**Supplemental Material**

**Methodology and Data Sources**

**Individual level testing data**

Addresses in the testing data were at various administrative levels, including community/ward level, but not at the household-level. Not all addresses specified the upazila, which was necessary for analysis.

Addresses without the upazila specified were first categorized by upazila using the 2011 Census and Google Maps. If a patient’s address was unable to be categorized using those two resources, facility location was used as a secondary form of categorization. Facility location was not used as a primary measure of categorization because in some instances, patient address and facility location did not share the same upazila, suggesting patients traveled across upazila borders for care. As such, facility location was only used as the secondary measure of categorization for tests that could not otherwise be categorized. Any remaining addresses that still could not be categorized at the upazila level were excluded from upazila-level analyses but included in district-level analyses. Addresses that were outside Cox’s Bazar were excluded from analysis. Throughout the cleaning process, common variations in spelling (e.g. Chakaria vs. Chakoria vs. Chokoria; Toytong vs Toitong) were identified and allowed.

**Case management data**

Because the data were daily at a facility-level, we could only calculate proportion of cases each day or the average weekly proportion.

**Population data**

The 2011 growth rate from the most recent 2011 census was also applied to the age-distributed populations and sex ratios. National population data was obtained from the Johns Hopkins COVID-19 dashboard (25).

**Supplementary Figures**

**Supplementary Figure 1. Epidemic curve, Chakaria**

Incidence, testing, and positivity rates were calculated for Chakaria upazila from March 2020 to March 2021. Incidence and testing rates are a rolling two-week average while positivity rate is a percentage.

A picture containing text, plot, diagram, line

Description automatically generated

**Supplementary Figure 2. Epidemic curve, Cox’s Bazar Sadar**

Incidence, testing, and positivity rates were calculated for Cox’s Bazar Sadar upazila from March 2020 to March 2021. Incidence and testing rates are a rolling two-week average while positivity rate is a percentage.



**Supplementary Figure 3. Epidemic curve, Kutubdia**

Incidence, testing, and positivity rates were calculated for Kutubdia upazila from March 2020 to March 2021. Incidence and testing rates are a rolling two-week average while positivity rate is a percentage.

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Description automatically generated

**Supplementary Figure 4. Epidemic curve, Moheshkhali**

Incidence, testing, and positivity rates were calculated for Moheshkhali upazila from March 2020 to March 2021. Incidence and testing rates are a rolling two-week average while positivity rate is a percentage.

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**Supplementary Figure 5. Epidemic curve, Pekua**

Incidence, testing, and positivity rates were calculated for Pekua upazila from March 2020 to March 2021. Incidence and testing rates are a rolling two-week average while positivity rate is a percentage.

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**Supplementary Figure 6. Epidemic curve, Ramu**

Incidence, testing, and positivity rates were calculated for Ramu upazila from March 2020 to March 2021. Incidence and testing rates are a rolling two-week average while positivity rate is a percentage.

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**Supplementary Figure 7. Epidemic curve, Teknaf**

Incidence, testing, and positivity rates were calculated for Teknaf upazila from March 2020 to March 2021. Incidence and testing rates are a rolling two-week average while positivity rate is a percentage.

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**Supplementary Figure 8. Epidemic curve, Ukhia**

Incidence, testing, and positivity rates were calculated for Ukhia upazila from March 2020 to March 2021. Incidence and testing rates are a rolling two-week average while positivity rate is a percentage.

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**Supplementary Figure 9.** Incidence rates per 100,000 people

**Supplementary Figure 10.** Testing rates per 100,000 people

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**Supplementary Figure 12.** Case-fatality rates (%)

**Supplementary Figure 11.** Positivity rates (%)

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**Supplementary Figure 13.** COVID-19 cases by age

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**Supplementary Figure 14.** COVID-19 deaths by age

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**Supplementary Tables**

**Supplementary Table 1.** Incidence, testing, and positivity rates by month and upazila

Incidence rates and testing rates are both per 100,000 people, and positivity rate is in percent. Incidence rates were calculated from the WHO Case Line List, while testing rates and positivity rates were calculated from the WHO Testing Line List. In March and April 2020, patient addresses in the testing line list were incomplete so tests could not be sorted by upazila. The March 2020 confirmed case in the WHO Case Line List was not included in the WHO Testing Line List, presenting another discrepancy in the early months.

