.05 | 1.22 | 1.43 | 3/26/2020 |
| 15 | 16 | 23 | 1.23 | 0.05 | 1.14 | 1.33 | 3/27/2020 |
| 16 | 17 | 24 | 1.11 | 0.05 | 1.02 | 1.20 | 3/28/2020 |
| 17 | 18 | 25 | 1.09 | 0.04 | 1.01 | 1.18 | 3/29/2020 |
| 18 | 19 | 26 | 1.14 | 0.04 | 1.05 | 1.23 | 3/30/2020 |
| 19 | 20 | 27 | 1.05 | 0.04 | 0.97 | 1.14 | 3/31/2020 |
| 20 | 21 | 28 | 1.08 | 0.04 | 1.00 | 1.17 | 4/1/2020 |

Appendix 2 Table 2. Characteristic and demographic information of sequenced samples in the study.

| Case | Epi week | Sex | Age, y | Region | ID | GISAID Accession # | Date symptom onset | Date results received | Epi cluster | Epiclusterlink | Type of exposition | Epi link | Exposition description | Lineage autocolor |
|------|----------|-----|--------|---------------|--------|--------------------|--------------------|-----------------------|-------------|----------------|--------------------|----------|------------------------|-------------------|
| 1 | 10 | F | 40 | Panamá Metro | 328677 | EPI_ISL_415152 | 2020-03-06 | 2020-03-09 | 1 | travel | imported | travel | Spain | B.1.5 |
| 3 | 10 | F | 29 | Panamá Metro | 328688 | EPI_ISL_496603 | 2020-03-04 | 2020-03-09 | 2 | travel | imported | travel | USA | A.3 |
| 4 | 10 | F | 43 | Panamá Metro | 328706 | EPI_ISL_496604 | 2020-03-05 | 2020-03-09 | 4 | travel | imported | travel | Spain | A.2 |
| 5 | 9 | M | 64 | Panamá Norte | 328709 | EPI_ISL_496605 | 2020-02-28 | 2020-03-09 | 3 | school | local | school | NA | A.2 |
| 6 | 8 | M | 49 | Panamá Metro | 328710 | EPI_ISL_496606 | 2020-02-20 | 2020-03-09 | 3 | school | local | unknown | NA | A.2.1 |
| 7 | 8 | F | 58 | Panamá Metro | 328719 | EPI_ISL_496607 | 2020-02-22 | 2020-03-10 | 3 | school | local | unknown | NA | A.2 |
| 8 | 10 | F | 35 | Panamá Metro | 328721 | EPI_ISL_496608 | 2020-03-09 | 2020-03-10 | 5 | travel | imported | travel | USA | A.1 |
| 9 | 8 | F | 57 | Panamá Norte | 328723 | EPI_ISL_496609 | 2020-02-17 | 2020-03-10 | 3 | school | local | school | NA | A.2 |
| 11 | 11 | M | 60 | San Miguelito | 328726 | EPI_ISL_496610 | 2020-03-08 | 2020-03-10 | 6 | travel | imported | travel | USA | A.3 |
| 12 | 10 | M | 61 | Panamá Metro | 328733 | EPI_ISL_496611 | 2020-03-07 | 2020-03-10 | NA | unknown | imported | travel | USA | A.1 |
| 14 | 11 | M | 38 | Panamá Metro | 328774 | EPI_ISL_496612 | 2020-03-10 | 2020-03-10 | 4 | travel | local | contact | Travel | A.2.1 |
| 15 | 10 | M | 31 | Panamá Metro | 328844 | EPI_ISL_496613 | 2020-03-07 | 2020-03-11 | NA | unknown | imported | travel | Spain | B.1.5 |
| 16 | 11 | F | 28 | Panamá Metro | 328848 | EPI_ISL_496614 | 2020-03-08 | 2020-03-11 | NA | unknown | imported | travel | Europe | B.1 |
| 17 | 11 | M | 34 | Panamá Metro | 328927 | EPI_ISL_496615 | 2020-02-15 | 2020-03-11 | 1 | travel | imported | travel | Spain | B.1 |
| 18 | 11 | F | 44 | Panamá Metro | 328933 | EPI_ISL_496616 | 2020-03-09 | 2020-03-11 | 6 | travel | imported | travel | Puerto Rico | A.3 |
| 19 | 9 | F | 37 | San Miguelito | 328941 | EPI_ISL_496617 | 2020-02-27 | 2020-03-11 | 5 | travel | imported | travel | USA | A.1 |
| 20 | 10 | M | 43 | San Miguelito | 328944 | EPI_ISL_496618 | 2020-03-04 | 2020-03-11 | 5 | travel | imported | travel | USA | A.1 |
| 23 | 11 | F | 70 | Panamá Metro | 328971 | EPI_ISL_496619 | 2020-03-09 | 2020-03-11 | 15 | travel | imported | travel | USA | A.1 |
| 24 | 11 | M | 41 | Panamá Norte | 328972 | EPI_ISL_496620 | 2020-03-08 | 2020-03-11 | 3 | school | local | contact | School | A.1 |
| 26 | 10 | M | 40 | Panamá Norte | 328980 | EPI_ISL_496621 | 2020-03-07 | 2020-03-11 | 3 | school | local | contact | School | A.2 |
| 27 | 11 | F | 10 | Panamá Norte | 328981 | EPI_ISL_496622 | 2020-03-10 | 2020-03-11 | 7 | travel | imported | travel | France, Italy | A.2.1 |
| 30 | 11 | M | 42 | Panamá Este | 329064 | EPI_ISL_496623 | 2020-03-09 | 2020-03-12 | 8 | police | local | police | NA | A.2 |
| 32 | 11 | M | 42 | Panamá Metro | 329108 | EPI_ISL_496624 | 2020-03-10 | 2020-03-12 | | unknown | imported | travel | Spain | B.1.5 |
| 33 | 11 | F | 48 | Panamá Oeste | 329117 | EPI_ISL_496625 | 2020-03-08 | 2020-03-12 | 1 | travel | imported | travel | Spain, Switzerland | B.1 |
| 35 | 11 | F | 38 | Panamá Metro | 329198 | EPI_ISL_496626 | 2020-03-08 | 2020-03-12 | 9 | travel | imported | travel | Germany | B.1 |
| 36 | 10 | F | 13 | Panamá Metro | 329230 | EPI_ISL_496627 | 2020-03-05 | 2020-03-12 | 10 | travel | imported | travel | USA | A.1 |
| 40 | 11 | F | 44 | Panamá Metro | 329377 | EPI_ISL_496628 | 2020-03-13 | 2020-03-13 | NA | unknown | local | unknown | NA | B |
| 42 | 11 | F | 45 | Panamá Oeste | 329388 | EPI_ISL_496629 | 2020-03-11 | 2020-03-13 | 1 | travel | local | contact | Travel | B.1 |
| 44 | 11 | F | 60 | Panamá Norte | 329446 | EPI_ISL_496630 | 2020-03-12 | 2020-03-13 | 1 | travel | local | contact | Health | A.2.1 |
| 45 | 11 | F | 43 | Colón | 329536 | EPI_ISL_496631 | 2020-03-09 | 2020-03-14 | 26 | local | local | contact | Health | A.3 |
| 52 | 11 | F | 50 | Panamá Oeste | 329546 | EPI_ISL_496632 | 2020-03-12 | 2020-03-14 | 25 | local | local | contact | Health | A.2 |
| 53 | 11 | F | 40 | Panamá Oeste | 329547 | EPI_ISL_496633 | 2020-03-13 | 2020-03-14 | 5 | travel | local | contact | Travel | A.1 |
| 55 | 11 | M | 63 | Panamá Metro | 329560 | EPI_ISL_496634 | 2020-03-12 | 2020-03-14 | 10 | travel | imported | travel | USA | A.1 |
| 59 | 11 | F | 48 | Panamá Metro | 329576 | EPI_ISL_496635 | 2020-03-09 | 2020-03-15 | NA | unknown | local | school | NA | A.2 |
| 61 | 11 | M | 49 | Panamá Oeste | 329593 | EPI_ISL_496636 | 2020-03-13 | 2020-03-15 | 8 | police | local | police | NA | A.2 |
| 62 | 11 | M | 54 | Panamá Oeste | 329628 | EPI_ISL_496637 | 2020-03-11 | 2020-03-15 | 8 | police | local | police | NA | A.2 |
| 68 | 11 | M | 41 | Panamá Oeste | 329653 | EPI_ISL_496638 | 2020-03-10 | 2020-03-15 | 17 | local | local | unknown | NA | A.2.1 |
| 69 | 11 | F | 41 | Panamá Metro | 329655 | EPI_ISL_496639 | 2020-03-11 | 2020-03-15 | NA | unknown | local | school | NA | A.2.1 |
| 70 | 11 | M | 48 | Panamá Metro | 329667 | EPI_ISL_496640 | 2020-03-14 | 2020-03-16 | 8 | police | local | police | NA | A.2 |
| 71 | 11 | F | 51 | San Miguelito | 329676 | EPI_ISL_496641 | 2020-03-12 | 2020-03-16 | 8 | police | local | police | NA | A.2 |
| 73 | 10 | F | 34 | Veraguas | 329682 | EPI_ISL_496642 | 2020-03-06 | 2020-03-16 | 14 | local | local | unknown | NA | A.2 |
| 74 | 11 | M | 36 | Panamá Oeste | 329694 | EPI_ISL_496643 | 2020-03-10 | 2020-03-16 | 20 | local | local | unknown | NA | A.1 |
| 75 | 12 | M | 48 | Panamá Metro | 329700 | EPI_ISL_496644 | 2020-03-16 | 2020-03-16 | 8 | police | local | police | NA | A.2 |
| 77 | 12 | F | 30 | Panamá Oeste | 329718 | EPI_ISL_496645 | 2020-03-15 | 2020-03-16 | 8 | police | local | police | NA | A.2 |
| 78 | 11 | M | 62 | Panamá Metro | 329728 | EPI_ISL_496646 | 2020-03-14 | 2020-03-16 | NA | unknown | local | unknown | NA | A.1 |
| 80 | 11 | M | 54 | Panamá Metro | 329734 | EPI_ISL_496648 | 2020-03-14 | 2020-03-16 | NA | unknown | imported | travel | USA | B.1 |

