



**COVID-19 Morbidity and Mortality Data:
Corrected and Adjusted Daily Time-Series for
Wuhan, Hubei and Mainland China**

by

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COVID-19 Morbidity and Mortality Data: Corrected and Adjusted Daily Time-Series for Wuhan, Hubei and Mainland China[§]

Lawrence J. Lau and Yanyan Xiong¹

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Abstract: In this Working Paper we discuss the procedure we used to adjust the cumulative and daily data on newly confirmed COVID-19 cases and new deaths resulting therefrom in Wuhan, Hubei ex Wuhan, and Mainland ex Hubei (excluding imported cases) to correct any perceived errors and inconsistencies, for example, a cumulative total number that decreases over time, and to smooth out the surges in the data that seem to be artificial, either because of possible delays in reporting or because of a change in the definition of a “confirmed” COVID-19 case in Hubei. Insofar as possible, we rely on the official cumulative total numbers of newly confirmed cases and new deaths as the controlled totals, because these numbers are updated daily whereas the past numbers of daily newly confirmed cases are seldom updated. However, sometimes the officially reported cumulative total numbers are inconsistent within themselves. When these situations arise, we examine the official data on the daily newly confirmed cases and new deaths to see whether the cumulative numbers can be minimally adjusted to become consistent.

The change in the definition of a “confirmed” case in Hubei on 2.12 not only affected the daily number of newly confirmed cases but also the daily number of new deaths as some deaths that occurred in the past were reclassified as deaths from COVID-19 cases. Similarly, the 325 newly confirmed cases and 1,290 new deaths reported in Wuhan on 4.16 must have been the results of delayed identification and could not have all occurred on that one day. The adjustment of data on the daily newly confirmed cases and new deaths essentially smooths the data and provides a more accurate picture of the progress of the COVID-19 epidemic. It is also more useful in terms of assessing and comparing the infection and mortality rates in and among Wuhan, Hubei ex Wuhan and Mainland ex Hubei.

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Introduction

In this Working Paper we discuss the procedure we used to adjust the cumulative and daily data on newly confirmed COVID-19 cases and new deaths resulting therefrom in Wuhan, Hubei ex Wuhan, and Mainland ex Hubei (excluding imported cases) to correct any perceived errors and inconsistencies, for example, a cumulative total number that decreases over time, and to smooth out the surges in the data that seem to be artificial, either because of possible delays in reporting or because of a change in the definition of a “confirmed” COVID-19 case in Hubei. Insofar as possible, we rely on the official cumulative total numbers of newly confirmed cases and new deaths as the controlled totals, because these numbers are updated daily whereas the past numbers of daily newly confirmed cases are seldom updated. However, sometimes the officially reported cumulative total numbers are inconsistent within themselves. When these situations arise, we examine the official data on the daily newly confirmed cases and new deaths to see whether the cumulative numbers can be minimally adjusted to become consistent.

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In Appendix 1 we discuss the procedures we used to revise the cumulative and daily data on newly confirmed cases and new deaths in Wuhan, Hubei ex Wuhan, and Mainland ex Hubei (excluding imported cases). The objective of the revision is to correct any perceived errors and inconsistencies, for example, a cumulative total number that decreases over time, and to smooth out the surges in the data that seem to be artificial, either because of possible delays in reporting or because of a change in the definition of a “confirmed” COVID-19 case in Hubei. Insofar as possible, we rely on the official cumulative numbers of newly confirmed cases and new deaths as the controlled totals, because these numbers are updated daily whereas

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The Derivation and Adjustment of the Daily Newly Confirmed Cases

Wuhan

The first confirmed COVID-19 case was reported in Wuhan on 1 December 2019.² In Table A1-1, column 2, the original official daily data on the cumulative number of newly confirmed cases in Wuhan from 1.10 to 5.31 are presented. The first check is whether these numbers are monotonically increasing over time. They are. In column 3, we derive the implied daily newly confirmed cases from the cumulative data. In column 4, the original official data on the daily newly confirmed cases are presented. In column 5, the derived numbers of newly confirmed cases in column 3 are compared with the official data in column 4. It turns out that the two sources of data differ only on three occasions: 2.09, 2.13 and 2.23 (numbers displayed in red). We shall adopt and use the implied numbers of daily newly confirmed cases in column 3, because otherwise the cumulative totals of the daily newly confirmed cases will fail to match the official data on the cumulative totals.

² The first case was identified as laboratory-confirmed COVID-19 infection in Wuhan on 1 December 2019. See Huang et al. (2020).

We also observe that there were three surges in the numbers of newly confirmed cases in Wuhan. The first surge in the data can be observed on 1.27 (displayed in red), when the number of daily newly confirmed cases jumped from 80 on 1.26 to 892 on 1.27 and then fell back to 315 on 1.28. It is thought that the number of newly confirmed cases could not possibly have increased that much in one day at the then early stage of the COVID-19 epidemic and that it must have been the result of delayed reporting over the previous days. Thus, we attempt to reallocate the estimated “excess” reported cases on 1.27 to the days between 1.16 and 1.27, holding constant the cumulative total number of confirmed cases through 1.27 at 1,590, the official number of cumulative confirmed cases as of that date.

The first step in the reallocation is to estimate the number of newly confirmed cases on 1.27 in the absence of the surge. By running a regression of the natural logarithm of the number of newly confirmed cases on a time trend, using data from 1.16 to 1.31, and predicting from the resulting estimated equation the “missing” value on 1.27, we obtain 251, after an adjustment of the constant term³. The resultant 641 (892-251) “excess” cases are then reallocated to the days between 1.16 and 1.27 proportionally. The adjusted numbers of daily newly confirmed cases are approximately 70.6% (641/908⁴) higher than before. They are presented in column 6, with the adjusted numbers in red.

The second surge in the data can be observed on 2.12, when the definition of a “confirmed” case in Hubei was changed to conform to the practice in the rest of the Mainland, that is, in the absence of results from a nucleic acid test, a combination of clinical symptoms is also sufficient to confirm a COVID-19 case. This change in definition led to a huge increase of newly confirmed cases of 13,436 on 2.12 (displayed in red). For this second surge, fortunately, for a couple of days during the transition in the definition, the numbers of newly confirmed cases under both the old and the new definitions were available. It was 1,072⁵ on 2.12 according to the old definition. This provided the basis for us to reallocate the “excess”

³ The constant term is adjusted so that the predicted value is exactly equal to the actual value on 1.28.

⁴ 908 is the sum of the daily newly confirmed cases in column 3 from 1.16 to 1.26 plus the predicted 251 for 1.27.

⁵ The Health Commission of Hubei Province released the cumulative confirmed cases of 32,994 according to the new definition on 2.12, and identified the number of confirmed cases due to the new definition to be 12,364 on 2.12. The number of cumulative confirmed cases on 2.12 in accordance with the old definition was therefore 20,630 (32,994-12,364). The number of cumulative confirmed cases released by the Health Commission of Hubei Province on 2.11 was 19,558. Therefore, the number of newly confirmed cases on 2.12 in accordance with the old definition was 1,072 (20,630-19,558).

newly confirmed cases of 12,364 (13,436-1,072) on 2.12 to the days between 1.16 and 2.12 on a proportional basis. The adjusted figures are presented in column 7, again in red. The adjusted numbers of daily newly confirmed cases are approximately 60.0% ($12,364/20,589^6$) higher than before.

The third surge in the data can be observed on 4.16 (displayed in red), when the Health Commission of Wuhan announced the upward revision of the cumulative numbers of newly confirmed cases and deaths by 325 and 1,290 respectively^{7 8}. These additional cases and deaths are reallocated to the days between 1.16 and 4.16 on a proportional basis. The adjusted numbers of daily newly confirmed cases are presented in column 8 in red. They are approximately 0.6% ($325/49,966^9$) higher than before. They are our final adjusted numbers of daily newly confirmed cases in Wuhan. In column 9, the cumulative totals of these final adjusted numbers are presented. The totals in column 9 between 4.16 and 5.31 agree exactly with the totals of the original official cumulative newly confirmed cases (column 2).

⁶ 20,589 is the sum of the daily newly confirmed cases in column 6 from 1.16 to 2.11 plus 1,072.

⁷ One may question why the additional number of newly confirmed cases was less than the additional number of deaths. It turned out that 965 (1,290-325) of the newly reported deaths were COVID-19 patients who were thought to have been cured and hence discharged from hospitals but subsequently died at home.

⁸ The upward revisions of cases and deaths are not unusual because of the high probabilities of under-counting. See Burn-Murdoch et al. (2020).

⁹ 49,966 is the sum of the daily newly confirmed cases in column 7 from 1.16 to 4.15 plus 0 case on 4.16 before the surge.

Table A1-1: Wuhan ex Imported: The Official and Adjusted Daily Newly Confirmed Cases