IR = Incidence Rate

TR= Testing rate

PR= Positivity Rate

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Admin. Unit** | **Rate** | **Mar. 2020** | **April 2020** | **May 2020** | **June 2020** | **July 2020** | **Aug. 2020** | **Sept. 2020** | **Oct. 2020** | **Nov. 2020** | **Dec. 2020** | **Jan. 2021** | **Feb. 2021** | **Mar. 2021** |
| **Cox's Bazar District** | **IR** | 0.03 | 1.17 | 21.09 | 63.35 | 24.76 | 21.16 | 17.09 | 12.22 | 10.78 | 6.47 | 3.94 | 2.84 | 17.76 |
| **TR** | 0.07 | 48.29 | 181.39 | 281.85 | 160.13 | 157.8 | 228.22 | 134.53 | 209.03 | 200.05 | 209.76 | 200.02 | 267.3 |
| **PR** | 0 | 3.25 | 19.54 | 19.08 | 15.65 | 13.96 | 8.19 | 9.77 | 5.29 | 3.37 | 1.86 | 1.47 | 6.66 |
| **Chakaria** | **IR** | 0 | 1.07 | 32.23 | 36.5 | 8.97 | 7.9 | 9.18 | 7.04 | 4.91 | 2.56 | 1.07 | 0.43 | 8.54 |
| **TR** | 0 | 0 | 197.67 | 160.1 | 81.33 | 72.15 | 102.25 | 86.88 | 131.07 | 134.27 | 231.62 | 208.13 | 244 |
| **PR** | 0 | 0 | 27.65 | 14.67 | 11.02 | 12.43 | 8.77 | 8.12 | 4.07 | 1.75 | 0.46 | 0.21 | 3.5 |
| **CXB Sadar** | **IR** | 0.16 | 0.81 | 44.94 | 153.86 | 64.64 | 57.63 | 46.73 | 32.07 | 30.61 | 17.58 | 9.12 | 8.47 | 51.12 |
| **TR** | 0 | 0 | 309.99 | 647.82 | 371.37 | 319.43 | 423.63 | 242.1 | 324.48 | 276.45 | 290.62 | 299.07 | 380.81 |
| **PR** | 0 | 0 | 24.95 | 19.93 | 17.32 | 19.01 | 11.95 | 15 | 9.68 | 6.3 | 3.31 | 3.62 | 13.51 |
| **Kutubdia** | **IR** | 0 | 0 | 1.34 | 43.49 | 16.73 | 2.68 | 2.68 | 2.01 | 0.67 | 0.67 | 0 | 0 | 0.67 |
| **TR** | 0 | 0 | 143.86 | 288.39 | 80.29 | 16.06 | 18.07 | 7.36 | 7.36 | 18.74 | 28.77 | 18.74 | 29.44 |
| **PR** | 0 | 0 | 1.4 | 16.47 | 22.5 | 25 | 3.7 | 27.27 | 9.09 | 10.71 | 0 | 0 | 2.27 |
| **Mohesh-khali** | **IR** | 0 | 2.45 | 5.39 | 20.32 | 11.26 | 19.1 | 8.08 | 8.82 | 4.9 | 3.92 | 2.94 | 1.96 | 7.35 |
| **TR** | 0 | 0 | 58.28 | 72.24 | 116.56 | 269.36 | 185.61 | 162.35 | 262.5 | 286.01 | 282.33 | 295.07 | 349.18 |
| **PR** | 0 | 0 | 11.34 | 26.78 | 10.92 | 7.36 | 5.01 | 4.98 | 1.49 | 1.71 | 1.04 | 0.83 | 1.96 |
| **Pekua** | **IR** | 0 | 0.57 | 10.62 | 18.37 | 11.2 | 6.32 | 2.87 | 3.73 | 4.88 | 2.3 | 0.57 | 0.57 | 1.44 |
| **TR** | 0 | 0 | 200.68 | 115.7 | 64.88 | 28.42 | 38.47 | 36.75 | 151.3 | 63.45 | 59.43 | 49.95 | 45.07 |
| **PR** | 0 | 0 | 8.44 | 10.67 | 17.7 | 24.24 | 13.43 | 10.16 | 3.04 | 1.36 | 0.97 | 1.15 | 3.18 |
| **Ramu** | **IR** | 0 | 0.85 | 6.54 | 51.17 | 19.62 | 11.37 | 8.81 | 5.4 | 3.13 | 8.53 | 4.26 | 3.41 | 7.11 |
| **TR** | 0 | 0 | 101.78 | 197.3 | 95.81 | 57.14 | 110.59 | 53.73 | 58.57 | 89.27 | 76.76 | 86.14 | 106.33 |
| **PR** | 0 | 0 | 22.91 | 17.58 | 21.07 | 13.93 | 8.74 | 11.11 | 5.34 | 7.96 | 5.56 | 3.96 | 6.68 |
| **Teknaf** | **IR** | 0 | 1.75 | 11.82 | 84.95 | 27.15 | 16.64 | 17.95 | 14.45 | 13.57 | 3.94 | 6.57 | 1.75 | 23.65 |
| **TR** | 0 | 0.44 | 216.32 | 389.29 | 171.66 | 196.62 | 491.76 | 283.32 | 560.51 | 576.27 | 571.45 | 598.6 | 675.23 |
| **PR** | 0 | 0 | 7.89 | 20.7 | 16.33 | 9.13 | 4.19 | 5.41 | 2.73 | 1.75 | 1.07 | 0.44 | 3.57 |
| **Ukhia** | **IR** | 0 | 2.15 | 33.63 | 70.11 | 22.18 | 21.82 | 22.54 | 11.45 | 11.45 | 3.58 | 4.65 | 1.79 | 22.54 |
| **TR** | 0 | 0 | 140.22 | 294.4 | 177.07 | 186.73 | 461.09 | 177.43 | 198.17 | 221.78 | 156.32 | 191.02 | 351.99 |
| **PR** | 0 | 0 | 19.39 | 22.48 | 11.72 | 12.07 | 5.35 | 6.65 | 6.14 | 1.61 | 2.29 | 0.94 | 6.4 |