| Case | Epi week | Sex | Age, y | Region | ID | GISAID Accession # | Date symptom onset | Date results received | Epi cluster | Epiclusterlink | Type of exposition | Epi link | Exposition description | Lineage autocolor |
|------|----------|-----|--------|---------------|--------|--------------------|--------------------|-----------------------|-------------|----------------|--------------------|----------|------------------------|-------------------|
| 82 | 11 | M | 45 | Panamá Metro | 329752 | EPI_ISL_496649 | 2020-03-14 | 2020-03-16 | NA | unknown | local | contact | Health | A.2.1 |
| 88 | 11 | F | 28 | San Miguelito | 329844 | EPI_ISL_496650 | 2020-03-12 | 2020-03-16 | NA | unknown | local | unknown | NA | A.2 |
| 91 | 11 | M | 57 | Panamá Metro | 329862 | EPI_ISL_496651 | 2020-03-14 | 2020-03-16 | 23 | travel | local | contact | Travel | B.1 |
| 92 | 11 | F | 29 | Panamá Norte | 329868 | EPI_ISL_496652 | 2020-03-13 | 2020-03-16 | NA | unknown | local | unknown | NA | A.2 |
| 93 | 10 | M | 45 | Veraguas | 329877 | EPI_ISL_496653 | 2020-03-06 | 2020-03-16 | 18 | local | local | unknown | NA | B.1 |
| 94 | 11 | F | 61 | Veraguas | 329879 | EPI_ISL_496654 | 2020-03-14 | 2020-03-16 | 14 | local | local | unknown | NA | A.2 |
| 95 | 10 | M | 34 | Panamá Metro | 329893 | EPI_ISL_496655 | 2020-03-09 | 2020-03-17 | NA | unknown | local | unknown | NA | A.2.1 |
| 97 | 11 | F | 70 | Panamá Metro | 329916 | EPI_ISL_496656 | 2020-03-13 | 2020-03-17 | NA | unknown | local | unknown | NA | A.2.1 |
| 112 | 12 | M | 66 | Panamá Oeste | 330057 | EPI_ISL_496657 | 2020-03-15 | 2020-03-17 | NA | unknown | local | unknown | NA | A.2.1 |
| 116 | 11 | M | 55 | Panamá Metro | 330089 | EPI_ISL_496658 | 2020-03-13 | 2020-03-17 | 8 | police | local | police | NA | A.2 |
| 121 | 12 | M | 53 | Panamá Metro | 330130 | EPI_ISL_496659 | 2020-03-15 | 2020-03-17 | 2 | travel | local | contact | Health | A.2.1 |
| 129 | 11 | M | 42 | Panamá Oeste | 330208 | EPI_ISL_496660 | 2020-03-10 | 2020-03-18 | NA | unknown | local | unknown | NA | A.2.1 |
| 134 | 11 | M | 52 | Panamá Metro | 330286 | EPI_ISL_496661 | 2020-03-09 | 2020-03-18 | 18 | local | local | contact | MP | B.1 |
| 138 | 11 | M | 40 | Panamá Norte | 330339 | EPI_ISL_496662 | 2020-03-09 | 2020-03-18 | 8 | police | local | police | NA | B.1 |
| 157 | 11 | M | 30 | Panamá Oeste | 330413 | EPI_ISL_496663 | 2020-03-13 | 2020-03-18 | NA | unknown | local | police | NA | A.2 |
| 163 | 11 | M | 40 | Panamá Oeste | 330449 | EPI_ISL_496664 | 2020-03-13 | 2020-03-18 | NA | unknown | local | unknown | NA | A.2 |
| 170 | 11 | F | 37 | Panamá Este | 330490 | EPI_ISL_496665 | 2020-03-19 | 2020-03-19 | NA | unknown | local | unknown | NA | A.2 |
| 175 | 11 | M | 46 | Coclé | 330547 | EPI_ISL_496666 | 2020-03-14 | 2020-03-19 | NA | unknown | local | police | NA | A.2 |
| 176 | 11 | M | 37 | Panamá Oeste | 330553 | EPI_ISL_496667 | 2020-03-11 | 2020-03-19 | 20 | local | local | unknown | NA | A.2.1 |
| 177 | 12 | M | 14 | Panamá Metro | 330558 | EPI_ISL_496668 | 2020-03-18 | 2020-03-19 | 11 | travel | local | contact | Travel | B.1 |
| 194 | 12 | F | 46 | Colón | 330671 | EPI_ISL_496669 | 2020-03-18 | 2020-03-19 | 26 | local | local | contact | Health | A.3 |
| 197 | 11 | M | 63 | Panamá Metro | 330722 | EPI_ISL_496670 | 2020-03-13 | 2020-03-19 | NA | unknown | local | police | NA | A.2 |
| 202 | 11 | M | 46 | Panamá Oeste | 330754 | EPI_ISL_496671 | 2020-03-12 | 2020-03-19 | NA | unknown | local | unknown | NA | A.2.1 |
| 207 | 11 | F | 53 | Colón | 330771 | EPI_ISL_496672 | 2020-03-12 | 2020-03-19 | NA | unknown | local | unknown | NA | A.2.1 |
| 208 | 10 | M | 54 | Panamá Metro | 330775 | EPI_ISL_496673 | 2020-03-01 | 2020-03-19 | NA | unknown | local | unknown | NA | A.3 |
| 211 | 12 | F | 49 | Panamá Norte | 330779 | EPI_ISL_496674 | 2020-03-18 | 2020-03-19 | 19 | local | local | contact | Health | B.1 |
| 217 | 11 | M | 46 | Panamá Oeste | 330795 | EPI_ISL_496675 | 2020-03-14 | 2020-03-19 | NA | unknown | local | unknown | NA | B.1 |
| 223 | 11 | M | 41 | Panamá Metro | 330817 | EPI_ISL_496676 | 2020-03-10 | 2020-03-20 | NA | unknown | local | contact | MP | B.1 |
| 239 | 12 | F | 49 | Panamá Norte | 330961 | EPI_ISL_496677 | 2020-03-19 | 2020-03-20 | NA | unknown | local | unknown | NA | A.2.1 |
| 243 | 12 | F | 38 | Panamá Norte | 331025 | EPI_ISL_496678 | 2020-03-18 | 2020-03-20 | NA | unknown | local | unknown | NA | A.2 |
| 245 | 12 | F | 59 | Panamá Metro | 331050 | EPI_ISL_496679 | 2020-03-19 | 2020-03-20 | 28 | local | local | contact | Health | A.2.1 |
| 251 | 12 | M | 46 | Panamá Oeste | 331074 | EPI_ISL_496680 | 2020-03-18 | 2020-03-20 | NA | unknown | local | contact | Health | A.2.1 |
| 259 | 10 | F | 42 | Panamá Oeste | 331186 | EPI_ISL_496681 | 2020-03-06 | 2020-03-20 | NA | unknown | local | unknown | NA | A.2.1 |
| 262 | 11 | M | 43 | Panamá Norte | 331254 | EPI_ISL_496682 | 2020-03-11 | 2020-03-20 | NA | unknown | local | unknown | NA | A.2.1 |
| 270 | 12 | F | 10 | Panamá Metro | 331336 | EPI_ISL_496683 | 2020-03-20 | 2020-03-21 | 30 | local | local | contact | Travel | B.1 |
| 291 | 12 | F | 2 | Panamá Este | 331499 | EPI_ISL_496684 | 2020-03-17 | 2020-03-21 | NA | unknown | local | contact | Police | A.2.1 |
| 297 | 10 | M | 49 | Panamá Este | 331516 | EPI_ISL_496685 | 2020-03-21 | 2020-03-21 | NA | unknown | local | unknown | NA | A.2.1 |
| 303 | 12 | F | 13 | Panamá Metro | 331540 | EPI_ISL_496686 | 2020-03-19 | 2020-03-22 | NA | unknown | local | unknown | NA | A.2 |
| 311 | 12 | M | 34 | Chiriqui | 331578 | EPI_ISL_496687 | 2020-03-19 | 2020-03-22 | NA | unknown | local | contact | MP | B.1 |
| 312 | 12 | M | 46 | Chiriqui | 331580 | EPI_ISL_496688 | 2020-03-19 | 2020-03-22 | NA | unknown | local | contact | MP | B.1 |
| 314 | 12 | F | 64 | Panamá Metro | 331596 | EPI_ISL_496689 | 2020-03-17 | 2020-03-22 | NA | unknown | local | unknown | NA | B.1 |
| 340 | 12 | F | 45 | Panamá Metro | 331701 | EPI_ISL_496690 | 2020-03-18 | 2020-03-22 | NA | unknown | local | unknown | NA | A.2.1 |
| 344 | 12 | F | 95 | Panamá Metro | 331715 | EPI_ISL_496691 | 2020-03-20 | 2020-03-22 | NA | unknown | local | unknown | NA | A.2 |
| 366 | 12 | F | 15 | Panamá Metro | 331789 | EPI_ISL_496692 | 2020-03-21 | 2020-03-23 | NA | unknown | local | unknown | NA | A.2.1 |
| 371 | 10 | M | 48 | Panamá Este | 331797 | EPI_ISL_496693 | 2020-03-20 | 2020-03-23 | NA | unknown | local | unknown | NA | A.2 |
| 379 | 12 | M | 49 | Panamá Norte | 331836 | EPI_ISL_496694 | 2020-03-18 | 2020-03-23 | NA | unknown | local | unknown | NA | A.2.1 |
| 380 | 12 | M | 30 | Panamá Oeste | 331837 | EPI_ISL_496695 | 2020-03-19 | 2020-03-23 | NA | unknown | local | contact | MP | B.1 |
| 387 | 12 | M | 55 | San Miguelito | 331872 | EPI_ISL_496696 | 2020-03-16 | 2020-03-23 | NA | unknown | local | unknown | NA | A.3 |