Date	Wuhan ex Imported: Cumulative Newly Confirmed Cases (original official data)	Wuhan ex Imported: Implied Daily Newly Confirmed Cases Derived from Daily Cumulative Cases	Wuhan ex Imported: Daily Newly Confirmed Cases (original official data)	Consistency Check	Wuhan ex Imported: Daily Newly Confirmed Cases (adjusted for first surge)	Wuhan ex Imported: Daily Newly Confirmed Cases (adjusted for first and second surges)	Wuhan ex Imported: Daily Newly Confirmed Cases (adjusted for all three surges)	Wuhan ex Imported: Cumulative Newly Confirmed Cases (final adjusted)
	Column 3- Column 4							
1.10	41	0	0	0	0	0	0	41
1.11	41	0	0	0	0	0	0	41
1.12	41	0	0	0	0	0	0	41
1.13	41	0	0	0	0	0	0	41
1.14	41	0	0	0	0	0	0	41
1.15	41	0	0	0	0	0	0	41
1.16	45	4	4	0	7	11	11	52
1.17	62	17	17	0	29	46	47	99
1.18	121	59	59	0	101	161	162	261
1.19	198	77	77	0	131	210	212	472
1.20	258	60	60	0	102	164	165	637
1.21	363	105	105	0	179	287	289	926
1.22	425	62	62	0	106	169	170	1096
1.23	495	70	70	0	119	191	192	1289
1.24	572	77	77	0	131	210	212	1500
1.25	618	46	46	0	78	126	126	1627
1.26	698	80	80	0	136	218	220	1847
1.27	1590	892	892	0	428	685	690	2536
1.28	1905	315	315	0	315	504	507	3044
1.29	2261	356	356	0	356	570	573	3617
1.30	2639	378	378	0	378	605	609	4226
1.31	3215	576	576	0	576	922	928	5154
2.01	4109	894	894	0	894	1431	1440	6594
2.02	5142	1033	1033	0	1033	1653	1664	8258
2.03	6384	1242	1242	0	1242	1988	2001	10259
2.04	8351	1967	1967	0	1967	3148	3169	13428
2.05	10117	1766	1766	0	1766	2827	2845	16273
2.06	11618	1501	1501	0	1501	2402	2418	18691
2.07	13603	1985	1985	0	1985	3177	3198	21888
2.08	14982	1379	1379	0	1379	2207	2221	24110
2.09	16902	1920	1921	-1	1920	3073	3093	27203
2.10	18454	1552	1552	0	1552	2484	2500	29703
2.11	19558	1104	1104	0	1104	1767	1778	31481
2.12	32994	13436	13436	0	13436	1716	1727	33208
2.13	35991	2997	3910	-913	2997	2997	3016	36225
2.14	37914	1923	1923	0	1923	1923	1936	38160
2.15	39462	1548	1548	0	1548	1548	1558	39718
2.16	41152	1690	1690	0	1690	1690	1701	41419
2.17	42752	1600	1600	0	1600	1600	1610	43030
2.18	44412	1660	1660	0	1660	1660	1671	44701
2.19	45027	615	615	0	615	615	619	45320
2.20	45346	319	319	0	319	319	321	45641
2.21	45660	314	314	0	314	314	316	45957
2.22	46201	541	541	0	541	541	545	46501
2.23	46607	406	348	58	406	406	409	46910
2.24	47071	464	464	0	464	464	467	47377
2.25	47441	370	370	0	370	370	372	47749
2.26	47824	383	383	0	383	383	385	48135
2.27	48137	313	313	0	313	313	315	48450
2.28	48557	420	420	0	420	420	423	48873
2.29	49122	565	565	0	565	565	569	49441

(to be continued)

Table A1-1: Wuhan ex Imported: The Official and Adjusted Daily Newly Confirmed Cases
(continued)

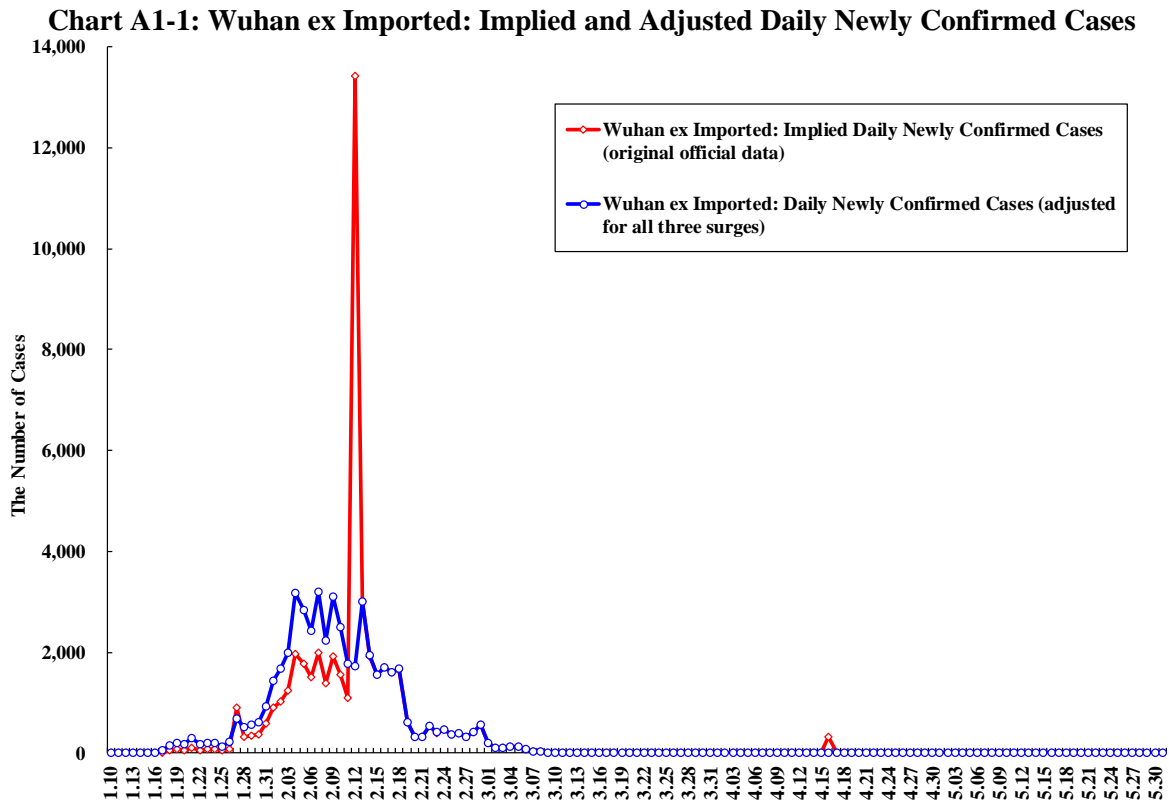
Date	Wuhan ex Imported: Cumulative Newly Confirmed Cases (original official data)	Wuhan ex Imported: Implied Daily Newly Confirmed Cases Derived from Daily Cumulative Cases	Wuhan ex Imported: Daily Newly Confirmed Cases (original official data)	Consistency Check	Wuhan ex Imported: Daily Newly Confirmed Cases (adjusted for first surge)	Wuhan ex Imported: Daily Newly Confirmed Cases (adjusted for first and second surges)	Wuhan ex Imported: Daily Newly Confirmed Cases (adjusted for all three surges)	Wuhan ex Imported: Cumulative Newly Confirmed Cases (final adjusted)
				Column 3- Column 4				
3.01	49315	193	193	0	193	193	194	49635
3.02	49426	111	111	0	111	111	112	49747
3.03	49540	114	114	0	114	114	115	49862
3.04	49671	131	131	0	131	131	132	49994
3.05	49797	126	126	0	126	126	127	50121
3.06	49871	74	74	0	74	74	74	50195
3.07	49912	41	41	0	41	41	41	50236
3.08	49948	36	36	0	36	36	36	50273
3.09	49965	17	17	0	17	17	17	50290
3.10	49978	13	13	0	13	13	13	50303
3.11	49986	8	8	0	8	8	8	50311
3.12	49991	5	5	0	5	5	5	50316
3.13	49995	4	4	0	4	4	4	50320
3.14	49999	4	4	0	4	4	4	50324
3.15	50003	4	4	0	4	4	4	50328
3.16	50004	1	1	0	1	1	1	50329
3.17	50005	1	1	0	1	1	1	50330
3.18	50005	0	0	0	0	0	0	50330
3.19	50005	0	0	0	0	0	0	50330
3.20	50005	0	0	0	0	0	0	50330
3.21	50005	0	0	0	0	0	0	50330
3.22	50005	0	0	0	0	0	0	50330
3.23	50006	1	1	0	1	1	1	50331
3.24	50006	0	0	0	0	0	0	50331
3.25	50006	0	0	0	0	0	0	50331
3.26	50006	0	0	0	0	0	0	50331
3.27	50006	0	0	0	0	0	0	50331
3.28	50006	0	0	0	0	0	0	50331
3.29	50006	0	0	0	0	0	0	50331
3.30	50006	0	0	0	0	0	0	50331
3.31	50006	0	0	0	0	0	0	50331
4.01	50006	0	0	0	0	0	0	50331
4.02	50006	0	0	0	0	0	0	50331
4.03	50007	1	1	0	1	1	1	50332
4.04	50007	0	0	0	0	0	0	50332
4.05	50007	0	0	0	0	0	0	50332
4.06	50007	0	0	0	0	0	0	50332
4.07	50007	0	0	0	0	0	0	50332
4.08	50007	0	0	0	0	0	0	50332
4.09	50007	0	0	0	0	0	0	50332
4.10	50007	0	0	0	0	0	0	50332
4.11	50007	0	0	0	0	0	0	50332
4.12	50007	0	0	0	0	0	0	50332
4.13	50007	0	0	0	0	0	0	50332
4.14	50007	0	0	0	0	0	0	50332
4.15	50007	0	0	0	0	0	0	50332
4.16	50332	325	325	0	325	325	0	50332
4.17	50332	0	0	0	0	0	0	50332
4.18	50332	0	0	0	0	0	0	50332
4.19	50332	0	0	0	0	0	0	50332

(to be continued)

Table A1-1: Wuhan ex Imported: The Official and Adjusted Daily Newly Confirmed Cases
(continued)

Date	Wuhan ex Imported: Cumulative Newly Confirmed Cases (original official data)	Wuhan ex Imported: Implied Daily Newly Confirmed Cases Derived from Daily Cumulative Cases	Wuhan ex Imported: Daily Newly Confirmed Cases (original official data)	Consistency Check	Wuhan ex Imported: Daily Newly Confirmed Cases (adjusted for first surge)	Wuhan ex Imported: Daily Newly Confirmed Cases (adjusted for first and second surges)	Wuhan ex Imported: Daily Newly Confirmed Cases (adjusted for all three surges)	Wuhan ex Imported: Cumulative Newly Confirmed Cases (final adjusted)
				Column 3- Column 4				
4.20	50332	0	0	0	0	0	0	50332
4.21	50332	0	0	0	0	0	0	50332
4.22	50332	0	0	0	0	0	0	50332
4.23	50332	0	0	0	0	0	0	50332
4.24	50332	0	0	0	0	0	0	50332
4.25	50332	0	0	0	0	0	0	50332
4.26	50332	0	0	0	0	0	0	50332
4.27	50332	0	0	0	0	0	0	50332
4.28	50332	0	0	0	0	0	0	50332
4.29	50332	0	0	0	0	0	0	50332
4.30	50332	0	0	0	0	0	0	50332
5.01	50332	0	0	0	0	0	0	50332
5.02	50332	0	0	0	0	0	0	50332
5.03	50332	0	0	0	0	0	0	50332
5.04	50332	0	0	0	0	0	0	50332
5.05	50332	0	0	0	0	0	0	50332
5.06	50332	0	0	0	0	0	0	50332
5.07	50332	0	0	0	0	0	0	50332
5.08	50332	0	0	0	0	0	0	50332
5.09	50333	1	1	0	1	1	1	50333
5.10	50338	5	5	0	5	5	5	50338
5.11	50338	0	0	0	0	0	0	50338
5.12	50338	0	0	0	0	0	0	50338
5.13	50338	0	0	0	0	0	0	50338
5.14	50338	0	0	0	0	0	0	50338
5.15	50338	0	0	0	0	0	0	50338
5.16	50338	0	0	0	0	0	0	50338
5.17	50338	0	0	0	0	0	0	50338
5.18	50339	1	1	0	1	1	1	50339
5.19	50339	0	0	0	0	0	0	50339
5.20	50339	0	0	0	0	0	0	50339
5.21	50339	0	0	0	0	0	0	50339
5.22	50339	0	0	0	0	0	0	50339
5.23	50339	0	0	0	0	0	0	50339
5.24	50339	0	0	0	0	0	0	50339
5.25	50339	0	0	0	0	0	0	50339
5.26	50339	0	0	0	0	0	0	50339
5.27	50339	0	0	0	0	0	0	50339
5.28	50339	0	0	0	0	0	0	50339
5.29	50339	0	0	0	0	0	0	50339
5.30	50339	0	0	0	0	0	0	50339
5.31	50339	0	0	0	0	0	0	50339