**Supplementary Table 2.** Age-specific incidence rates per 100,000

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **CXB District** | **Chakaria** | **CXB Sadar** | **Kutubdia** | **Moheshkhali** | **Pekua** | **Ramu** | **Teknaf** | **Ukhia** |
| **Under 10** | 21.91 | 11.31 | 55.93 | 17.84 | 3.34 | 10.15 | 7.74 | 44.46 | 25.97 |
| **10-19** | 53.46 | 25.27 | 127.97 | 25.2 | 28.81 | 29.07 | 39.78 | 74.22 | 46.2 |
| **20-29** | 328.62 | 160.4 | 697.75 | 137.25 | 172.21 | 108.54 | 190.07 | 450.0 | 536.56 |
| **30-49** | 440.02 | 281.29 | 1068.73 | 129.72 | 232.96 | 140.46 | 293.42 | 450.47 | 478.87 |
| **50-59** | 452.74 | 306.86 | 1363.97 | 118.08 | 159.69 | 118.58 | 319.83 | 415.98 | 222.58 |
| **60+** | 304.95 | 251.14 | 947.24 | 71.68 | 89.04 | 67.86 | 155.55 | 295.32 | 233.59 |

Age-specific incidence rates per 100,000 people were calculated using case counts from the WHO Case Line List and age-specific population data projected from the 2011 Census.