| Case | Epi week | Sex | Age, y | Region | ID | GISAID Accession # | Date symptom onset | Date results received | Epi cluster | Epiclusterlink | Type of exposition | Epi link | Exposition description | Lineage autocolor |
|------|----------|-----|--------|---------------|--------|--------------------|--------------------|-----------------------|-------------|----------------|--------------------|----------|------------------------|-------------------|
| 391 | 12 | F | 29 | Panamá Este | 331920 | EPI_ISL_496697 | 2020-03-21 | 2020-03-23 | NA | unknown | local | unknown | NA | A.2.1 |
| 395 | 12 | F | 58 | Panamá Oeste | 331943 | EPI_ISL_496698 | 2020-03-20 | 2020-03-23 | NA | unknown | local | unknown | NA | A.2.1 |
| 397 | 12 | M | 53 | Panamá Metro | 331954 | EPI_ISL_496699 | 2020-03-20 | 2020-03-23 | NA | unknown | local | unknown | NA | A.2 |
| 405 | 13 | F | 17 | Panamá Metro | 331997 | EPI_ISL_496700 | 2020-03-22 | 2020-03-23 | NA | unknown | local | unknown | NA | A.2.1 |
| 407 | 12 | M | 86 | San Miguelito | 332013 | EPI_ISL_496701 | 2020-03-19 | 2020-03-23 | NA | unknown | local | unknown | NA | A.2.1 |
| 410 | 12 | M | 40 | Panamá Metro | 332033 | EPI_ISL_496702 | 2020-03-20 | 2020-03-23 | NA | unknown | local | unknown | NA | B.1.5 |
| 422 | 13 | M | 52 | Panamá Metro | 332089 | EPI_ISL_496703 | 2020-03-22 | 2020-03-23 | NA | unknown | local | unknown | NA | A.2.1 |
| 438 | 12 | M | 15 | Panamá Norte | 332231 | EPI_ISL_496704 | 2020-03-18 | 2020-03-23 | NA | unknown | local | unknown | NA | A.2.1 |
| 442 | 11 | M | 31 | Coclé | 332238 | EPI_ISL_496705 | 2020-03-14 | 2020-03-23 | NA | unknown | local | unknown | NA | A.2.1 |
| 445 | 13 | M | 49 | Guna Yala | 332252 | EPI_ISL_496706 | 2020-03-23 | 2020-03-24 | NA | unknown | local | unknown | NA | A.3 |
| 446 | 12 | M | 73 | Panamá Metro | 332254 | EPI_ISL_496707 | 2020-03-16 | 2020-03-24 | NA | unknown | local | unknown | NA | B.1 |
| 456 | 12 | F | 46 | Panamá Norte | 332298 | EPI_ISL_496708 | 2020-03-20 | 2020-03-24 | NA | unknown | local | unknown | NA | A.2.1 |
| 459 | 13 | M | 46 | Panamá Oeste | 332311 | EPI_ISL_496709 | 2020-03-22 | 2020-03-24 | NA | unknown | local | unknown | NA | A.2.1 |
| 472 | 13 | F | 60 | Panamá Metro | 332352 | EPI_ISL_496710 | 2020-03-23 | 2020-03-24 | NA | unknown | local | unknown | NA | A.2.1 |
| 481 | 12 | M | 40 | Panamá Metro | 332389 | EPI_ISL_496711 | 2020-03-19 | 2020-03-24 | NA | unknown | local | unknown | NA | A.2.1 |
| 500 | 12 | M | 60 | Panamá Metro | 332469 | EPI_ISL_496712 | 2020-03-22 | 2020-03-24 | NA | unknown | local | unknown | NA | A.2.1 |
| 511 | 13 | M | 55 | Panamá Oeste | 332513 | EPI_ISL_496713 | 2020-03-23 | 2020-03-24 | NA | unknown | local | unknown | NA | A.2.1 |
| 524 | 12 | F | 60 | Panamá Metro | 332575 | EPI_ISL_496714 | 2020-03-17 | 2020-03-24 | NA | unknown | local | unknown | NA | A.2.1 |
| 534 | 13 | M | 25 | Chiriqui | 332629 | EPI_ISL_496715 | 2020-03-24 | 2020-03-24 | NA | unknown | local | police | NA | B.1 |
| 549 | 13 | M | 39 | Panamá Metro | 332688 | EPI_ISL_496716 | 2020-03-23 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2.1 |
| 551 | 13 | F | 70 | Panamá Metro | 332692 | EPI_ISL_496717 | 2020-03-23 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2.1 |
| 554 | 12 | F | 39 | Panamá Este | 332702 | EPI_ISL_496718 | 2020-03-15 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2.1 |
| 559 | 13 | M | 26 | Veraguas | 332718 | EPI_ISL_496719 | 2020-03-23 | 2020-03-25 | NA | unknown | local | police | NA | A.2.1 |
| 567 | 12 | F | 48 | Coclé | 332759 | EPI_ISL_496720 | 2020-03-20 | 2020-03-25 | NA | unknown | imported | travel | USA | A.2 |
| 568 | A | F | 22 | San Miguelito | 332762 | EPI_ISL_496721 | 2020-03-20 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2.1 |
| 572 | 13 | F | 73 | Panamá Metro | 332791 | EPI_ISL_496722 | 2020-03-22 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2.1 |
| 575 | 12 | M | 31 | Panamá Este | 332800 | EPI_ISL_496723 | 2020-03-20 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2.1 |
| 577 | 13 | F | 35 | Panamá Metro | 332810 | EPI_ISL_496724 | 2020-03-23 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2 |
| 582 | 13 | F | 59 | Panamá Metro | 332822 | EPI_ISL_496725 | 2020-03-25 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2 |
| 583 | 12 | F | 44 | Panamá Metro | 332833 | EPI_ISL_496726 | 2020-03-25 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2.1 |
| 587 | 13 | M | 52 | San Miguelito | 332856 | EPI_ISL_496727 | 2020-03-22 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2.1 |
| 588 | 13 | F | 69 | San Miguelito | 332857 | EPI_ISL_496728 | 2020-03-24 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2.1 |
| 596 | 13 | M | 54 | Panamá Metro | 332875 | EPI_ISL_496729 | 2020-03-22 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2.1 |
| 623 | 13 | F | 7 | San Miguelito | 333048 | EPI_ISL_496730 | 2020-03-24 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2 |
| 627 | 12 | F | 49 | San Miguelito | 333063 | EPI_ISL_496731 | 2020-03-21 | 2020-03-25 | NA | unknown | local | unknown | NA | A.2.1 |
| 657 | 13 | M | 25 | San Miguelito | 333156 | EPI_ISL_496732 | 2020-03-24 | 2020-03-26 | NA | unknown | local | unknown | NA | A.2 |
| 664 | 13 | M | 49 | Panamá Metro | 333177 | EPI_ISL_496733 | 2020-03-23 | 2020-03-26 | NA | unknown | local | unknown | NA | A.2.1 |
| 666 | 12 | F | 47 | Colón | 333181 | EPI_ISL_496734 | 2020-03-19 | 2020-03-26 | NA | unknown | local | unknown | NA | A.2.1 |
| 678 | 13 | F | 30 | Panamá Este | 333242 | EPI_ISL_496735 | 2020-03-25 | 2020-03-26 | NA | unknown | local | unknown | NA | A.2.1 |
| 687 | 12 | F | 71 | Panamá Metro | 333271 | EPI_ISL_496736 | 2020-02-23 | 2020-03-26 | NA | unknown | local | unknown | NA | A.2.1 |
| 714 | 13 | F | 24 | San Miguelito | 333338 | EPI_ISL_496737 | 2020-03-25 | 2020-03-26 | NA | unknown | local | unknown | NA | A.2.1 |
| 725 | 12 | M | 66 | Guna Yala | 333376 | EPI_ISL_496738 | 2020-03-16 | 2020-03-26 | NA | unknown | local | unknown | NA | A.2.1 |
| 734 | 12 | M | 45 | Coclé | 333393 | EPI_ISL_496739 | 2020-03-18 | 2020-03-26 | NA | unknown | local | unknown | NA | A.2 |
| 735 | 13 | F | 40 | San Miguelito | 333400 | EPI_ISL_496740 | 2020-03-23 | 2020-03-26 | NA | unknown | local | unknown | NA | A.2.1 |
| 740 | 13 | M | 66 | Panamá Oeste | 333427 | EPI_ISL_496741 | 2020-03-25 | 2020-03-26 | NA | unknown | local | contact | Health | A.2.1 |
| 742 | 13 | M | 36 | Panamá Oeste | 333430 | EPI_ISL_496742 | 2020-03-23 | 2020-03-26 | NA | unknown | local | contact | Health | A.2.1 |
| 753 | 13 | M | 77 | Panamá Metro | 333467 | EPI_ISL_496743 | 2020-03-23 | 2020-03-26 | NA | unknown | local | unknown | NA | B.1 |
| 758 | 13 | M | 65 | San Miguelito | 333487 | EPI_ISL_496744 | 2020-03-23 | 2020-03-26 | NA | unknown | local | contact | Family | B.1 |