Both the original official implied (column 3 of Table A1-1) and the final adjusted (column 8 of Table A1-1) data on the daily newly confirmed cases are presented in Chart A1-1. The original red line shows the three surges in the number of newly confirmed cases. The adjusted blue line no longer shows the surges. However, the areas under each of the lines are actually identical because they both represent the same cumulative total of daily newly confirmed cases.



Hubei ex Wuhan

In Table A1-2, the original official data on the cumulative (column 2) and daily newly confirmed (column 4) cases in Hubei ex Wuhan are presented. The implied daily newly confirmed cases derived from column 2 are presented in column 3. The first check is whether the official cumulative numbers are monotonically increasing over time. Unfortunately, they are not. Specifically, it is found that the reported number of cumulative confirmed cases in Hubei ex Wuhan, which was 17,742 on 2.20, decreased to 17,680 on 2.23 and ended with 17,715 on 2.24 (displayed in red). As a decrease in a cumulative total number over time is impossible, the figures between 2.20 and 2.22 must have errors. (This inconsistency is also revealed by the negative implied daily newly confirmed cases of -203 on 2.23.) We compare

the implied numbers of newly confirmed cases (column 3) with the official data on newly confirmed cases (column 4) in column 5. While there are differences, they are the same between 2.19 and 2.22, and on or after 2.24. We first note that both the implied and the direct numbers of newly confirmed cases on 2.24 are 35. If we subtract 35 from 17,715, the cumulative number on 2.24, we obtain 17,680, exactly the same as the cumulative number on 2.23. By successively subtracting the numbers of newly confirmed cases on 2.23 (50), 2.22 (89) and 2.21 (52) from 17,680, we obtain the corrected cumulative numbers of 17,630, 17,541, and 17,489 for 2.22, 2.21, and 2.20, respectively (displayed in red). With these corrections, the inconsistencies due to non-monotonicity are removed. The corrected series of cumulative new cases are presented in column 6, with the implied newly confirmed cases presented in column 7.

Having corrected for the inconsistencies in the cumulative data, we proceed to adjust the newly confirmed cases for the surge in the number of newly confirmed cases in Hubei ex Wuhan on 2.12. Fortunately, the additional numbers of newly confirmed cases due to the change in definition in both Hubei and Wuhan are known, respectively 13,332¹⁰ and 12,364. Thus, the additional number of cases due to the change in definition in Hubei ex Wuhan on 2.12 may be estimated to be 968 (13,332-12,364), and the number of newly confirmed cases under the old definition may be estimated as 436, the difference between 1,404, the total number of newly confirmed cases, and 968. Next, we reallocate the “excess” newly confirmed cases of 968 on 2.12 to the days between 1.10 and 2.12 on a proportional basis.¹¹ The adjusted figures are presented in column 8 in red. The adjusted numbers of daily newly confirmed cases are approximately 6.8% ($968/14,244$ ¹²) higher than before. They are our final adjusted numbers of daily newly confirmed cases in Hubei ex Wuhan. In column 9, the cumulative total numbers of our final adjusted series of newly confirmed cases are presented. The cumulative total numbers of confirmed cases in column 9 on and after 2.23 are identical with the original official data on cumulative confirmed cases (column 2) as there was no revision in the data for Hubei ex Wuhan on 4.16.

¹⁰ The Health Commission of Hubei Province released the number of additional confirmed cases for Hubei due to the new definition as 13,332 on 2.12.

¹¹ All confirmed COVID-19 cases in the Mainland of China came from Wuhan before 1.20.

¹² 14,244 is the sum of the daily newly confirmed cases in column 7 from 1.20 to 2.11 plus 436.

**Table A1-2: Hubei ex Imported and Wuhan:
The Implied and Adjusted Daily Newly Confirmed Cases**

Date	Hubei ex Imported and Wuhan: Cumulative Newly Confirmed Cases (original official data)	Hubei ex Imported and Wuhan: Implied Daily Newly Confirmed Cases Derived from Daily Cumulative Cases	Hubei ex Imported and Wuhan: Daily Newly Confirmed Cases (original official data)	Consistency Check	Hubei ex Imported and Wuhan: Cumulative Newly Confirmed Cases (corrected for inconsistencies)	Hubei ex Imported and Wuhan: Implied Daily Newly Confirmed Cases (corrected for inconsistencies)	Hubei ex Imported and Wuhan: Daily Newly Confirmed Cases (corrected for inconsistencies and adjusted for the surge on 2.12)	Hubei ex Imported and Wuhan: Cumulative Newly Confirmed Cases (final adjusted)
				Column 3- Column 4				
1.10	0	0	0	0	0	0	0	0
1.11	0	0	0	0	0	0	0	0
1.12	0	0	0	0	0	0	0	0
1.13	0	0	0	0	0	0	0	0
1.14	0	0	0	0	0	0	0	0
1.15	0	0	0	0	0	0	0	0
1.16	0	0	0	0	0	0	0	0
1.17	0	0	0	0	0	0	0	0
1.18	0	0	0	0	0	0	0	0
1.19	0	0	0	0	0	0	0	0
1.20	12	12	12	0	12	12	13	13
1.21	12	0	0	0	12	0	0	13
1.22	19	7	7	0	19	7	7	20
1.23	54	35	35	0	54	35	37	58
1.24	157	103	103	0	157	103	110	168
1.25	434	277	277	0	434	277	296	463
1.26	725	291	291	0	725	291	311	774
1.27	1124	399	399	0	1124	399	426	1200
1.28	1649	525	525	0	1649	525	561	1761
1.29	2325	676	676	0	2325	676	722	2483
1.30	3167	842	842	0	3167	842	899	3382
1.31	3938	771	771	0	3938	771	823	4206
2.01	4965	1027	1027	0	4965	1027	1097	5302
2.02	6035	1070	1070	0	6035	1070	1143	6445
2.03	7138	1103	1103	0	7138	1103	1178	7623
2.04	8327	1189	1189	0	8327	1189	1270	8893
2.05	9548	1221	1221	0	9548	1221	1304	10197
2.06	10494	946	946	0	10494	946	1010	11207
2.07	11350	856	856	0	11350	856	914	12121
2.08	12118	768	768	0	12118	768	820	12942
2.09	12729	611	697	-86	12729	611	653	13594
2.10	13274	545	545	0	13274	545	582	14176
2.11	13808	534	534	0	13808	534	570	14746
2.12	15212	1404	1404	0	15212	1404	466	15212
2.13	15995	783	913	-130	15995	783	783	15995
2.14	16492	497	497	0	16492	497	497	16492
2.15	16787	295	295	0	16787	295	295	16787
2.16	17030	243	243	0	17030	243	243	17030
2.17	17237	207	207	0	17237	207	207	17237
2.18	17270	33	33	0	17270	33	33	17270
2.19	17430	160	160	0	17430	160	160	17430
2.20	17742	312	312	0	17489	59	59	17489
2.21	17794	52	52	0	17541	52	52	17541
2.22	17883	89	89	0	17630	89	89	17630
2.23	17680	-203	50	-253	17680	50	50	17680
2.24	17715	35	35	0	17715	35	35	17715
2.25	17746	31	31	0	17746	31	31	17746
2.26	17772	26	26	0	17772	26	26	17772
2.27	17777	5	5	0	17777	5	5	17777
2.28	17780	3	3	0	17780	3	3	17780
2.29	17785	5	5	0	17785	5	5	17785

(to be continued)

