Multimedia Appendix 1: Number of tweets by month comprising at least one of the terms "flu," "vaccination," "vaccine," "vaxx," and "covid.".

| Month/Year | Number tweets $\begin{aligned} & (\mathrm{N}=2,782,720) \\ & \mathrm{N}(\%) \end{aligned}$ | $\begin{aligned} & \text { of } \begin{array}{l} \text { flu } \\ (\mathrm{N}=647,839) \\ N(\%) \end{array} \\ & \hline(\%) \end{aligned}$ | $\begin{aligned} & \left\lvert\, \begin{array}{l} \text { vaccination } \\ (\mathrm{N}=220,122) \\ \mathrm{N}(\%) \end{array}\right. \\ & \hline \end{aligned}$ | $\begin{aligned} & \hline \text { vaccine } \\ & (\mathrm{N}=1,826,094) \\ & \mathrm{N}(\%) \end{aligned}$ | $\begin{aligned} & \hline \text { vaxx } \\ & (N=34,522) \\ & N(\%) \end{aligned}$ | $\begin{aligned} & \hline \text { covid } \\ & (\mathrm{N}=775,829) \\ & \mathrm{N}(\%) \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 12/2019 | $\begin{aligned} & 1,197 \\ & (0.04 \%) \end{aligned}$ | $\begin{aligned} & 631 \\ & (52.72 \%) \end{aligned}$ | $\begin{aligned} & 102 \\ & (8.52 \%) \end{aligned}$ | $\begin{aligned} & 400 \\ & (33.42 \%) \end{aligned}$ | $\begin{aligned} & 27 \\ & (2.26 \%) \end{aligned}$ | $\begin{aligned} & 0 \\ & (0.00 \%) \end{aligned}$ |
| 01/2020 | $\begin{aligned} & 43,074 \\ & (1.55 \%) \end{aligned}$ | $\begin{aligned} & 21,641 \\ & (50.24 \%) \end{aligned}$ | $\begin{aligned} & \hline 2,702 \\ & (6.27 \%) \end{aligned}$ | $\begin{aligned} & 15,872 \\ & (36.85 \%) \end{aligned}$ | $\begin{aligned} & 1,403 \\ & (3.26 \%) \end{aligned}$ | $\begin{aligned} & \hline 3,132 \\ & (7.27 \%) \end{aligned}$ |
| 02/2020 | $\begin{aligned} & 65,993 \\ & (2.37 \%) \end{aligned}$ | $\begin{array}{\|l\|} \hline 36,387 \\ (55.14 \%) \end{array}$ | $\begin{aligned} & \hline 2,727 \\ & (4.13 \%) \end{aligned}$ | $\begin{aligned} & 21,729 \\ & (32.93 \%) \end{aligned}$ | $\begin{aligned} & 1,744 \\ & (2.64 \%) \end{aligned}$ | $\begin{aligned} & 15,130 \\ & (22.93 \%) \end{aligned}$ |
| 03/2020 | $\begin{aligned} & 238,675 \\ & (8.58 \%) \end{aligned}$ | $\begin{array}{\|l\|} \hline 148,965 \\ (62.41 \%) \end{array}$ | $\begin{aligned} & \hline 4,497 \\ & (1.88 \%) \end{aligned}$ | $\begin{aligned} & 64,952 \\ & (27.21 \%) \end{aligned}$ | $\begin{aligned} & \hline 1,665 \\ & (0.70 \%) \end{aligned}$ | $\begin{aligned} & 61,223 \\ & (25.65 \%) \end{aligned}$ |
| 04/2020 | $\begin{aligned} & 197,011 \\ & (7.08 \%) \end{aligned}$ | $\begin{aligned} & 78,394 \\ & (39.79 \%) \end{aligned}$ | $\begin{aligned} & 8,302 \\ & (4.21 \%) \end{aligned}$ | $\begin{aligned} & 102,358 \\ & (51.96 \%) \end{aligned}$ | $\begin{aligned} & \hline 1,938 \\ & (0.98 \%) \end{aligned}$ | $\begin{aligned} & 45,300 \\ & (22.99 \%) \end{aligned}$ |
| 05/2020 | $\begin{aligned} & 150,584 \\ & (5.41 \%) \end{aligned}$ | $\begin{aligned} & 50,496 \\ & (33.53 \%) \end{aligned}$ | $\begin{aligned} & \hline 5,875 \\ & (3.90 \%) \end{aligned}$ | $\begin{aligned} & 89,465 \\ & (59.41 \%) \end{aligned}$ | $\begin{aligned} & \hline 1,853 \\ & (1.23 \%) \end{aligned}$ | $\begin{aligned} & 37,727 \\ & (25.05 \%) \end{aligned}$ |
| 06/2020 | $\begin{aligned} & 76,073 \\ & (2.73 \%) \end{aligned}$ | $\begin{aligned} & 28,289 \\ & (37.19 \%) \end{aligned}$ | $\begin{array}{\|l} 3,173 \\ (4.17 \%) \end{array}$ | $\begin{aligned} & 40,463 \\ & (53.19 \%) \end{aligned}$ | $\begin{array}{\|l} 887 \\ (1.17 \%) \end{array}$ | $\begin{aligned} & \hline 18,932 \\ & (24.89 \%) \end{aligned}$ |