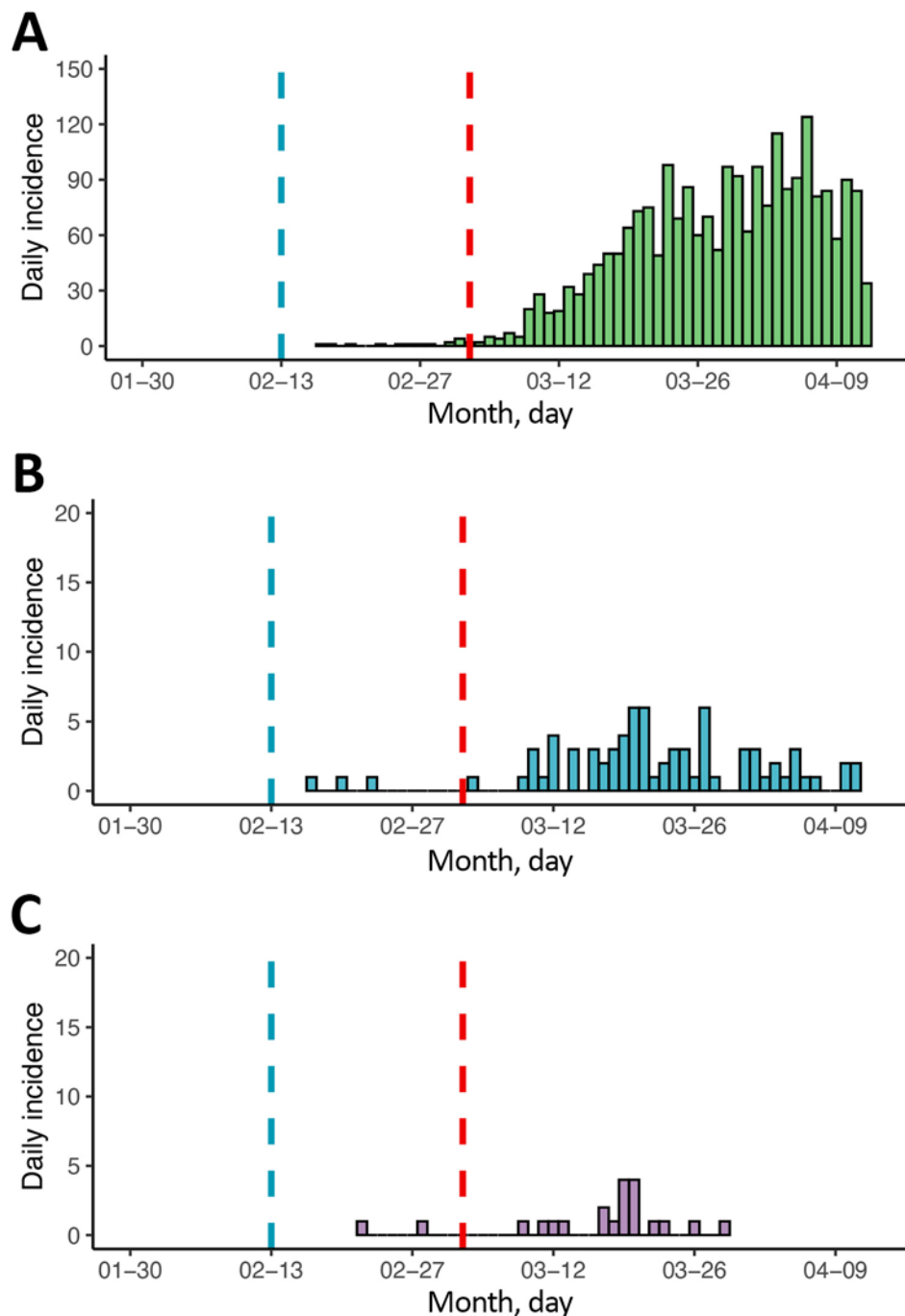
| Case | Epi week | Sex | Age, y | Region | ID | GISAID Accession # | Date symptom onset | Date results received | Epi cluster | Epiclusterlink | Type of exposition | Epi link | Exposition description | Lineage autocolor |
|------|----------|-----|--------------|-------------------------|----------------|--------------------|--------------------|-----------------------|-------------|----------------|--------------------|----------|------------------------|-------------------|
| 765 | 13 | M | 29 | San Miguelito | 333517 | EPI_ISL_496745 | 2020-03-27 | 2020-03-27 | NA | unknown | local | unknown | NA | A.2.1 |
| 775 | 13 | M | 28 | Chiriqui | 333564 | EPI_ISL_496746 | 2020-03-26 | 2020-03-27 | NA | unknown | local | police | NA | B.1 |
| 777 | 12 | M | 45 | Coclé | 333567 | EPI_ISL_496747 | 2020-03-18 | 2020-03-27 | NA | unknown | local | contact | Police | B.1 |
| 778 | 12 | M | 42 | Coclé | 333568 | EPI_ISL_496748 | 2020-03-16 | 2020-03-27 | NA | unknown | local | contact | Police | B.1 |
| 809 | 13 | M | 48 | Guna Yala | 333668 | EPI_ISL_496749 | 2020-03-26 | 2020-03-27 | NA | unknown | local | unknown | NA | A.2.1 |
| 815 | 13 | F | 33 | Panamá Este | 333679 | EPI_ISL_496750 | 2020-03-24 | 2020-03-27 | NA | unknown | local | unknown | NA | A.2.1 |
| 817 | 13 | F | 58 | Panamá Metro | 333681 | EPI_ISL_496751 | 2020-03-23 | 2020-03-27 | NA | unknown | local | unknown | NA | A.2.1 |
| 818 | 13 | F | 49 | Barco Anclado en Amador | 333685 | EPI_ISL_496752 | 2020-03-24 | 2020-03-27 | NA | unknown | local | unknown | NA | A.2.1 |
| 821 | 13 | M | 19 | Colón | 333694 | EPI_ISL_496753 | 2020-03-23 | 2020-03-27 | NA | unknown | local | unknown | NA | A.3 |
| 827 | 12 | M | 29 | Colón | 333706 | EPI_ISL_496754 | 2020-03-20 | 2020-03-27 | NA | unknown | local | unknown | NA | A.2.1 |
| 853 | 13 | F | 86 | Panamá Metro | 333825 | EPI_ISL_496755 | 2020-03-26 | 2020-03-27 | NA | unknown | local | unknown | NA | A.2.1 |
| 881 | 12 | F | 29 | Colón | 333937 | EPI_ISL_496756 | 1900-01-00 | 2020-03-28 | NA | unknown | local | unknown | NA | A.3 |
| 883 | 12 | M | 39 | Colón | 333949 | EPI_ISL_496757 | 2020-03-27 | 2020-03-28 | NA | unknown | local | unknown | NA | A.2.1 |
| 894 | 13 | M | 49 | Panamá Metro | 334000 | EPI_ISL_496758 | 2020-03-23 | 2020-03-28 | NA | unknown | local | unknown | NA | B.1 |
| 903 | 13 | M | 48 | Chiriqui | 334032 | EPI_ISL_496759 | 2020-03-22 | 2020-03-28 | NA | unknown | local | police | NA | B.1 |
| 904 | 13 | M | 41 | Panamá Oeste | 334034 | EPI_ISL_496760 | 2020-03-26 | 2020-03-28 | NA | unknown | local | police | NA | B.1 |
| 905 | 13 | M | 40 | Bocas Del Toro | 334035 | EPI_ISL_496761 | 2020-03-24 | 2020-03-28 | NA | unknown | local | contact | MP | B.1 |
| 906 | 12 | M | 37 | Coclé | 334036 | EPI_ISL_496762 | 2020-03-25 | 2020-03-28 | NA | unknown | local | police | NA | B.1 |
| 907 | 13 | M | 22 | Panamá Este | 334038 | EPI_ISL_496763 | 2020-03-24 | 2020-03-28 | NA | unknown | local | police | NA | B.1 |
| 922 | A | M | 61 | Guna Yala | 334102 | EPI_ISL_496764 | 2020-03-21 | 2020-03-29 | NA | unknown | local | unknown | NA | A.2.1 |
| 930 | 13 | F | 35 | Panamá Oeste | 334115 | EPI_ISL_496765 | 2020-03-26 | 2020-03-29 | NA | unknown | local | unknown | NA | A.2.1 |
| 932 | 13 | F | 99 | Panamá Oeste | 334117 | EPI_ISL_496766 | 2020-03-19 | 2020-03-29 | NA | unknown | local | unknown | NA | B.1.5 |
| 937 | 13 | F | 40 | Colón | 334144 | EPI_ISL_496767 | 2020-03-24 | 2020-03-29 | NA | unknown | local | contact | Family | A.3 |
| 960 | - | F | 79 | Panamá Metro | 334239 | EPI_ISL_496768 | 2020-03-29 | 2020-03-29 | NA | unknown | local | unknown | NA | A.2.1 |
| 962 | - | M | 45 | Panamá Norte | 334245 | EPI_ISL_496769 | 2020-03-23 | 2020-03-29 | NA | unknown | local | unknown | NA | A.2 |
| 964 | 14 | M | 65 | Guna Yala | 334256 | EPI_ISL_496770 | 2020-03-26 | 2020-03-29 | NA | unknown | local | unknown | NA | A.2.1 |
| 969 | 13 | M | 26 | Panamá Oeste | 334277 | EPI_ISL_496771 | 2020-03-29 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2.1 |
| 970 | 13 | M | 19 | Herrera | 334280 | EPI_ISL_496772 | 2020-03-28 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2.1 |
| 973 | 13 | M | 27 | San Miguelito | 334283 | EPI_ISL_496773 | 2020-03-27 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2.1 |
| 986 | F | 47 | Panamá Oeste | 334333 | EPI_ISL_496774 | 2020-03-25 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2 | |
| 1006 | 13 | F | 37 | San Miguelito | 334389 | EPI_ISL_496775 | 2020-03-29 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2 |
| 1007 | 13 | M | | San Miguelito | 334390 | EPI_ISL_496776 | 2020-03-30 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2 |
| 1010 | A | M | 27 | Panamá Metro | 334396 | EPI_ISL_496777 | 2020-03-27 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2.1 |
| 1013 | 13 | F | 60 | Panamá Oeste | 334400 | EPI_ISL_496778 | 2020-03-30 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2.1 |
| 1031 | | M | 29 | Panamá Oeste | 334440 | EPI_ISL_496779 | 2020-03-30 | 2020-03-30 | NA | unknown | local | contact | Health | A.2.1 |
| 1040 | 14 | F | 41 | Colón | 334456 | EPI_ISL_496780 | 2020-03-20 | 2020-03-30 | NA | unknown | local | unknown | NA | B.1 |
| 1041 | 13 | M | 46 | Panamá Metro | 334468 | EPI_ISL_496781 | 2020-03-30 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2.1 |
| 1043 | 14 | M | 36 | Panamá Metro | 334475 | EPI_ISL_496782 | 2020-03-27 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2.1 |
| 1068 | 14 | F | 33 | Coclé | 334554 | EPI_ISL_496783 | 2020-03-25 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2.1 |
| 1069 | 14 | M | 43 | Colón | 334559 | EPI_ISL_496784 | 2020-03-22 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2 |
| 1078 | 13 | F | 34 | San Miguelito | 334598 | EPI_ISL_496785 | 2020-03-22 | 2020-03-30 | NA | unknown | local | unknown | NA | A.2.1 |
| 1083 | 14 | F | 55 | San Miguelito | 334610 | EPI_ISL_496786 | 2020-03-29 | 2020-03-31 | NA | unknown | local | unknown | NA | A.2 |
| 1084 | 14 | M | 23 | Panamá Metro | 334611 | EPI_ISL_496787 | 2020-03-29 | 2020-03-31 | NA | unknown | local | unknown | NA | A.2.1 |
| 1087 | 13 | M | 34 | Panamá Norte | 334618 | EPI_ISL_496788 | 2020-03-27 | 2020-03-31 | NA | unknown | local | unknown | NA | A.2.1 |
| 1092 | 14 | M | 33 | Coclé | 334647 | EPI_ISL_496789 | 2020-03-29 | 2020-03-31 | NA | unknown | local | contact | MP | B.1 |
| 1095 | 14 | M | 41 | Coclé | 334655 | EPI_ISL_496790 | 2020-03-30 | 2020-03-31 | NA | unknown | local | unknown | NA | A.2.1 |
| 1098 | 14 | M | 4m | Panamá Oeste | 334658 | EPI_ISL_496791 | 2020-03-31 | 2020-03-31 | NA | unknown | local | unknown | NA | A.2.1 |