**Table A1-2: Hubei ex Imported and Wuhan:
The Implied and Adjusted Daily Newly Confirmed Cases (continued)**

Date	Hubei ex Imported and Wuhan: Cumulative Newly Confirmed Cases (original official data)	Hubei ex Imported and Wuhan: Implied Daily Newly Confirmed Cases Derived from Daily Cumulative Cases	Hubei ex Imported and Wuhan: Daily Newly Confirmed Cases (original official data)	Consistency Check	Hubei ex Imported and Wuhan: Cumulative Newly Confirmed Cases (corrected for inconsistencies)	Hubei ex Imported and Wuhan: Implied Daily Newly Confirmed Cases (corrected for inconsistencies)	Hubei ex Imported and Wuhan: Daily Newly Confirmed Cases (corrected for inconsistencies and adjusted for the surge on 2.12)	Hubei ex Imported and Wuhan: Cumulative Newly Confirmed Cases (final adjusted)
				Column 3- Column 4				
3.01	17788	3	3	0	17788	3	3	17788
3.02	17791	3	3	0	17791	3	3	17791
3.03	17792	1	1	0	17792	1	1	17792
3.04	17795	3	3	0	17795	3	3	17795
3.05	17795	0	0	0	17795	0	0	17795
3.06	17795	0	0	0	17795	0	0	17795
3.07	17795	0	0	0	17795	0	0	17795
3.08	17795	0	0	0	17795	0	0	17795
3.09	17795	0	0	0	17795	0	0	17795
3.10	17795	0	0	0	17795	0	0	17795
3.11	17795	0	0	0	17795	0	0	17795
3.12	17795	0	0	0	17795	0	0	17795
3.13	17795	0	0	0	17795	0	0	17795
3.14	17795	0	0	0	17795	0	0	17795
3.15	17795	0	0	0	17795	0	0	17795
3.16	17795	0	0	0	17795	0	0	17795
3.17	17795	0	0	0	17795	0	0	17795
3.18	17795	0	0	0	17795	0	0	17795
3.19	17795	0	0	0	17795	0	0	17795
3.20	17795	0	0	0	17795	0	0	17795
3.21	17795	0	0	0	17795	0	0	17795
3.22	17795	0	0	0	17795	0	0	17795
3.23	17795	0	0	0	17795	0	0	17795
3.24	17795	0	0	0	17795	0	0	17795
3.25	17795	0	0	0	17795	0	0	17795
3.26	17795	0	0	0	17795	0	0	17795
3.27	17795	0	0	0	17795	0	0	17795
3.28	17795	0	0	0	17795	0	0	17795
3.29	17795	0	0	0	17795	0	0	17795
3.30	17795	0	0	0	17795	0	0	17795
3.31	17795	0	0	0	17795	0	0	17795
4.01	17795	0	0	0	17795	0	0	17795
4.02	17795	0	0	0	17795	0	0	17795
4.03	17795	0	0	0	17795	0	0	17795
4.04	17795	0	0	0	17795	0	0	17795
4.05	17795	0	0	0	17795	0	0	17795
4.06	17795	0	0	0	17795	0	0	17795
4.07	17795	0	0	0	17795	0	0	17795
4.08	17795	0	0	0	17795	0	0	17795
4.09	17795	0	0	0	17795	0	0	17795
4.10	17795	0	0	0	17795	0	0	17795
4.11	17795	0	0	0	17795	0	0	17795
4.12	17795	0	0	0	17795	0	0	17795
4.13	17795	0	0	0	17795	0	0	17795
4.14	17795	0	0	0	17795	0	0	17795
4.15	17795	0	0	0	17795	0	0	17795
4.16	17795	0	0	0	17795	0	0	17795
4.17	17795	0	0	0	17795	0	0	17795
4.18	17795	0	0	0	17795	0	0	17795
4.19	17795	0	0	0	17795	0	0	17795

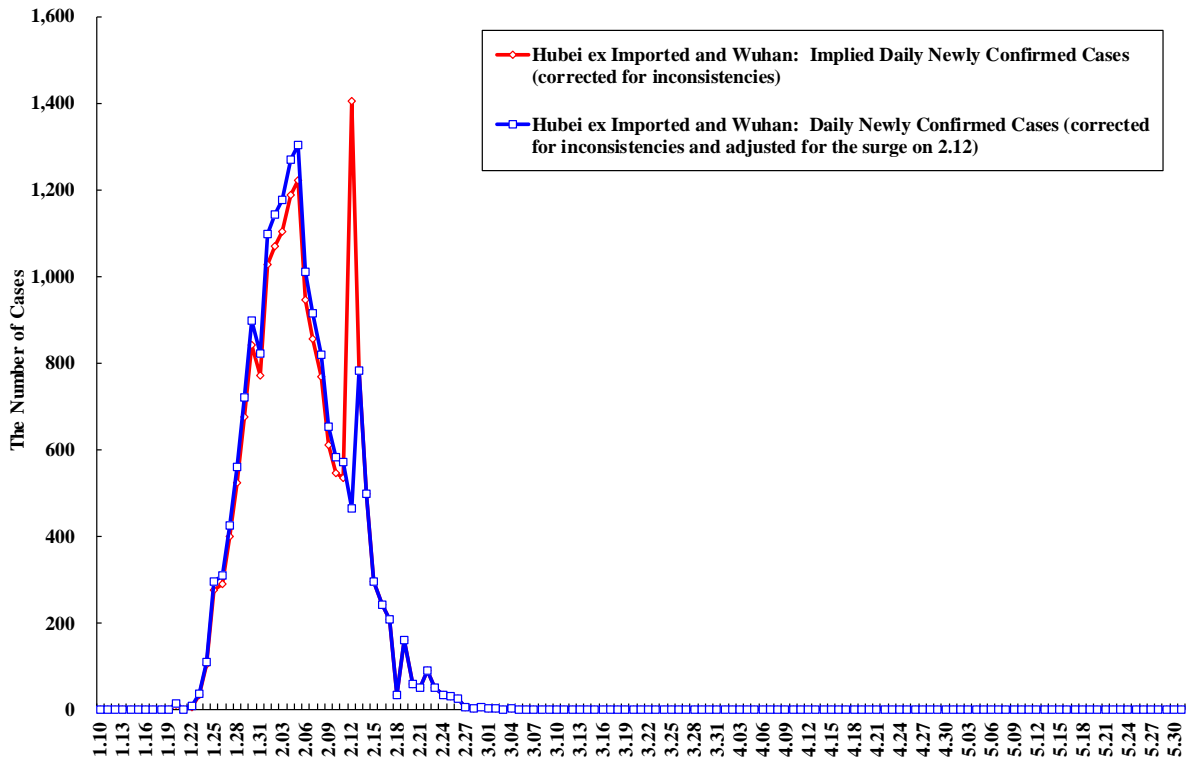
(to be continued)

**Table A1-2: Hubei ex Imported and Wuhan:
The Implied and Adjusted Daily Newly Confirmed Cases (continued)**

Date	Hubei ex Imported and Wuhan: Cumulative Newly Confirmed Cases (original official data)	Hubei ex Imported and Wuhan: Implied Daily Newly Confirmed Cases Derived from Daily Cumulative Cases	Hubei ex Imported and Wuhan: Daily Newly Confirmed Cases (original official data)	Consistency Check	Hubei ex Imported and Wuhan: Cumulative Newly Confirmed Cases (corrected for inconsistencies)	Hubei ex Imported and Wuhan: Implied Daily Newly Confirmed Cases (corrected for inconsistencies)	Hubei ex Imported and Wuhan: Daily Newly Confirmed Cases (corrected for inconsistencies and adjusted for the surge on 2.12)	Hubei ex Imported and Wuhan: Cumulative Newly Confirmed Cases (final adjusted)
				Column 3- Column 4				
4.20	17795	0	0	0	17795	0	0	17795
4.21	17795	0	0	0	17795	0	0	17795
4.22	17795	0	0	0	17795	0	0	17795
4.23	17795	0	0	0	17795	0	0	17795
4.24	17795	0	0	0	17795	0	0	17795
4.25	17795	0	0	0	17795	0	0	17795
4.26	17795	0	0	0	17795	0	0	17795
4.27	17795	0	0	0	17795	0	0	17795
4.28	17795	0	0	0	17795	0	0	17795
4.29	17795	0	0	0	17795	0	0	17795
4.30	17795	0	0	0	17795	0	0	17795
5.01	17795	0	0	0	17795	0	0	17795
5.02	17795	0	0	0	17795	0	0	17795
5.03	17795	0	0	0	17795	0	0	17795
5.04	17795	0	0	0	17795	0	0	17795
5.05	17795	0	0	0	17795	0	0	17795
5.06	17795	0	0	0	17795	0	0	17795
5.07	17795	0	0	0	17795	0	0	17795
5.08	17795	0	0	0	17795	0	0	17795
5.09	17795	0	0	0	17795	0	0	17795
5.10	17795	0	0	0	17795	0	0	17795
5.11	17795	0	0	0	17795	0	0	17795
5.12	17795	0	0	0	17795	0	0	17795
5.13	17795	0	0	0	17795	0	0	17795
5.14	17795	0	0	0	17795	0	0	17795
5.15	17795	0	0	0	17795	0	0	17795
5.16	17795	0	0	0	17795	0	0	17795
5.17	17795	0	0	0	17795	0	0	17795
5.18	17795	0	0	0	17795	0	0	17795
5.19	17795	0	0	0	17795	0	0	17795
5.20	17795	0	0	0	17795	0	0	17795
5.21	17795	0	0	0	17795	0	0	17795
5.22	17795	0	0	0	17795	0	0	17795
5.23	17795	0	0	0	17795	0	0	17795
5.24	17795	0	0	0	17795	0	0	17795
5.25	17795	0	0	0	17795	0	0	17795
5.26	17795	0	0	0	17795	0	0	17795
5.27	17795	0	0	0	17795	0	0	17795
5.28	17795	0	0	0	17795	0	0	17795
5.29	17795	0	0	0	17795	0	0	17795
5.30	17795	0	0	0	17795	0	0	17795
5.31	17795	0	0	0	17795	0	0	17795

The implied (corrected for inconsistencies) (column 7 of Table A1-2) and the final adjusted (column 8 of Table A1-2) data on the daily newly confirmed cases are also presented in Chart A1-2. The adjusted blue line no longer shows the huge surge on 2.12 of the red line. However, the areas under each of the lines are actually identical because they both represent the same cumulative total number of daily newly confirmed cases.

**Chart A1-2: Hubei ex Imported and Wuhan:
Implied and Adjusted Daily Newly Confirmed Cases**



Hubei

In Table A1-3, the original official data on the cumulative daily newly confirmed cases in the Province of Hubei as a whole are presented in column 2. They are compared with the adjusted data for Hubei (column 5), which consist of the sum of the adjusted data for Wuhan (column 3) and Hubei ex Wuhan (column 4), which are taken from columns 9 of Tables A1-1 and A1-2 respectively. Columns 6 and 7, the implied daily newly confirmed cases, are derived from column 2 and column 5 respectively.

We note, first of all, that the adjusted cumulative total number of confirmed cases for Hubei is identical with the official cumulative number of confirmed cases on and after 4.16, as 4.16 was the last date with a surge. Second, the implied daily newly confirmed cases derived from the adjusted cumulative data are almost always larger than the implied cases derived from the official cumulative data (see column 8), except for the dates marked in red, when surges in the number of daily newly confirmed cases occurred¹³. This is because part of our adjustments consists of smoothing out the surges, that is, reallocating the sudden increases in the reporting of confirmed cases to the days past proportionally.

¹³ There was no apparent surge in newly confirmed cases on 2.20. We believe the -251 was an error which was later rectified on 2.23.