| 07/2020 | $\begin{aligned} & 128,239 \\ & (4.61 \%) \end{aligned}$ | $\begin{aligned} & 43,161 \\ & (33.66 \%) \end{aligned}$ | $\begin{aligned} & 4,891 \\ & (3.81 \%) \end{aligned}$ | $\begin{aligned} & 75,732 \\ & (59.06 \%) \end{aligned}$ | $\begin{aligned} & \hline 1,537 \\ & (1.20 \%) \end{aligned}$ | $\begin{aligned} & \hline 35,395 \\ & (27.60 \%) \end{aligned}$ |
| 08/2020 | $\begin{aligned} & 110,794 \\ & (3.98 \%) \end{aligned}$ | $\begin{aligned} & 34,001 \\ & (30.69 \%) \end{aligned}$ | $\begin{aligned} & 4,934 \\ & (4.45 \%) \end{aligned}$ | $\begin{aligned} & 69,554 \\ & (62.78 \%) \end{aligned}$ | $\begin{aligned} & 1,507 \\ & (1.36 \%) \end{aligned}$ | $\begin{aligned} & \hline 30,633 \\ & (27.65 \%) \end{aligned}$ |
| 09/2020 | $\begin{aligned} & 125,957 \\ & (4.53 \%) \end{aligned}$ | $\begin{aligned} & 38,466 \\ & (30.54 \%) \end{aligned}$ | $\begin{aligned} & 4,106 \\ & (3.26 \%) \end{aligned}$ | $\begin{aligned} & 81,735 \\ & (64.89 \%) \end{aligned}$ | $\begin{aligned} & \hline 1,906 \\ & (1.51 \%) \end{aligned}$ | $\begin{aligned} & \hline 35,993 \\ & (28.58 \%) \end{aligned}$ |
| 10/2020 | $\begin{aligned} & 107,615 \\ & (3.87 \%) \end{aligned}$ | $\begin{array}{\|l} \hline 47,340 \\ (43.99 \%) \end{array}$ | $\begin{aligned} & 3,430 \\ & (3.19 \%) \end{aligned}$ | $\begin{aligned} & 53,833 \\ & (50.02 \%) \end{aligned}$ | $\begin{aligned} & 883 \\ & (0.82 \%) \end{aligned}$ | $\begin{aligned} & 32,817 \\ & (30.49 \%) \end{aligned}$ |
| 11/2020 | $\begin{aligned} & 162,202 \\ & (5.83 \%) \end{aligned}$ | $\begin{array}{\|l} \hline 29,688 \\ (18.30 \%) \end{array}$ | $\begin{array}{\|l\|} \hline 6,292 \\ (3.88 \%) \end{array}$ | $\begin{aligned} & 122,168 \\ & (75.32 \%) \end{aligned}$ | $\begin{aligned} & 1,563 \\ & (0.96 \%) \end{aligned}$ | $\begin{aligned} & 47,654 \\ & (29.38 \%) \end{aligned}$ |
| 2020/12 | $\begin{aligned} & 346,928 \\ & (12.47 \%) \end{aligned}$ | $\begin{aligned} & 34,709 \\ & (10.00 \%) \end{aligned}$ | $\begin{array}{\|l} 24,141 \\ (6.96 \%) \end{array}$ | $\begin{aligned} & 281,748 \\ & (81.21 \%) \end{aligned}$ | $\begin{aligned} & \hline 4,247 \\ & (1.22 \%) \end{aligned}$ | $\begin{aligned} & 108,525 \\ & (31.28 \%) \end{aligned}$ |
| 2021/01 | $\begin{aligned} & 227,599 \\ & (8.18 \%) \end{aligned}$ | $\begin{aligned} & 15,134 \\ & (6.65 \%) \end{aligned}$ | $\begin{array}{\|l\|} \hline 31,640 \\ (13.90 \%) \end{array}$ | $\begin{aligned} & \hline 175,760 \\ & (77.22 \%) \end{aligned}$ | $\begin{aligned} & \hline 2,010 \\ & (0.88 \%) \end{aligned}$ | $\begin{aligned} & \hline 75,997 \\ & (33.39 \%) \end{aligned}$ |
| 02/2021 | $\begin{aligned} & 198,355 \\ & (7.13 \%) \end{aligned}$ | $\begin{aligned} & \hline 11,830 \\ & (5.96 \%) \end{aligned}$ | $\begin{aligned} & 29,680 \\ & (14.96 \%) \end{aligned}$ | $\begin{aligned} & \hline 151,984 \\ & (76.62 \%) \end{aligned}$ | $\begin{aligned} & 1,962 \\ & (0.99 \%) \end{aligned}$ | $\begin{aligned} & 67,374 \\ & (33.97 \%) \end{aligned}$ |
| 03/2021 | $\begin{aligned} & 291,140 \\ & (10.46 \%) \end{aligned}$ | $\begin{aligned} & 14,183 \\ & (4.87 \%) \end{aligned}$ | $\begin{aligned} & 42,204 \\ & (14.50 \%) \end{aligned}$ | $\begin{aligned} & 228,382 \\ & (78.44 \%) \end{aligned}$ | $\begin{array}{\|l} \hline 3,683 \\ (1.27 \%) \end{array}$ | $\begin{aligned} & 82,158 \\ & (28.22 \%) \end{aligned}$ |
| 04/2021 | $\begin{aligned} & 311,284 \\ & (11.19 \%) \end{aligned}$ | $\begin{aligned} & 14,524 \\ & (4.67 \%) \end{aligned}$ | $\begin{aligned} & \hline 41,426 \\ & (13.31 \%) \end{aligned}$ | $\begin{aligned} & 249,959 \\ & (80.30 \%) \end{aligned}$ | $\begin{aligned} & 5,707 \\ & (1.83 \%) \end{aligned}$ | $\begin{aligned} & \hline 77,839 \\ & (25.01 \%) \end{aligned}$ |