| Case | Epi week | Sex | Age, y | Region | ID | GISAID Accession # | Date symptom onset | Date results received | Epi cluster | Epiclusterlink | Type of exposition | Epi link | Exposition description | Lineage autocolor |
|------|----------|-----|--------|---------------|--------|--------------------|--------------------|-----------------------|-------------|----------------|--------------------|----------|------------------------|-------------------|
| 1105 | 13 | F | 55 | Panamá Metro | 334687 | EPI_ISL_496792 | 2020-03-26 | 2020-03-31 | NA | unknown | local | unknown | NA | A.2.1 |
| 1128 | 14 | M | 49 | Panamá Este | 334779 | EPI_ISL_496793 | 2020-03-29 | 2020-03-31 | NA | unknown | local | unknown | NA | A.2.1 |
| 1145 | | F | | Coclé | 334835 | EPI_ISL_496794 | 2020-03-31 | 2020-03-31 | NA | unknown | local | unknown | NA | B.1 |
| 1148 | 14 | M | 48 | Panamá Oeste | 334845 | EPI_ISL_496795 | 2020-03-30 | 2020-03-31 | NA | unknown | local | unknown | NA | A.2.1 |
| 1155 | 13 | M | 48 | Panamá Norte | 334868 | EPI_ISL_496796 | 2020-03-24 | 2020-03-31 | NA | unknown | local | unknown | NA | A.2.1 |
| 1159 | | F | 67 | Panamá Metro | 334898 | EPI_ISL_496797 | 2020-03-31 | 2020-03-31 | NA | unknown | local | unknown | NA | A.2.1 |
| 1161 | | M | 38 | Panamá Norte | 334913 | EPI_ISL_496798 | 2020-03-31 | 2020-03-31 | NA | unknown | local | unknown | NA | A.2.1 |
| 1167 | 13 | M | 28 | San Miguelito | 334998 | EPI_ISL_496799 | 2020-04-01 | 2020-04-01 | NA | unknown | local | unknown | NA | A.2.1 |
| 1169 | 14 | F | 25 | Panamá Oeste | 335002 | EPI_ISL_496800 | 2020-04-01 | 2020-04-01 | NA | unknown | local | unknown | NA | A.2.1 |
| 1171 | 14 | M | 30 | Coclé | 335013 | EPI_ISL_496801 | 2020-04-01 | 2020-04-01 | NA | unknown | local | unknown | NA | A.2 |
| 1184 | 14 | M | 37 | Panamá Norte | 335067 | EPI_ISL_496802 | 2020-03-31 | 2020-04-01 | NA | unknown | local | unknown | NA | B.1 |
| 1188 | 14 | F | 23 | Panamá Metro | 335090 | EPI_ISL_496803 | 2020-03-30 | 2020-04-01 | NA | unknown | local | unknown | NA | A.2 |
| 1190 | 13 | M | 18 | Panamá Este | 335097 | EPI_ISL_496804 | 2020-03-28 | 2020-04-01 | NA | unknown | local | unknown | NA | A.2.1 |
| 1191 | 14 | F | 18 | Panamá Este | 335099 | EPI_ISL_496805 | 2020-03-29 | 2020-04-01 | NA | unknown | local | unknown | NA | A.2.1 |
| 1197 | 14 | M | 28 | Panamá Oeste | 335119 | EPI_ISL_496806 | 2020-03-31 | 2020-04-01 | NA | unknown | local | unknown | NA | A.2.1 |
| 1208 | | F | 41 | Panamá Metro | 335156 | EPI_ISL_496807 | 2020-03-30 | 2020-04-01 | NA | unknown | local | unknown | NA | A.2.1 |
| 1216 | 14 | F | 9 | Panamá Metro | 335166 | EPI_ISL_496808 | 2020-03-31 | 2020-04-01 | NA | unknown | local | unknown | NA | A.2.1 |
| 1219 | 14 | F | 29 | Panamá Norte | 335182 | EPI_ISL_496809 | 2020-03-28 | 2020-04-01 | NA | unknown | local | unknown | NA | A.2 |
| 1255 | 14 | M | 41 | Veraguas | 335382 | EPI_ISL_496810 | 31-03-2020 | 2020-04-02 | NA | unknown | local | unknown | NA | A.2.1 |
| 1262 | 14 | F | 42 | Panamá Oeste | 335403 | EPI_ISL_496811 | NA | 2020-04-02 | NA | unknown | local | unknown | NA | A.2.1 |
| 1263 | 13 | M | 44 | Colón | 335406 | EPI_ISL_496812 | NA | 2020-04-02 | NA | unknown | local | unknown | NA | A.2.1 |
| 1267 | 13 | M | 27 | Panamá Este | 335473 | EPI_ISL_496813 | 2020-03-26 | 2020-04-02 | NA | unknown | local | unknown | NA | A.2.1 |
| 1268 | 14 | M | 89 | Panamá Metro | 335488 | EPI_ISL_496814 | 2020-03-30 | 2020-04-02 | NA | unknown | local | unknown | NA | B.1 |
| 1279 | 14 | M | 40 | Panamá Oeste | 335546 | EPI_ISL_496815 | NA | 2020-04-02 | 8 | police | local | unknown | NA | A.2 |
| 1284 | 14 | M | 33 | Coclé | 335568 | EPI_ISL_496816 | 2020-04-02 | 2020-04-02 | NA | unknown | local | unknown | NA | A.2.1 |
| 1285 | 14 | M | 45 | Panamá Oeste | 335572 | EPI_ISL_496817 | 2020-03-29 | 2020-04-02 | NA | unknown | local | unknown | NA | A.2.1 |
| 1302 | 13 | F | 19 | Panamá Norte | 335631 | EPI_ISL_496818 | NA | 2020-04-02 | NA | unknown | local | unknown | NA | A.2.1 |
| 1320 | 14 | M | 25 | Panamá Metro | 335723 | EPI_ISL_496819 | 2020-04-02 | 2020-04-03 | NA | unknown | local | unknown | NA | A.2.1 |
| 1342 | 13 | F | 61 | Panamá Metro | 335800 | EPI_ISL_496820 | 2020-03-28 | 2020-04-03 | NA | unknown | local | contact | Family | A.2.1 |
| 1348 | 14 | M | 16 | Panamá Oeste | 335859 | EPI_ISL_496821 | 2020-03-30 | 2020-04-03 | NA | unknown | local | unknown | NA | A.2.1 |
| 1349 | 14 | F | 44 | Panamá Oeste | 335862 | EPI_ISL_496822 | 2020-04-02 | 2020-04-03 | NA | unknown | local | contact | Family | A.2.1 |
| 1356 | 14 | M | 20 | Chiriqui | 335877 | EPI_ISL_496823 | 2020-04-01 | 2020-04-03 | NA | unknown | local | unknown | NA | A.2.1 |
| 1360 | 14 | M | 23 | Herrera | 335885 | EPI_ISL_496824 | 2020-04-01 | 2020-04-03 | NA | unknown | local | unknown | NA | A.2.1 |
| 1364 | 14 | M | 30 | Coclé | 335903 | EPI_ISL_496825 | 2020-04-01 | 2020-04-03 | NA | unknown | local | contact | Family | A.2.1 |
| 1367 | 14 | M | 24 | Panamá Este | 335922 | EPI_ISL_496826 | NA | 2020-04-03 | NA | unknown | local | contact | Family | A.2.1 |
| 1368 | 14 | F | 38 | Panamá Metro | 335925 | EPI_ISL_496827 | 2020-03-31 | 2020-04-03 | NA | unknown | local | unknown | NA | A.2 |
| 1370 | 14 | M | 61 | Guna Yala | 335931 | EPI_ISL_496828 | 2020-04-02 | 2020-04-03 | NA | unknown | local | unknown | NA | A.2.1 |
| 1375 | 14 | F | 54 | Panamá Oeste | 335941 | EPI_ISL_496829 | 01/04/2020 | 2020-04-03 | NA | unknown | local | unknown | NA | A.2 |
| 1378 | 14 | F | 31 | Panamá Metro | 335944 | EPI_ISL_496830 | 2020-04-01 | 2020-04-03 | NA | unknown | local | unknown | NA | A.2.1 |
| 1379 | 14 | M | 43 | Panamá Metro | 335945 | EPI_ISL_496831 | 2020-03-29 | 2020-04-03 | NA | unknown | local | unknown | NA | A.2.1 |
| 1385 | 14 | F | 36 | Panamá Norte | 335967 | EPI_ISL_496832 | 2020-04-03 | 2020-04-03 | NA | unknown | local | unknown | NA | A.2.1 |
| 1395 | 14 | F | 26 | Panamá Oeste | 336008 | EPI_ISL_496833 | 2020-03-30 | 2020-04-03 | NA | unknown | local | contact | Family | A.2.1 |
| 1402 | 14 | M | 74 | San Miguelito | 336023 | EPI_ISL_496834 | 2020-04-01 | 2020-04-03 | NA | unknown | local | contact | Family | A.2.1 |
| 1407 | 14 | F | 61 | Colón | 336044 | EPI_ISL_496835 | 2020-04-01 | 2020-04-03 | NA | unknown | local | contact | Family | A.3 |
| 1409 | 14 | M | 56 | Colón | 336047 | EPI_ISL_496836 | 2020-04-03 | 2020-04-03 | NA | unknown | local | unknown | NA | A.3 |
| 1418 | A | F | 25 | Panamá Metro | 336085 | EPI_ISL_496837 | 2020-04-03 | 2020-04-03 | NA | unknown | local | unknown | NA | A.2.1 |
| 1437 | 13 | F | 38 | Panamá Metro | 336231 | EPI_ISL_496838 | 2020-03-28 | 2020-04-04 | NA | unknown | local | contact | Family | A.2.1 |
| 1441 | 13 | M | 28 | Panamá Este | 336247 | EPI_ISL_496839 | 2020-03-25 | 2020-04-04 | NA | unknown | local | unknown | NA | A.2.1 |