Table A1-3: Hubei ex Imported: The Implied and Adjusted Daily Newly Confirmed Cases

Date	Hubei ex Imported: Cumulative Newly Confirmed Cases (original official data)	Wuhan ex Imported: Cumulative Newly Confirmed Cases (adjusted for surges)	Hubei ex Imported and Wuhan: Cumulative Newly Confirmed Cases (corrected for inconsistencies and adjusted for surges)	Hubei ex Imported: Cumulative Newly Confirmed Cases (corrected for inconsistencies and adjusted for surges)	Hubei ex Imported: Implied Daily Newly Confirmed Cases (original official data)	Hubei ex Imported: Implied Daily Newly Confirmed Cases (corrected for inconsistencies and adjusted for surges)	Consistency Check
	Column 9 of Table A1-1	Column 9 of Table A1-2	Column 3+Column 4			Column 7-Column 6	
1.10	41	41	0	41	0	0	0
1.11	41	41	0	41	0	0	0
1.12	41	41	0	41	0	0	0
1.13	41	41	0	41	0	0	0
1.14	41	41	0	41	0	0	0
1.15	41	41	0	41	0	0	0
1.16	45	52	0	52	4	11	7
1.17	62	99	0	99	17	47	30
1.18	121	261	0	261	59	162	103
1.19	198	472	0	472	77	212	135
1.20	270	637	13	650	72	178	106
1.21	375	926	13	939	105	289	184
1.22	444	1096	20	1117	69	178	109
1.23	549	1289	58	1346	105	230	125
1.24	729	1500	168	1668	180	322	142
1.25	1052	1627	463	2090	323	422	99
1.26	1423	1847	774	2621	371	531	160
1.27	2714	2536	1200	3737	1291	1116	-175
1.28	3554	3044	1761	4805	840	1068	228
1.29	4586	3617	2483	6100	1032	1295	263
1.30	5806	4226	3382	7608	1220	1508	288
1.31	7153	5154	4206	9360	1347	1751	404
2.01	9074	6594	5302	11897	1921	2537	616
2.02	11177	8258	6445	14703	2103	2807	704
2.03	13522	10259	7623	17882	2345	3179	834
2.04	16678	13428	8893	22321	3156	4438	1282
2.05	19665	16273	10197	26470	2987	4149	1162
2.06	22112	18691	11207	29898	2447	3428	981
2.07	24953	21888	12121	34010	2841	4112	1271
2.08	27100	24110	12942	37051	2147	3042	895
2.09	29631	27203	13594	40797	2531	3745	1214
2.10	31728	29703	14176	43879	2097	3082	985
2.11	33366	31481	14746	46228	1638	2349	711
2.12	48206	33208	15212	48420	14840	2193	-12647
2.13	51986	36225	15995	52220	3780	3799	19
2.14	54406	38160	16492	54652	2420	2433	13
2.15	56249	39718	16787	56505	1843	1853	10
2.16	58182	41419	17030	58449	1933	1944	11
2.17	59989	43030	17237	60267	1807	1817	10
2.18	61682	44701	17270	61971	1693	1704	11
2.19	62457	45320	17430	62750	775	779	4
2.20	63088	45641	17489	63130	631	380	-251
2.21	63454	45957	17541	63498	366	368	2
2.22	64084	46501	17630	64131	630	634	4
2.23	64287	46910	17680	64590	203	459	256
2.24	64786	47377	17715	65092	499	502	3
2.25	65187	47749	17746	65495	401	403	2
2.26	65596	48135	17772	65907	409	411	2
2.27	65914	48450	17777	66227	318	320	2
2.28	66337	48873	17780	66653	423	426	3
2.29	66907	49441	17785	67226	570	574	4

(to be continued)

Table A1-3: Hubei ex Imported: The Implied and Adjusted Daily Newly Confirmed Cases
(continued)

Date	Hubei ex Imported: Cumulative Newly Confirmed Cases (original official data)	Wuhan ex Imported: Cumulative Newly Confirmed Cases (adjusted for surges)	Hubei ex Imported and Wuhan: Cumulative Newly Confirmed Cases (corrected for inconsistencies and adjusted for surges)	Hubei ex Imported: Cumulative Newly Confirmed Cases (corrected for inconsistencies and adjusted for surges)	Hubei ex Imported: Implied Daily Newly Confirmed Cases (original official data)	Hubei ex Imported: Implied Daily Newly Confirmed Cases (corrected for inconsistencies and adjusted for surges)	Consistency Check
	Column 9 of Table A1-1	Column 9 of Table A1-2	Column 3+Column 4			Column 7-Column 6	
3.01	67103	49635	17788	67423	196	197	1
3.02	67217	49747	17791	67538	114	115	1
3.03	67332	49862	17792	67654	115	116	1
3.04	67466	49994	17795	67789	134	135	1
3.05	67592	50121	17795	67916	126	127	1
3.06	67666	50195	17795	67990	74	74	0
3.07	67707	50236	17795	68031	41	41	0
3.08	67743	50273	17795	68068	36	36	0
3.09	67760	50290	17795	68085	17	17	0
3.10	67773	50303	17795	68098	13	13	0
3.11	67781	50311	17795	68106	8	8	0
3.12	67786	50316	17795	68111	5	5	0
3.13	67790	50320	17795	68115	4	4	0
3.14	67794	50324	17795	68119	4	4	0
3.15	67798	50328	17795	68123	4	4	0
3.16	67799	50329	17795	68124	1	1	0
3.17	67800	50330	17795	68125	1	1	0
3.18	67800	50330	17795	68125	0	0	0
3.19	67800	50330	17795	68125	0	0	0
3.20	67800	50330	17795	68125	0	0	0
3.21	67800	50330	17795	68125	0	0	0
3.22	67800	50330	17795	68125	0	0	0
3.23	67801	50331	17795	68126	1	1	0
3.24	67801	50331	17795	68126	0	0	0
3.25	67801	50331	17795	68126	0	0	0
3.26	67801	50331	17795	68126	0	0	0
3.27	67801	50331	17795	68126	0	0	0
3.28	67801	50331	17795	68126	0	0	0
3.29	67801	50331	17795	68126	0	0	0
3.3	67801	50331	17795	68126	0	0	0
3.31	67801	50331	17795	68126	0	0	0
4.01	67801	50331	17795	68126	0	0	0
4.02	67801	50331	17795	68126	0	0	0
4.03	67802	50332	17795	68127	1	1	0
4.04	67802	50332	17795	68127	0	0	0
4.05	67802	50332	17795	68127	0	0	0
4.06	67802	50332	17795	68127	0	0	0
4.07	67802	50332	17795	68127	0	0	0
4.08	67802	50332	17795	68127	0	0	0
4.09	67802	50332	17795	68127	0	0	0
4.1	67802	50332	17795	68127	0	0	0
4.11	67802	50332	17795	68127	0	0	0
4.12	67802	50332	17795	68127	0	0	0
4.13	67802	50332	17795	68127	0	0	0
4.14	67802	50332	17795	68127	0	0	0
4.15	67802	50332	17795	68127	0	0	0
4.16	68127	50332	17795	68127	325	0	-325
4.17	68127	50332	17795	68127	0	0	0
4.18	68127	50332	17795	68127	0	0	0
4.19	68127	50332	17795	68127	0	0	0

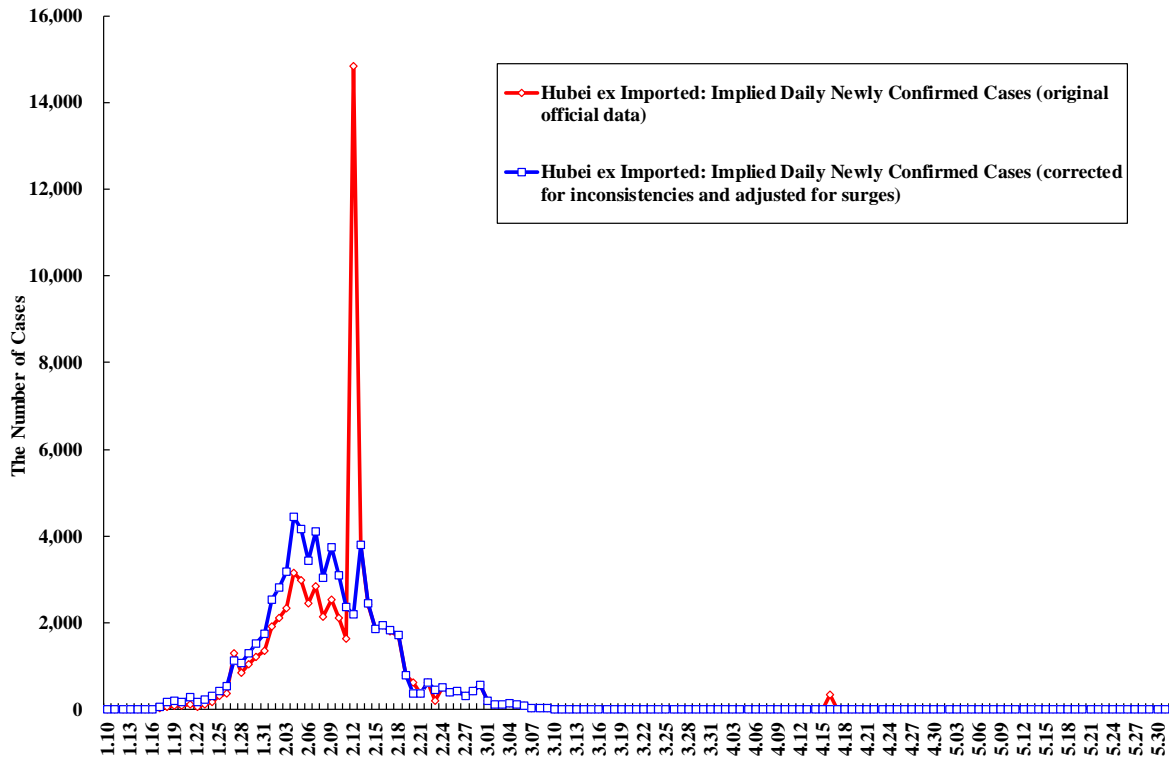
(to be continued)

Table A1-3: Hubei ex Imported, The Implied and Adjusted Daily Newly Confirmed Cases
(continued)