**Supplementary Table 3.** Data availability, WHO Case Line List

|  |  |  |
| --- | --- | --- |
| **Data Availability (N by variable)** | | |
|  | **N=6075** | **%** |
| Detection method | 3622 | 59.62 |
| Date of case detection | 6075 | 100 |
| Location of testing | 5567 | 91.64 |
| Case or contact | 3406 | 56.07 |
| Age | 6013 | 98.98 |
| Sex | 6073 | 99.97 |
| Nationality | 3569 | 58.75 |
| Camp of residence | 1250 | 20.58 |
| Upazila | 6075 | 100 |
| District | 0 | 0 |
| Travel history | 1881 | 30.96 |
| Last status of patient | 3652 | 60.12 |
| Isolation location | 484 | 3.34 |
| Severity of disease | 484 | 7.97 |
| No. contacts identified | 0 | 0 |
| No. contacts traced | 0 | 0 |
| No. contacts in home quarantine | 0 | 0 |
| Location of facility of quarantine | 0 | 0 |
| Date of specimen collection | 5399 | 88.87 |
| Date of lab result received | 290 | 4.77 |
| 30-day outcome | 3652 | 60.12 |
| Date of death | 76 | 1.25 |
| Discharge date | 32 | 0.53 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Data Availability (N by variable)** | | | | | | | | | |
|  | | **Referred by (Facility)** | **Age** | **Sex** | **Date specimen collected** | **PCR Date** | **Category** | **Address** | **Interpretation** |
| **March 2020** | **N=2** | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 0 |
| **%** | 0 | 100 | 0 | 100 | 0 | 100 | 0 | 0 |
| **April 2020** | **N=1447** | 1 | 1430 | 3 | 1447 | 0 | 1447 | 0 | 1447 |
| **%** | 0.1 | 98.8 | 0.2 | 100 | 0 | 100 | 0 | 100 |
| **May 2020** | **N=6673** | 3293 | 6567 | 3277 | 6673 | 0 | 6673 | 1041 | 6673 |
| **%** | 49.3 | 98.4 | 49.1 | 100 | 0 | 100 | 15.6 | 100 |
| **June 2020** | **N=10619** | 10615 | 10421 | 10572 | 10619 | 0 | 10619 | 10269 | 10619 |
| **%** | 100.0 | 98.1 | 99.6 | 100 | 0 | 100 | 96.7 | 100 |
| **July 2020** | **N=7683** | 7683 | 7509 | 7639 | 7683 | 341 | 7683 | 7682 | 7683 |
| **%** | 100 | 97.7 | 99.4 | 100 | 4.44 | 100 | 99.99 | 100 |
| **August 2020** | **N=8824** | 8824 | 8707 | 8751 | 8824 | 8824 | 8824 | 8824 | 8824 |
| **%** | 100 | 98.7 | 99.2 | 100 | 100 | 100 | 100 | 100 |
| **September 2020** | **N=14349** | 14349 | 14177 | 14241 | 14349 | 14349 | 14349 | 14349 | 14349 |
| **%** | 100 | 98.8 | 99.2 | 100 | 100 | 100 | 100 | 100 |
| **October 2020** | **N=8884** | 8884 | 8712 | 8776 | 8884 | 8884 | 8884 | 8884 | 8884 |
| **%** | 100 | 98.1 | 98.8 | 100 | 100 | 100 | 100 | 100 |
| **November 2020** | **N=13085** | 13085 | 12960 | 12968 | 13085 | 13085 | 13085 | 13084 | 13085 |
| **%** | 100 | 99.0 | 99.1 | 100 | 100 | 100 | 99.99 | 100 |
| **December 2020** | **N=11909** | 11909 | 11830 | 11885 | 11909 | 11909 | 11909 | 11909 | 11909 |
| **%** | 100 | 99.3 | 99.8 | 100 | 100 | 100 | 100 | 100 |
| **January 2021** | **N=6478** | 6478 | 6439 | 6478 | 6478 | 6478 | 6478 | 6477 | 6478 |
| **%** | 100 | 99.4 | 100 | 100 | 100 | 100 | 99.98 | 100 |
| **February 2021** | **N=6240** | 6240 | 6193 | 6240 | 6240 | 6240 | 6240 | 6234 | 6240 |
| **%** | 100 | 99.2 | 100 | 100 | 100 | 100 | 99.9 | 100 |
| **March 2021** | **N=8411** | 8411 | 8350 | 8411 | 8411 | 8411 | 8411 | 8410 | 8411 |
| **%** | 100 | 99.3 | 100 | 100 | 100 | 100 | 99.99 | 100 |

**Supplementary Table 4.** Data availability, WHO Testing Line List

**Supplementary Table 5:** Data availability, DHIS2 Clinical Management Data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Facility** | **Patients in Facility** | **% in ICU** | **% on Oxygen** | **% on Ventilator** | **% with Comorbidities** | **Bed Occupancy** |
| Asian Hospital (Pvt.) Limited, Coxs Bazar | 0 | 0 | 0 | 0 | 0 | 0 |
| Chakaria Upazila Health Complex, Cox's Bazar | 74.1 | 74.1 | 74.1 | 73.8 | 74.1 | 59.6 |
| Cox's Bazar 250 Bed District Sadar Hospital | 68.7 | 71.1 | 1.1 | 66.0 | 5.1 | 72.2 |
| Cox’s Bazar Medical College Hospital, Coxs Bazar | 0 | 0 | 0 | 0 | 0 | 0 |
| Kutubdia Upazila Health Complex | 60.2 | 59.4 | 59.1 | 59.6 | 60.2 | 44.4 |
| Moheshkhali Upazila Health Complex | 89.8 | 89.8 | 89.8 | 89.8 | 89.8 | 75.9 |
| Pekua Upazila Health Complex | 89.8 | 72.5 | 89.6 | 90.1 | 90.1 | 73.8 |
| Ramu Upazila Health Complex | 72.5 | 72.5 | 72.5 | 72.2 | 72.5 | 57.8 |
| Teknaf Upazila Health Complex | 37.4 | 37.4 | 37.4 | 37.4 | 37.2 | 37.2 |
| Ukhia Upazila Health Complex | 65.2 | 65.2 | 65.2 | 65.0 | 65.2 | 65.2 |