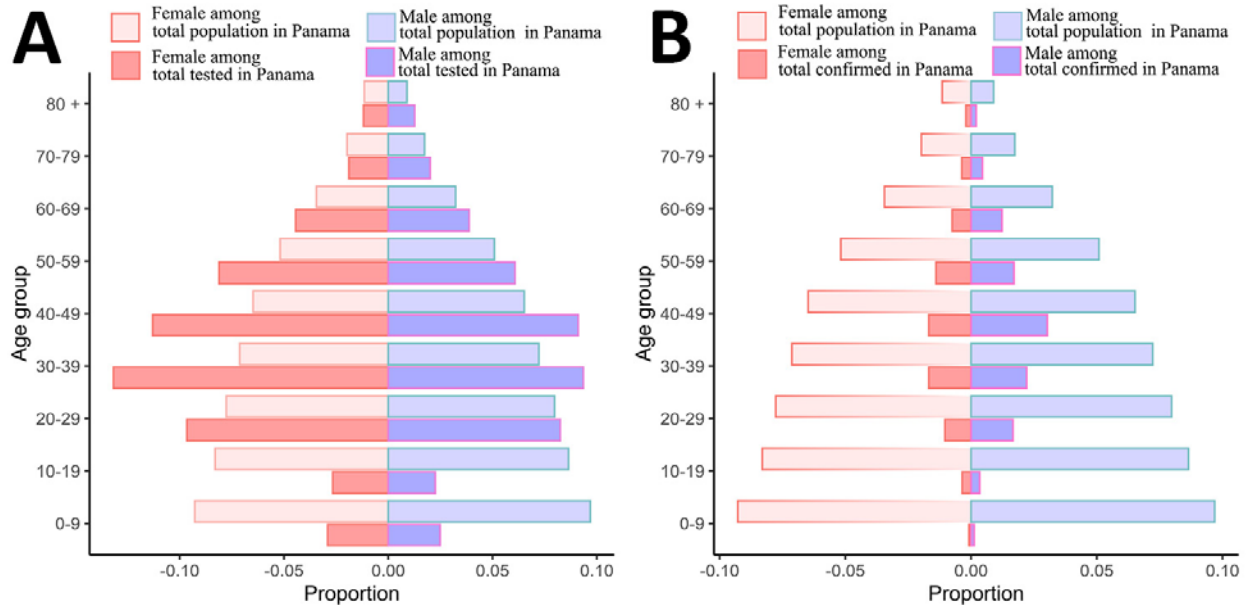
| Case | Epi week | Sex | Age, y | Region | ID | GISAID Accession # | Date symptom onset | Date results received | Epi cluster | Epiclusterlink | Type of exposition | Epi link | Exposition description | Lineage autocolor |
|------|----------|-----|--------|---------------|--------|--------------------|--------------------|-----------------------|-------------|----------------|--------------------|----------|------------------------|-------------------|
| 1445 | 14 | F | 42 | Panamá Metro | 336264 | EPI_ISL_496840 | 2020-04-04 | 2020-04-04 | NA | unknown | local | contact | Family | B.1 |
| 1452 | 14 | M | 60 | San Miguelito | 336320 | EPI_ISL_496841 | 2020-03-31 | 2020-04-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1458 | 14 | M | 45 | Panamá Metro | 336341 | EPI_ISL_496842 | 2020-04-02 | 2020-04-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1460 | 14 | F | 40 | Panamá Norte | 336344 | EPI_ISL_496843 | 2020-04-02 | 2020-04-04 | NA | unknown | local | contact | Family | A.2 |
| 1466 | 14 | F | 15 | Panamá Oeste | 336377 | EPI_ISL_496844 | 2020-04-03 | 2020-04-04 | NA | unknown | local | contact | Family | A.2 |
| 1469 | 14 | M | 61 | San Miguelito | 336388 | EPI_ISL_496845 | NA | 2020-04-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1475 | 14 | F | 52 | Panamá Metro | 336416 | EPI_ISL_496846 | 2020-04-03 | 2020-04-04 | NA | unknown | local | contact | Family | A.2.1 |
| 1476 | 14 | M | 34 | San Miguelito | 336417 | EPI_ISL_496847 | 2020-04-04 | 2020-04-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1477 | 14 | F | 41 | Panamá Metro | 336418 | EPI_ISL_496848 | 2020-04-02 | 2020-04-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1480 | 14 | M | 48 | San Miguelito | 336432 | EPI_ISL_496849 | 2020-03-29 | 2020-04-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1481 | | F | 42 | Panamá Metro | 336440 | EPI_ISL_496850 | 2020-04-03 | 2020-04-05 | NA | unknown | local | unknown | NA | A.2.1 |
| 1484 | 13 | M | 32 | Panamá Este | 336491 | EPI_ISL_496851 | 2020-03-26 | 2020-04-05 | NA | unknown | local | unknown | NA | A.2.1 |
| 1490 | 14 | M | 33 | Panamá Metro | 336523 | EPI_ISL_496852 | 2020-04-04 | 2020-04-05 | NA | unknown | local | unknown | NA | A.2.1 |
| 1497 | 14 | F | 44 | Panamá Oeste | 336567 | EPI_ISL_496853 | 2020-04-03 | 2020-04-05 | NA | unknown | local | unknown | NA | A.2 |
| 1606 | 14 | F | 56 | San Miguelito | 336897 | EPI_ISL_496854 | 2020-04-01 | 2020-06-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1650 | 14 | M | 50 | Guna Yala | 337097 | EPI_ISL_496855 | 2020-04-04 | 2020-04-06 | NA | unknown | local | unknown | NA | A.2.1 |
| 1651 | 15 | M | 38 | Guna Yala | 337099 | EPI_ISL_496856 | 2020-04-05 | 2020-04-06 | NA | unknown | local | unknown | NA | A.2.1 |
| 1681 | 15 | M | 39 | Colón | 337250 | EPI_ISL_496857 | 2020-04-05 | 2020-04-07 | NA | unknown | local | unknown | NA | A.2.1 |
| 1689 | 14 | F | 26 | Los Santos | 337306 | EPI_ISL_496858 | 2020-04-04 | 2020-04-07 | NA | unknown | local | police | NA | A.2.1 |
| 1705 | 14 | F | 26 | Panamá Metro | 337358 | EPI_ISL_496859 | NA | 2020-04-07 | NA | unknown | local | contact | Family | A.2.1 |
| 1725 | 14 | M | 28 | Chiriqui | 337442 | EPI_ISL_496860 | 2020-04-04 | 2020-07-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1731 | 14 | M | 28 | Panamá Oeste | 337467 | EPI_ISL_496861 | 2020-04-05 | 2020-07-04 | NA | unknown | local | contact | Family | A.2.1 |
| 1775 | 14 | M | 27 | Chiriqui | 337640 | EPI_ISL_496862 | 2020-04-03 | 2020-07-04 | NA | unknown | local | unknown | NA | B.1.5 |
| 1778 | 15 | M | 43 | Panamá Oeste | 337660 | EPI_ISL_496863 | 2020-04-06 | 2020-07-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1781 | 14 | F | 55 | Panamá Oeste | 337668 | EPI_ISL_496864 | 2020-04-01 | 2020-07-04 | NA | unknown | local | unknown | NA | A.2 |
| 1834 | 15 | M | 36 | Panamá Oeste | 337884 | EPI_ISL_496865 | 2020-04-05 | 2020-04-08 | NA | unknown | local | unknown | NA | A.2.1 |
| 1895 | 14 | F | 46 | San Miguelito | 338258 | EPI_ISL_496866 | 2020-04-01 | 2020-04-08 | NA | unknown | local | unknown | NA | A.2.1 |
| 1904 | 15 | M | 23 | San Miguelito | 338362 | EPI_ISL_496867 | 2020-04-07 | 2020-04-09 | NA | unknown | local | police | NA | A.2.1 |
| 1910 | 15 | F | 25 | Panamá Metro | 338393 | EPI_ISL_496868 | 2020-04-05 | 2020-04-09 | NA | unknown | local | unknown | NA | A.2 |
| 1918 | 14 | M | 51 | Panamá Oeste | 338477 | EPI_ISL_496869 | 2020-04-02 | 2020-04-09 | NA | unknown | local | unknown | NA | A.2.1 |
| 1952 | 15 | F | 48 | Guna Yala | 338634 | EPI_ISL_496870 | 2020-04-06 | 2020-09-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1954 | 15 | M | 53 | Guna Yala | 338639 | EPI_ISL_496871 | 2020-04-06 | 2020-09-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1955 | 15 | F | 33 | Guna Yala | 338640 | EPI_ISL_496872 | 2020-04-06 | 2020-09-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1956 | 15 | F | 21 | Guna Yala | 338641 | EPI_ISL_496873 | 2020-04-06 | 2020-09-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1957 | 15 | M | 60 | Guna Yala | 338642 | EPI_ISL_496874 | 2020-04-06 | 2020-09-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 1959 | 14 | M | 48 | Coclé | 338657 | EPI_ISL_496875 | 2020-04-02 | 2020-09-04 | NA | unknown | local | unknown | NA | B.1 |
| 1960 | 14 | M | 36 | Coclé | 338658 | EPI_ISL_496876 | 2020-03-29 | 2020-09-04 | NA | unknown | local | unknown | NA | B.1 |
| 1964 | A | M | 54 | Colón | 338674 | EPI_ISL_496877 | NA | 2020-09-04 | NA | unknown | local | contact | MP | B.1 |
| 1965 | A | M | 31 | Colón | 338677 | EPI_ISL_496878 | 2020-04-06 | 2020-09-04 | NA | unknown | local | unknown | NA | B.1 |
| 1966 | 15 | F | 30 | Coclé | 338681 | EPI_ISL_496879 | 2020-04-05 | 2020-09-04 | NA | unknown | local | contact | Family | A.2.1 |
| 1967 | 15 | M | 30 | Colón | 338687 | EPI_ISL_496880 | 2020-04-07 | 2020-09-04 | NA | unknown | local | contact | MP | B.1 |
| 1968 | 15 | M | 46 | Colón | 338689 | EPI_ISL_496881 | 2020-04-08 | 2020-09-04 | NA | unknown | local | contact | MP | B.1 |
| 1970 | 15 | F | 32 | Panamá Oeste | 338698 | EPI_ISL_496882 | NA | 2020-09-04 | NA | unknown | local | contact | Family | A.2.1 |
| 1972 | 15 | M | 32 | Coclé | 338706 | EPI_ISL_496883 | NA | 2020-09-04 | NA | unknown | local | police | NA | B.1 |
| 1981 | 15 | F | 25 | Colón | 338744 | EPI_ISL_496884 | 2020-04-08 | 2020-09-04 | NA | unknown | local | contact | Family | A.3 |
| 1984 | 14 | M | 70 | Panamá Metro | 338777 | EPI_ISL_496885 | NA | 2020-09-04 | NA | unknown | local | contact | Health | A.2.1 |
| 1993 | 15 | M | 47 | Panamá Metro | 338832 | EPI_ISL_496886 | NA | 2020-09-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 2000 | 14 | M | 34 | Panamá Metro | 338859 | EPI_ISL_496887 | 2020-04-01 | 2020-10-04 | NA | unknown | local | unknown | NA | A.2.1 |

| Case | Epi week | Sex | Age, y | Region | ID | GISAID Accession # | Date symptom onset | Date results received | Epi cluster | Epiclusterlink | Type of exposition | Epi link | Exposition description | Lineage autocolor |
|------|----------|-----|--------|----------------|--------|--------------------|--------------------|-----------------------|-------------|----------------|--------------------|----------|------------------------|-------------------|
| 2004 | 14 | M | 55 | Panamá Metro | 338872 | EPI_ISL_496888 | 2020-04-03 | 2020-10-04 | NA | unknown | local | contact | Family | A.2.1 |
| 2024 | 15 | M | 21 | Panamá Norte | 338939 | EPI_ISL_496889 | 05/04/2020 | 2020-10-04 | NA | unknown | local | unknown | NA | A.2.1 |
| 2061 | 14 | F | 8 | Panamá Norte | 339064 | EPI_ISL_496890 | NA | 2020-04-10 | NA | unknown | local | unknown | NA | A.2.1 |
| 2074 | 15 | M | 27 | Coclé | 339125 | EPI_ISL_496891 | NA | 2020-04-10 | NA | unknown | local | unknown | NA | A.2.1 |
| 2083 | 15 | M | 28 | Colón | 339160 | EPI_ISL_496892 | NA | 2020-04-10 | NA | unknown | local | unknown | NA | A.3 |
| 2147 | A | M | 43 | Colón | 339459 | EPI_ISL_496893 | NA | 2020-04-11 | NA | unknown | local | unknown | NA | B.1 |
| 2148 | A | F | 57 | Panamá Oeste | 339467 | EPI_ISL_496894 | NA | 2020-04-11 | NA | unknown | local | unknown | NA | A.2.1 |
| 2152 | 15 | M | 22 | Colón | 339494 | EPI_ISL_496895 | NA | 2020-04-11 | NA | unknown | local | unknown | NA | A.3 |
| 2155 | 15 | M | 26 | Colón | 339499 | EPI_ISL_496896 | NA | 2020-04-11 | NA | unknown | local | unknown | NA | A.3 |
| 2165 | | M | 35 | Coclé | 339631 | EPI_ISL_496897 | NA | 2020-04-12 | NA | unknown | local | unknown | NA | A.2.1 |
| 2166 | 15 | M | 40 | Colón | 339644 | EPI_ISL_496898 | NA | 2020-04-12 | NA | unknown | local | unknown | NA | A.3 |
| 2181 | 15 | M | 36 | Colón | 339755 | EPI_ISL_496899 | NA | 2020-04-12 | NA | unknown | local | unknown | NA | B.1 |
| 2182 | 14 | M | 38 | Colón | 339756 | EPI_ISL_496900 | NA | 2020-04-12 | NA | unknown | local | unknown | NA | B.1 |
| 2220 | 16 | M | 28 | Chiriquí | 340006 | EPI_ISL_496901 | 2020-04-12 | 2020-04-13 | NA | unknown | local | unknown | NA | A.2.1 |
| 2244 | 15 | F | 47 | Panamá Oeste | 340172 | EPI_ISL_496902 | 2020-04-08 | 2020-04-13 | NA | unknown | local | unknown | NA | A.2 |
| 2266 | 15 | F | 23 | Guna Yala | 340229 | EPI_ISL_496903 | 2020-04-09 | 2020-04-13 | NA | unknown | local | unknown | NA | A.2.1 |
| 2267 | 15 | M | 68 | Guna Yala | 340232 | EPI_ISL_496904 | 2020-04-09 | 2020-04-13 | NA | unknown | local | unknown | NA | A.2.1 |
| 2269 | 15 | F | 22 | Guna Yala | 340239 | EPI_ISL_496905 | 2020-04-10 | 2020-04-13 | NA | unknown | local | unknown | NA | A.2.1 |
| 2367 | 16 | M | 31 | Panamá Oeste | 340836 | EPI_ISL_496906 | NA | 2020-04-14 | NA | unknown | local | unknown | NA | A.2.1 |
| 2368 | 15 | F | 41 | Panamá Oeste | 340837 | EPI_ISL_496907 | 2020-04-10 | 2020-04-14 | NA | unknown | local | unknown | NA | B.1 |
| 2414 | A | M | 46 | Colón | 341001 | EPI_ISL_496908 | NA | 2020-04-14 | NA | unknown | local | unknown | NA | B.1 |
| 2415 | A | M | 37 | Colón | 341003 | EPI_ISL_496909 | NA | 2020-04-14 | NA | unknown | local | unknown | NA | B.1 |
| 2418 | 15 | M | 34 | Colón | 341008 | EPI_ISL_496910 | 2020-04-11 | 2020-04-14 | NA | unknown | local | unknown | NA | B.1 |
| 2419 | A | M | 42 | Colón | 341009 | EPI_ISL_496911 | NA | 2020-04-14 | NA | unknown | local | unknown | NA | B.1 |
| 2422 | 15 | M | 29 | Bocas Del Toro | 341042 | EPI_ISL_496912 | 2020-04-11 | 2020-04-14 | NA | unknown | local | unknown | NA | A.3 |
| 2463 | 16 | M | 21 | San Miguelito | 341259 | EPI_ISL_496913 | 2020-04-12 | 2020-04-15 | NA | unknown | local | unknown | NA | A.2.1 |
| 2466 | 16 | M | 26 | Guna Yala | 341269 | EPI_ISL_496914 | 2020-04-13 | 2020-04-15 | NA | unknown | local | unknown | NA | A.2.1 |
| 2481 | 16 | M | 22 | Colón | 341361 | EPI_ISL_496915 | NA | 2020-04-15 | NA | unknown | local | unknown | NA | A.2.1 |