Date	Hubei ex Imported: Cumulative Newly Confirmed Cases (original official data)	Wuhan ex Imported: Cumulative Newly Confirmed Cases (adjusted for surges)	Hubei ex Imported and Wuhan: Cumulative Newly Confirmed Cases (corrected for inconsistencies and adjusted for surges)	Hubei ex Imported: Cumulative Newly Confirmed Cases (corrected for inconsistencies and adjusted for surges)	Hubei ex Imported: Implied Daily Newly Confirmed Cases (original official data)	Hubei ex Imported: Implied Daily Newly Confirmed Cases (corrected for inconsistencies and adjusted for surges)	Consistency Check
	Column 9 of Table A1-1	Column 9 of Table A1-2	Column 3+Column 4			Column 7-Column 6	
4.20	68127	50332	17795	68127	0	0	0
4.21	68127	50332	17795	68127	0	0	0
4.22	68127	50332	17795	68127	0	0	0
4.23	68127	50332	17795	68127	0	0	0
4.24	68127	50332	17795	68127	0	0	0
4.25	68127	50332	17795	68127	0	0	0
4.26	68127	50332	17795	68127	0	0	0
4.27	68127	50332	17795	68127	0	0	0
4.28	68127	50332	17795	68127	0	0	0
4.29	68127	50332	17795	68127	0	0	0
4.30	68127	50332	17795	68127	0	0	0
5.01	68127	50332	17795	68127	0	0	0
5.02	68127	50332	17795	68127	0	0	0
5.03	68127	50332	17795	68127	0	0	0
5.04	68127	50332	17795	68127	0	0	0
5.05	68127	50332	17795	68127	0	0	0
5.06	68127	50332	17795	68127	0	0	0
5.07	68127	50332	17795	68127	0	0	0
5.08	68127	50332	17795	68127	0	0	0
5.09	68128	50333	17795	68128	1	1	0
5.10	68133	50338	17795	68133	5	5	0
5.11	68133	50338	17795	68133	0	0	0
5.12	68133	50338	17795	68133	0	0	0
5.13	68133	50338	17795	68133	0	0	0
5.14	68133	50338	17795	68133	0	0	0
5.15	68133	50338	17795	68133	0	0	0
5.16	68133	50338	17795	68133	0	0	0
5.17	68133	50338	17795	68133	0	0	0
5.18	68134	50339	17795	68134	1	1	0
5.19	68134	50339	17795	68134	0	0	0
5.20	68134	50339	17795	68134	0	0	0
5.21	68134	50339	17795	68134	0	0	0
5.22	68134	50339	17795	68134	0	0	0
5.23	68134	50339	17795	68134	0	0	0
5.24	68134	50339	17795	68134	0	0	0
5.25	68134	50339	17795	68134	0	0	0
5.26	68134	50339	17795	68134	0	0	0
5.27	68134	50339	17795	68134	0	0	0
5.28	68134	50339	17795	68134	0	0	0
5.29	68134	50339	17795	68134	0	0	0
5.30	68134	50339	17795	68134	0	0	0
5.31	68134	50339	17795	68134	0	0	0

Both the implied derived from official data numbers (column 6 of Table A1-3) and the final adjusted numbers (column 7 of Table A1-3) on the daily newly confirmed cases are presented in Chart A1-3. The adjusted blue line no longer shows the surges of the red line. The areas under both the red and the blue lines are actually identical because they both represent the same cumulative total of daily newly confirmed cases.

Chart A1-3: Hubei ex Imported: Implied and Adjusted Daily Newly Confirmed Cases



Mainland ex Hubei

In Table A1-4 the original official data on the cumulative confirmed cases on the entire Mainland (column 2), Hubei (column 3), and Mainland ex Hubei (column 4) are presented (all ex imported). We first verify that the cumulative confirmed cases data for Mainland ex Hubei satisfy the monotonicity requirement over time. They do. Since there has been no change in the definition of a “confirmed” case used outside of Hubei, nor any one-off adjustment of the data, no further adjustment of the Mainland ex Hubei data is necessary. In column 5, the numbers of implied daily newly confirmed cases for Mainland ex Hubei are derived from column 4. They are compared with the number of direct official daily newly confirmed cases (column 6) in column 7. As column 7 indicates, there are minor discrepancies between the implied daily newly confirmed cases and the direct daily newly confirmed cases. However, the differences between them are not large, especially after 2.11. But both sets of numbers show an identical unexplained surge of 258 cases on 2.20. In order to maintain consistency with the official cumulative cases data, we shall use the implied daily newly confirmed cases in column 5 as the final adjusted daily newly confirmed cases. The implied (blue line) and the original direct official (red line) series of daily newly confirmed cases are compared in Chart A1-4.

**Table A1-4: Mainland ex Imported and Hubei:
The Implied and Adjusted Daily Newly Confirmed Cases**

Date	Mainland ex Imported: Cumulative Daily Newly Confirmed Cases (original official data)	Hubei ex Imported: Cumulative Daily Newly Confirmed Cases (original official data)	Mainland ex Imported and Hubei: Cumulative Daily Newly Confirmed Cases (original official data)	Mainland ex Imported and Hubei: Implied Daily Newly Confirmed Cases (original official data)	Mainland ex Imported and Hubei: Daily Newly Confirmed Cases (original official data)	Consistency Check
	Column 2-Column 3			Column 5-Column 6		
1.19	214	198	16			
1.20	291	270	21	5	5	0
1.21	440	375	65	44	44	0
1.22	571	444	127	62	62	0
1.23	830	549	281	154	154	0
1.24	1287	729	558	277	264	13
1.25	1975	1052	923	365	365	0
1.26	2744	1423	1321	398	398	0
1.27	4515	2714	1801	480	480	0
1.28	5974	3554	2420	619	619	0
1.29	7711	4586	3125	705	705	0
1.30	9692	5806	3886	761	762	-1
1.31	11791	7153	4638	752	755	-3
2.01	14380	9074	5306	668	669	-1
2.02	17205	11177	6028	722	726	-4
2.03	20438	13522	6916	888	890	-2
2.04	24324	16678	7646	730	731	-1
2.05	28018	19665	8353	707	707	0
2.06	31161	22112	9049	696	696	0
2.07	34546	24953	9593	544	558	-14
2.08	37198	27100	10098	505	509	-4
2.09	40171	29631	10540	442	444	-2
2.10	42638	31728	10910	370	381	-11
2.11	44653	33366	11287	377	377	0
2.12	59804	48206	11598	311	312	-1
2.13	63851	51986	11865	267	267	0
2.14	66492	54406	12086	221	221	0
2.15	68500	56249	12251	165	166	-1
2.16	70548	58182	12366	115	115	0
2.17	72436	59989	12447	81	79	2
2.18	74185	61682	12503	56	56	0
2.19	75002	62457	12545	42	45	-3
2.20	75891	63088	12803	258	258	0
2.21	76288	63454	12834	31	31	0
2.22	76936	64084	12852	18	18	0
2.23	77150	64287	12863	11	11	0
2.24	77658	64786	12872	9	9	0
2.25	78064	65187	12877	5	5	0
2.26	78496	65596	12900	23	23	0
2.27	78821	65914	12907	7	7	0
2.28	79247	66337	12910	3	3	0
2.29	79818	66907	12911	1	1	0

(to be continued)

**Table A1-4: Mainland ex Imported and Hubei:
The Implied and Adjusted Daily Newly Confirmed Cases (*continued*)**

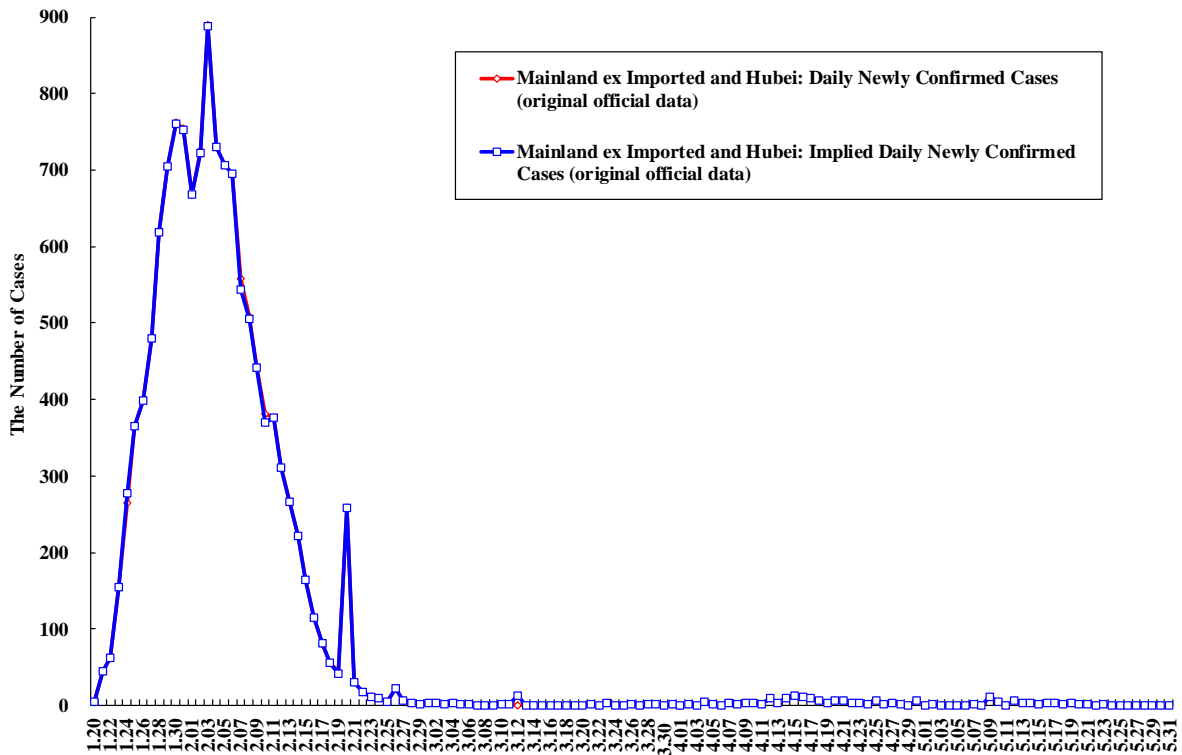
Date	Mainland ex Imported: Cumulative Daily Newly Confirmed Cases (original official data)	Hubei ex Imported: Cumulative Daily Newly Confirmed Cases (original official data)	Mainland ex Imported and Hubei: Cumulative Daily Newly Confirmed Cases (original official data)	Mainland ex Imported and Hubei: Implied Daily Newly Confirmed Cases (original official data)	Mainland ex Imported and Hubei: Daily Newly Confirmed Cases (original official data)	Consistency Check
			Column 2-Column 3		Column 5-Column 6	
3.01	80017	67103	12914	3	3	0
3.02	80135	67217	12918	4	4	0
3.03	80252	67332	12920	2	2	0
3.04	80389	67466	12923	3	3	0
3.05	80516	67592	12924	1	1	0
3.06	80591	67666	12925	1	1	0
3.07	80632	67707	12925	0	0	0
3.08	80668	67743	12925	0	0	0
3.09	80685	67760	12925	0	0	0
3.10	80699	67773	12926	1	1	0
3.11	80708	67781	12927	1	1	0
3.12	80725	67786	12939	12	0	12
3.13	80729	67790	12939	0	0	0
3.14	80733	67794	12939	0	0	0
3.15	80737	67798	12939	0	0	0
3.16	80738	67799	12939	0	0	0
3.17	80739	67800	12939	0	0	0
3.18	80739	67800	12939	0	0	0
3.19	80739	67800	12939	0	0	0
3.20	80739	67800	12939	0	0	0
3.21	80740	67800	12940	1	1	0
3.22	80740	67800	12940	0	0	0
3.23	80744	67801	12943	3	3	0
3.24	80744	67801	12943	0	0	0
3.25	80744	67801	12943	0	0	0
3.26	80745	67801	12944	1	1	0
3.27	80745	67801	12944	0	0	0
3.28	80746	67801	12945	1	1	0
3.29	80747	67801	12946	1	1	0
3.30	80747	67801	12946	0	0	0
3.31	80748	67801	12947	1	1	0
4.01	80748	67801	12947	0	0	0
4.02	80750	67801	12949	2	2	0
4.03	80751	67802	12949	0	0	0
4.04	80756	67802	12954	5	5	0
4.05	80757	67802	12955	1	1	0
4.06	80757	67802	12955	0	0	0
4.07	80760	67802	12958	3	3	0
4.08	80762	67802	12960	2	2	0
4.09	80766	67802	12964	4	4	0
4.10	80770	67802	12968	4	4	0
4.11	80772	67802	12970	2	2	0
4.12	80782	67802	12980	10	10	0
4.13	80785	67802	12983	3	3	0
4.14	80795	67802	12993	10	10	0
4.15	80807	67802	13005	12	12	0
4.16	81143	68127	13016	11	11	0
4.17	81153	68127	13026	10	10	0
4.18	81160	68127	13033	7	7	0
4.19	81164	68127	13037	4	4	0

(to be continued)

**Table A1-4: Mainland ex Imported and Hubei,
The Implied and Adjusted Daily Newly Confirmed Cases (*continued*)**

Date	Mainland ex Imported: Cumulative Daily Newly Confirmed Cases (original official data)	Hubei ex Imported: Cumulative Daily Newly Confirmed Cases (original official data)	Mainland ex Imported and Hubei: Cumulative Daily Newly Confirmed Cases (original official data)	Mainland ex Imported and Hubei: Implied Daily Newly Confirmed Cases (original official data)	Mainland ex Imported and Hubei: Daily Newly Confirmed Cases (original official data)	Consistency Check
	Column 2-Column 3			Column 5-Column 6		
4.20	81171	68127	13044	7	7	0
4.21	81178	68127	13051	7	7	0
4.22	81182	68127	13055	4	4	0
4.23	81186	68127	13059	4	4	0
4.24	81187	68127	13060	1	1	0
4.25	81193	68127	13066	6	6	0
4.26	81194	68127	13067	1	1	0
4.27	81197	68127	13070	3	3	0
4.28	81198	68127	13071	1	1	0
4.29	81198	68127	13071	0	0	0
4.30	81204	68127	13077	6	6	0
5.01	81204	68127	13077	0	0	0
5.02	81205	68127	13078	1	1	0
5.03	81205	68127	13078	0	0	0
5.04	81205	68127	13078	0	0	0
5.05	81205	68127	13078	0	0	0
5.06	81205	68127	13078	0	0	0
5.07	81206	68127	13079	1	1	0
5.08	81206	68127	13079	0	0	0
5.09	81218	68128	13090	11	11	0
5.10	81228	68133	13095	5	5	0
5.11	81228	68133	13095	0	0	0
5.12	81234	68133	13101	6	6	0
5.13	81237	68133	13104	3	3	0
5.14	81241	68133	13108	4	4	0
5.15	81243	68133	13110	2	2	0
5.16	81247	68133	13114	4	3	1
5.17	81250	68133	13117	3	3	0
5.18	81253	68134	13119	2	2	0
5.19	81257	68134	13123	4	4	0
5.20	81258	68134	13124	1	1	0
5.21	81260	68134	13126	2	2	0
5.22	81260	68134	13126	0	0	0
5.23	81261	68134	13127	1	1	0
5.24	81261	68134	13127	0	0	0
5.25	81261	68134	13127	0	0	0
5.26	81261	68134	13127	0	0	0
5.27	81261	68134	13127	0	0	0
5.28	81261	68134	13127	0	0	0
5.29	81261	68134	13127	0	0	0
5.30	81261	68134	13127	0	0	0
5.31	81261	68134	13127	0	0	0

Chart A1-4: Mainland ex Imported and Hubei: Direct and Implied Daily Newly Confirmed Cases



The Mainland as a Whole

In Table A1-5, the original official data on the cumulative daily newly confirmed cases on the entire Mainland (except imported cases) are presented in column 2. There appear to be surges in the number of daily newly confirmed cases similar to those in Wuhan and Hubei on 1.27, 2.12 and 4.16. In columns 3 and 4, we present our final cumulative daily newly confirmed cases for Hubei (from column 5 of Table A1-3) and Mainland ex Hubei (from column 4 of Table A1-4) respectively. By adding together columns 3 and 4, we obtain the adjusted cumulative daily newly confirmed cases for the Mainland as a whole (column 5). The implied numbers of daily newly confirmed cases from the original official cumulative data and from the final adjusted cumulative data are presented in columns 6 and 7 respectively. They are compared in column 8. The adjusted series of daily newly confirmed cases are almost always larger than the original series because of the reallocation of the “excess” cases attributed to the surges. Again, the official and the adjusted series fully coincide after 4.16. Both the original (column 6, red line) and the finally adjusted (column 7, blue line) data are compared in Chart A1-5. The adjusted blue line no longer shows the surges.

Table A1-5: Mainland ex Imported: The Implied and Adjusted Daily Newly Confirmed Cases

Date	Mainland ex Imported: Cumulative Daily Newly Confirmed Cases (original official data)	Hubei ex Imported: Cumulative Newly Confirmed Cases (original official data corrected for inconsistencies and adjusted for surges)	Mainland ex Imported and Hubei: Cumulative Newly Confirmed Cases (original official data)	Mainland ex Imported: Cumulative Newly Confirmed Cases (original official data corrected for inconsistencies and adjusted for surges)	Mainland ex Imported: Implied Daily Newly Confirmed Cases (original official data)	Mainland ex Imported: Implied Daily Newly Confirmed Cases (corrected for inconsistencies and adjusted for surges)	Consistency Check
	Column 2 of Table A1-4	Column 5 of Table A1-3	Column 4 of Table A1-4	Column 3+Column 4		Column 7-Column 6	
1.19	214	472	16	488			
1.20	291	650	21	671	77	183	106
1.21	440	939	65	1004	149	333	184
1.22	571	1117	127	1244	131	240	109
1.23	830	1346	281	1627	259	384	125
1.24	1287	1668	558	2226	457	599	142
1.25	1975	2090	923	3013	688	787	99
1.26	2744	2621	1321	3942	769	929	160
1.27	4515	3737	1801	5538	1771	1596	-175
1.28	5974	4805	2420	7225	1459	1687	228
1.29	7711	6100	3125	9225	1737	2000	263
1.30	9692	7608	3886	11494	1981	2269	288
1.31	11791	9360	4638	13998	2099	2503	404
2.01	14380	11897	5306	17203	2589	3205	616
2.02	17205	14703	6028	20731	2825	3529	704
2.03	20438	17882	6916	24798	3233	4067	834
2.04	24324	22321	7646	29967	3886	5168	1282
2.05	28018	26470	8353	34823	3694	4856	1162
2.06	31161	29898	9049	38947	3143	4124	981
2.07	34546	34010	9593	43603	3385	4656	1271
2.08	37198	37051	10098	47149	2652	3547	895
2.09	40171	40797	10540	51337	2973	4187	1214
2.10	42638	43879	10910	54789	2467	3452	985
2.11	44653	46228	11287	57515	2015	2726	711
2.12	59804	48420	11598	60018	15151	2504	-12647
2.13	63851	52220	11865	64085	4047	4066	19
2.14	66492	54652	12086	66738	2641	2654	13
2.15	68500	56505	12251	68756	2008	2018	10
2.16	70548	58449	12366	70815	2048	2059	11
2.17	72436	60267	12447	72714	1888	1898	10
2.18	74185	61971	12503	74474	1749	1760	11
2.19	75002	62750	12545	75295	817	821	4
2.20	75891	63130	12803	75933	889	638	-251
2.21	76288	63498	12834	76332	397	399	2
2.22	76936	64131	12852	76983	648	652	4
2.23	77150	64590	12863	77453	214	470	256
2.24	77658	65092	12872	77964	508	511	3
2.25	78064	65495	12877	78372	406	408	2
2.26	78496	65907	12900	78807	432	434	2
2.27	78821	66227	12907	79134	325	327	2
2.28	79247	66653	12910	79563	426	429	3
2.29	79818	67226	12911	80137	571	575	4

(to be continued)

Table A1-5: Mainland ex Imported: The Implied and Adjusted Daily Newly Confirmed Cases
(continued)