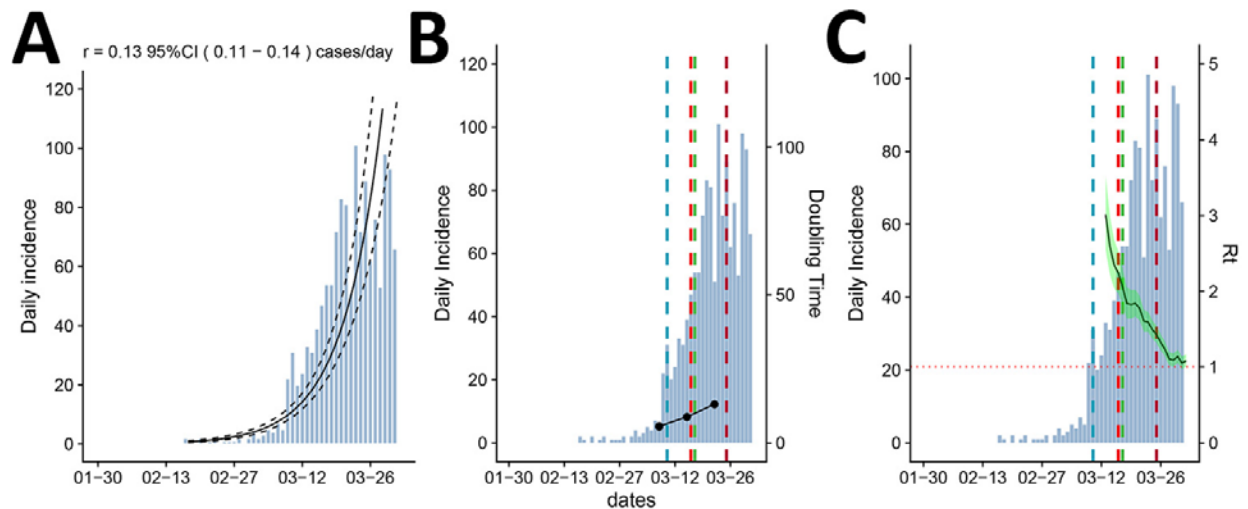
epi, epidemiological; NA, not available.



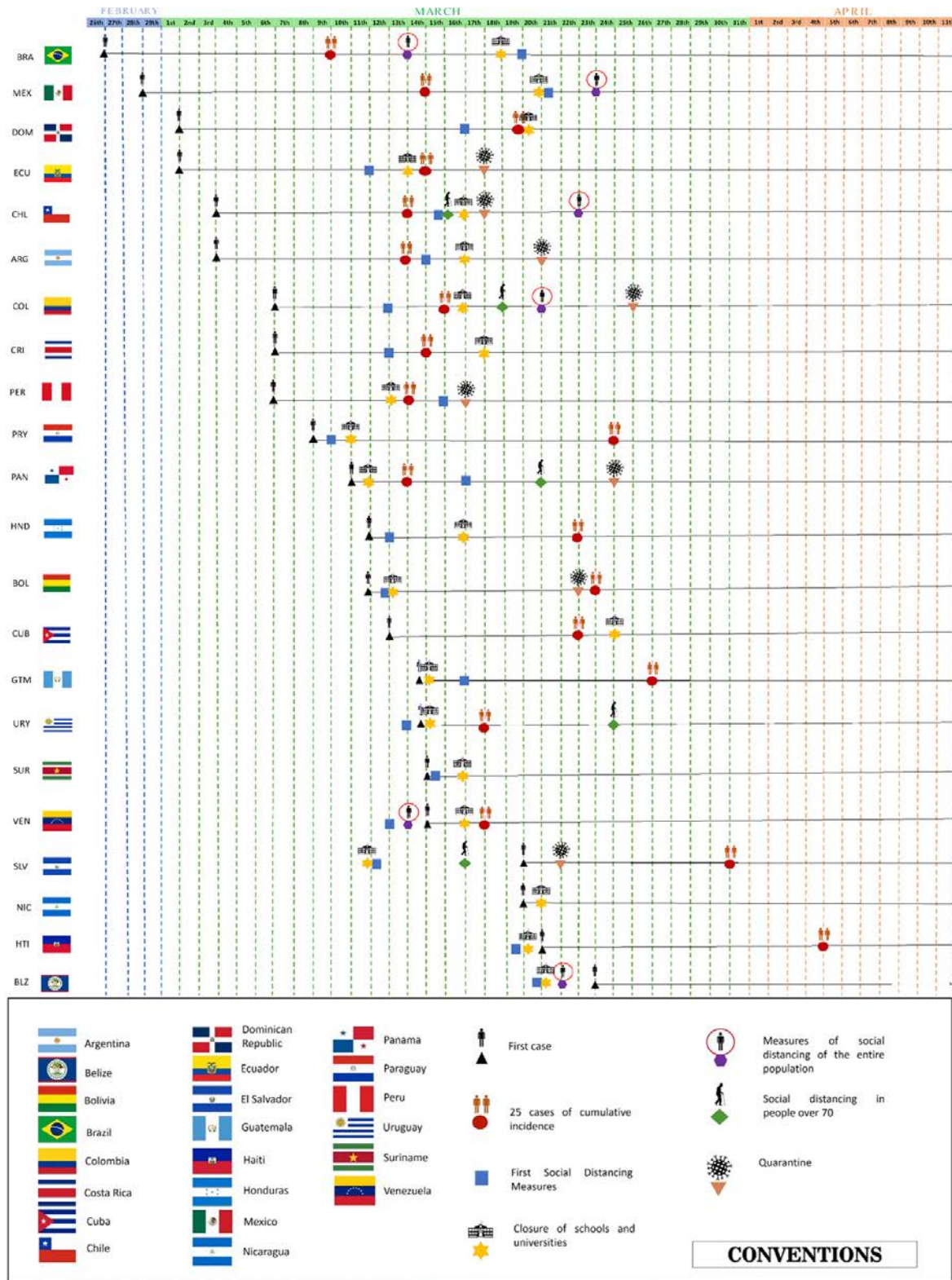
Appendix 2 Figure 1. Daily incidence of SARS-CoV-2 cases in Panama: A) ambulatory patients (asymptomatic, pre-symptomatic, mildly symptomatic outpatient), B) hospitalized patients, and C) patients who had died, detected through April 16, with symptom onset during February 15–April 13. In all 3 charts, the y-axis represents the daily incidence and the x-axis represents the date of symptom onset for each reported case. The blue dashed vertical lines represent the first recorded onset of symptoms and red dashed vertical lines the date of first case confirmed by the surveillance system.



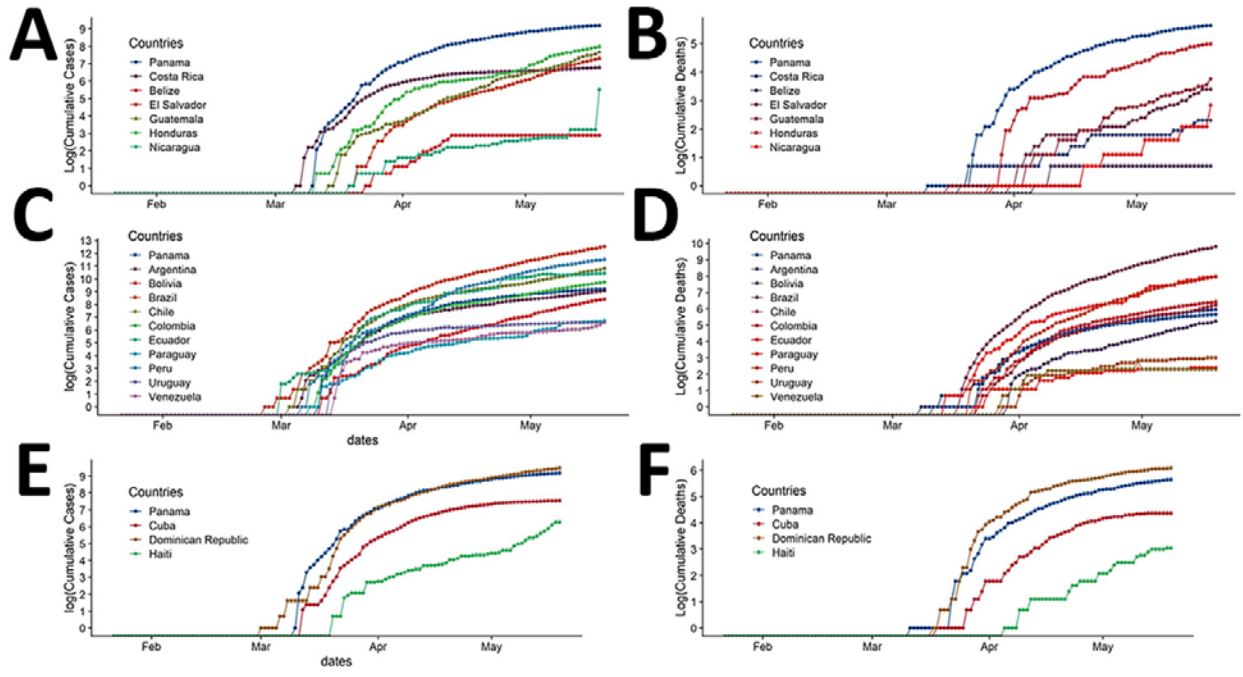
Appendix 2 Figure 2. Age and sex distribution of tested subjects in Panama. Proportion of subjects with age group distribution and sex proportion of A) tested and B) SARS-CoV-2–confirmed cases.



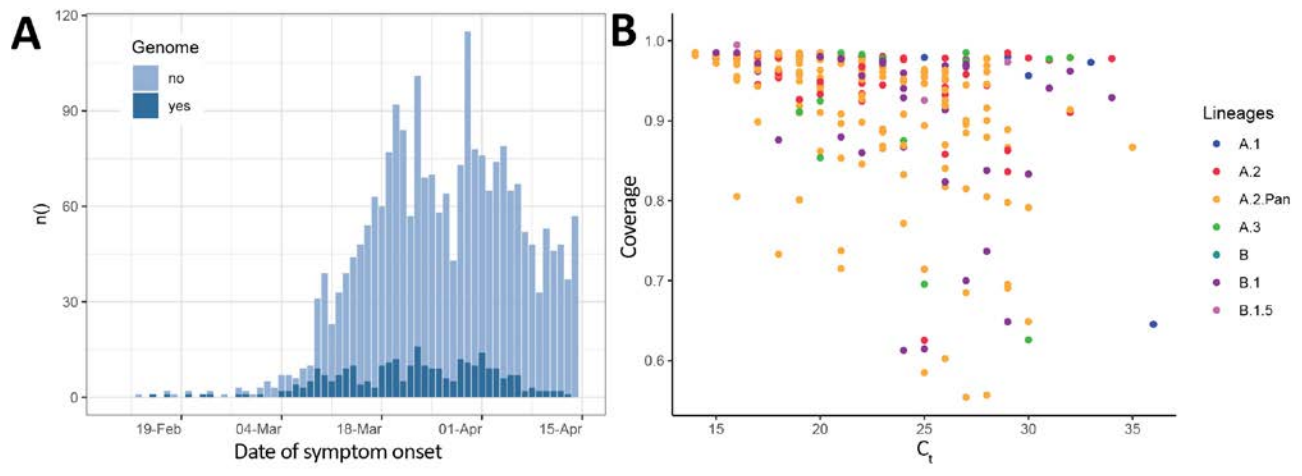
Appendix 2 Figure 3. Estimates of epidemiologic dynamics in Panama. Number of COVID-19 daily confirmed infections (left axes and bars) overlaid with estimates of A) fitted exponential growth in cases daily growth rate; B) doubling time; and C) time-varying effective reproduction number R_t , for a time frame of 45 days (x-axes). For C), green shaded areas show 95% confidence intervals around the median estimated R_t . The threshold value $R_t = 1$ is indicated by the red dashed horizontal line. For both B) and C), dashed vertical lines indicate the implementation dates of school closures (blue), night curfews (red), restrictions of movement (green), and the 24-hour curfew (purple).



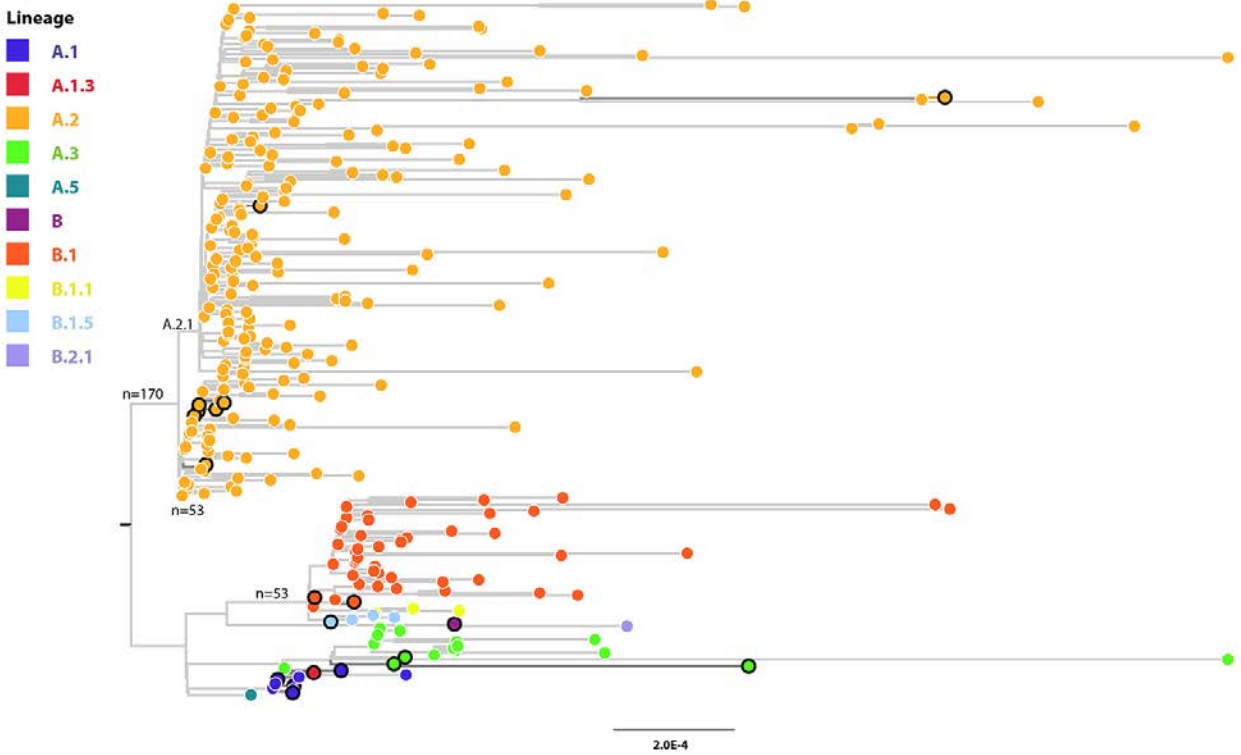
Appendix 2 Figure 4. SARS-CoV-2 timeline in Latin America. Timeline of the first reported SARS-CoV-2 infection and time frame to adopt control strategies for each Latin American country based on official report of Panama MoH and media reports.



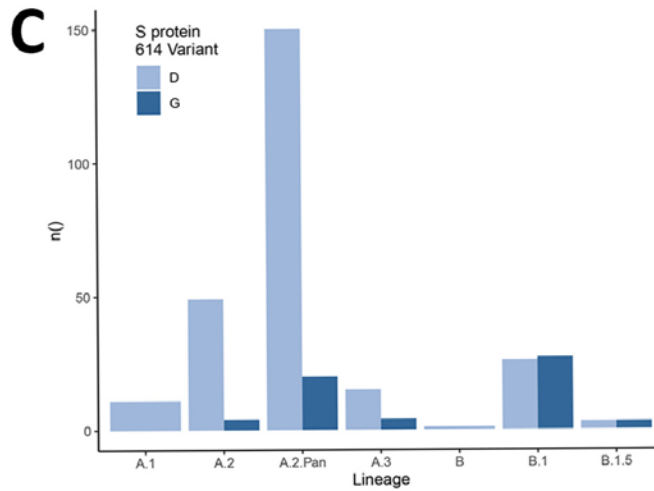
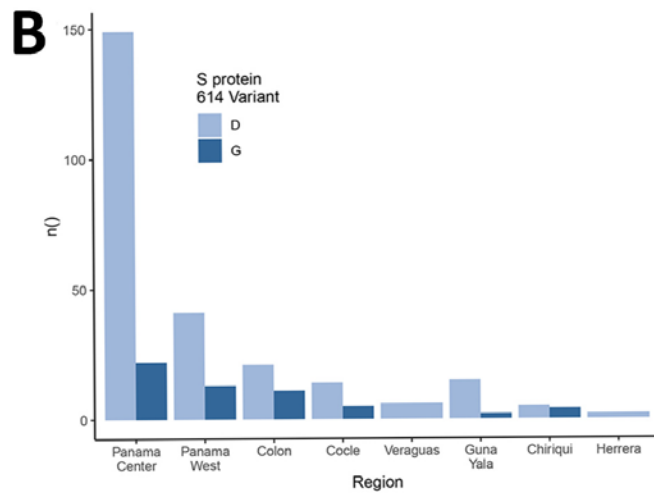
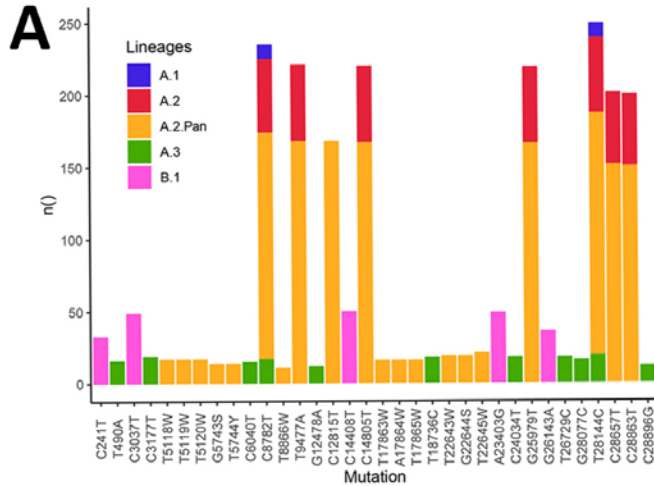
Appendix 2 Figure 5. Cumulative incidence and deaths over time in Panama compared with A) Central America (incidence), B) Central America (deaths), C) South America (incidence), D) South America (deaths), E) Caribbean countries (incidence), and F) Caribbean countries (deaths).



Appendix 2 Figure 6. Daily distribution and characteristics of SARS-CoV-2 genomes obtained in the study. A) COVID-19-confirmed cases and SARS-CoV-2 genomes distribution during the analyzed period in Panama, by date of symptom onset reported by the patient. B) Plot of proportion of genome coverage versus C_t value obtained in real-time PCR, dots are colored according to lineages.



Appendix 2 Figure 7. Maximum likelihood tree of the SARS-CoV-2 genomes obtained ($n = 313$) circulating in Panama. Tip shapes were colored according to the inferred lineage of the samples. Circles outlined in black indicate samples with travel-related epidemiologic link.



Appendix 2 Figure 8. Mutation profile of the sequences obtained in the study: A) frequency of single nucleotide polymorphism in the genome (position according to MN908947) for all analyzed sequences (n = 313) in the study. Distribution of S protein variants, D614 or G614, B) in different regions of the country or C) among lineages.