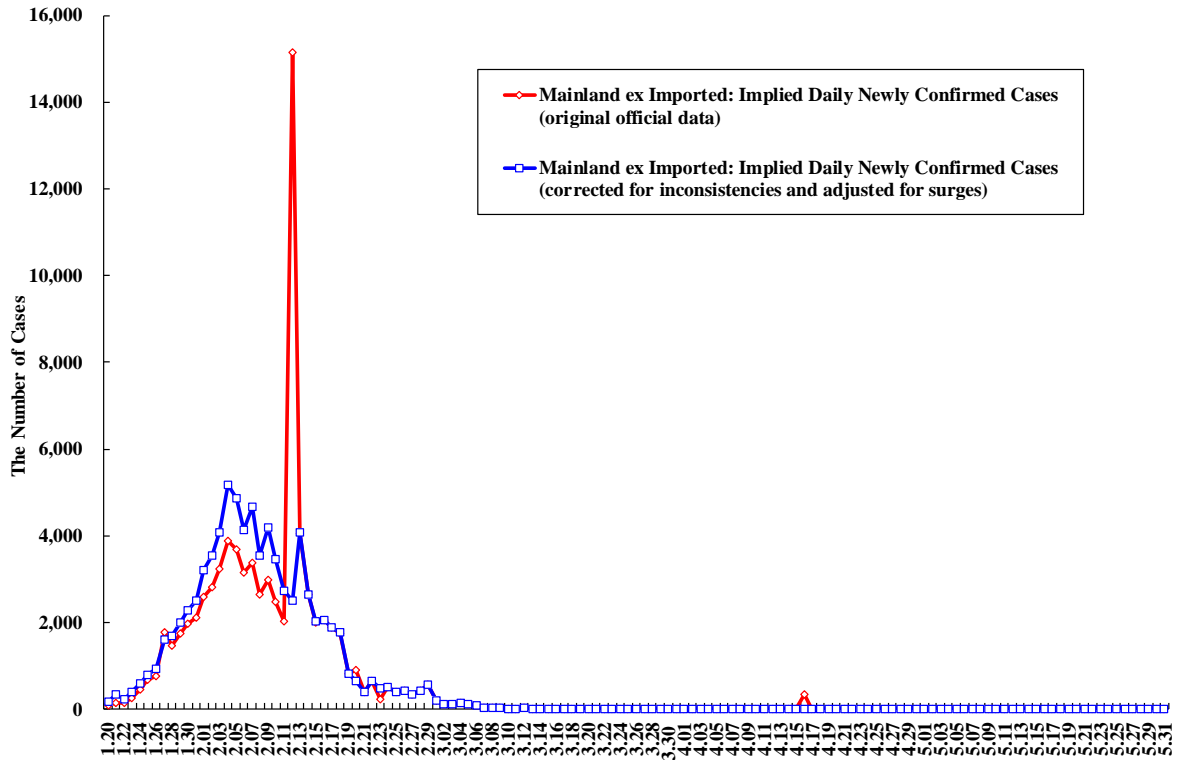
Date	Mainland ex Imported: Cumulative Daily Newly Confirmed Cases (original official data)	Hubei ex Imported: Cumulative Newly Confirmed Cases (original official data corrected for inconsistencies and adjusted for surges)	Mainland ex Imported and Hubei: Cumulative Newly Confirmed Cases (original official data)	Mainland ex Imported: Cumulative Newly Confirmed Cases (original official data corrected for inconsistencies and adjusted for surges)	Mainland ex Imported: Implied Daily Newly Confirmed Cases (original official data)	Mainland ex Imported: Implied Daily Newly Confirmed Cases (corrected for inconsistencies and adjusted for surges)	Consistency Check
	Column 2 of Table A1-4	Column 5 of Table A1-3	Column 4 of Table A1-4	Column 3+Column 4			Column 7-Column 6
3.01	80017	67423	12914	80337	199	200	1
3.02	80135	67538	12918	80456	118	119	1
3.03	80252	67654	12920	80574	117	118	1
3.04	80389	67789	12923	80712	137	138	1
3.05	80516	67916	12924	80840	127	128	1
3.06	80591	67990	12925	80915	75	75	0
3.07	80632	68031	12925	80956	41	41	0
3.08	80668	68068	12925	80993	36	36	0
3.09	80685	68085	12925	81010	17	17	0
3.10	80699	68098	12926	81024	14	14	0
3.11	80708	68106	12927	81033	9	9	0
3.12	80725	68111	12939	81050	17	17	0
3.13	80729	68115	12939	81054	4	4	0
3.14	80733	68119	12939	81058	4	4	0
3.15	80737	68123	12939	81062	4	4	0
3.16	80738	68124	12939	81063	1	1	0
3.17	80739	68125	12939	81064	1	1	0
3.18	80739	68125	12939	81064	0	0	0
3.19	80739	68125	12939	81064	0	0	0
3.20	80739	68125	12939	81064	0	0	0
3.21	80740	68125	12940	81065	1	1	0
3.22	80740	68125	12940	81065	0	0	0
3.23	80744	68126	12943	81069	4	4	0
3.24	80744	68126	12943	81069	0	0	0
3.25	80744	68126	12943	81069	0	0	0
3.26	80745	68126	12944	81070	1	1	0
3.27	80745	68126	12944	81070	0	0	0
3.28	80746	68126	12945	81071	1	1	0
3.29	80747	68126	12946	81072	1	1	0
3.30	80747	68126	12946	81072	0	0	0
3.31	80748	68126	12947	81073	1	1	0
4.01	80748	68126	12947	81073	0	0	0
4.02	80750	68126	12949	81075	2	2	0
4.03	80751	68127	12949	81076	1	1	0
4.04	80756	68127	12954	81081	5	5	0
4.05	80757	68127	12955	81082	1	1	0
4.06	80757	68127	12955	81082	0	0	0
4.07	80760	68127	12958	81085	3	3	0
4.08	80762	68127	12960	81087	2	2	0
4.09	80766	68127	12964	81091	4	4	0
4.10	80770	68127	12968	81095	4	4	0
4.11	80772	68127	12970	81097	2	2	0
4.12	80782	68127	12980	81107	10	10	0
4.13	80785	68127	12983	81110	3	3	0
4.14	80795	68127	12993	81120	10	10	0
4.15	80807	68127	13005	81132	12	12	0
4.16	81143	68127	13016	81143	336	11	-325
4.17	81153	68127	13026	81153	10	10	0
4.18	81160	68127	13033	81160	7	7	0
4.19	81164	68127	13037	81164	4	4	0

(to be continued)

Table A1-5: Mainland ex Imported, The Implied and Adjusted Daily Newly Confirmed Cases
(continued)

Date	Mainland ex Imported: Cumulative Daily Newly Confirmed Cases (original official data)	Hubei ex Imported: Cumulative Newly Confirmed Cases (original official data corrected for inconsistencies and adjusted for surges)	Mainland ex Imported and Hubei: Cumulative Newly Confirmed Cases (original official data)	Mainland ex Imported: Cumulative Newly Confirmed Cases (original official data corrected for inconsistencies and adjusted for surges)	Mainland ex Imported: Implied Daily Newly Confirmed Cases (original official data)	Mainland ex Imported: Implied Daily Newly Confirmed Cases (corrected for inconsistencies and adjusted for surges)	Consistency Check
	Column 2 of Table A1-4	Column 5 of Table A1-3	Column 4 of Table A1-4	Column 3+Column 4			Column 7-Column 6
4.20	81171	68127	13044	81171	7	7	0
4.21	81178	68127	13051	81178	7	7	0
4.22	81182	68127	13055	81182	4	4	0
4.23	81186	68127	13059	81186	4	4	0
4.24	81187	68127	13060	81187	1	1	0
4.25	81193	68127	13066	81193	6	6	0
4.26	81194	68127	13067	81194	1	1	0
4.27	81197	68127	13070	81197	3	3	0
4.28	81198	68127	13071	81198	1	1	0
4.29	81198	68127	13071	81198	0	0	0
4.30	81204	68127	13077	81204	6	6	0
5.01	81204	68127	13077	81204	0	0	0
5.02	81205	68127	13078	81205	1	1	0
5.03	81205	68127	13078	81205	0	0	0
5.04	81205	68127	13078	81205	0	0	0
5.05	81205	68127	13078	81205	0	0	0
5.06	81205	68127	13078	81205	0	0	0
5.07	81206	68127	13079	81206	1	1	0
5.08	81206	68127	13079	81206	0	0	0
5.09	81218	68128	13090	81218	12	12	0
5.10	81228	68133	13095	81228	10	10	0
5.11	81228	68133	13095	81228	0	0	0
5.12	81234	68133	13101	81234	6	6	0
5.13	81237	68133	13104	81237	3	3	0
5.14	81241	68133	13108	81241	4	4	0
5.15	81243	68133	13110	81243	2	2	0
5.16	81247	68133	13114	81247	4	4	0
5.17	81250	68133	13117	81250	3	3	0
5.18	81253	68134	13119	81253	3	3	0
5.19	81257	68134	13123	81257	4	4	0
5.20	81258	68134	13124	81258	1	1	0
5.21	81260	68134	13126	81260	2	2	0
5.22	81260	68134	13126	81260	0	0	0
5.23	81261	68134	13127	81261	1	1	0
5.24	81261	68134	13127	81261	0	0	0
5.25	81261	68134	13127	81261	0	0	0
5.26	81261	68134	13127	81261	0	0	0
5.27	81261	68134	13127	81261	0	0	0
5.28	81261	68134	13127	81261	0	0	0
5.29	81261	68134	13127	81261	0	0	0
5.30	81261	68134	13127	81261	0	0	0
5.31	81261	68134	13127	81261	0	0	0

Chart A1-5: Mainland ex Imported: Implied and Adjusted Daily Newly Confirmed Cases



The Adjustment of the Daily New Deaths

Wuhan

The first death from COVID-19 was reported in Wuhan on 10 January 2020. In Table A1-6, column 2, the original official data on the cumulative number of new deaths in Wuhan are presented. The first check is whether these numbers are monotonically increasing over time. Unfortunately, they are not. The cumulative number was 1,036 on 2.12 and 1,016 on 2.13. Obviously, 1,036 must be an error. In column 3, we derive the implied numbers of daily new deaths from the cumulative data. In column 4, the original official data on the daily new deaths in Wuhan are presented. In column 5, the derived new deaths in column 3 are compared with the official data in column 4. It turns out that the data differ only on 2.13. The officially reported new deaths on 2.13 was 88. If 88 were adopted as the number of new deaths on 2.13, then subtracting it from 1,016 gives 928 as an estimated number of the cumulative deaths as of 2.12, which is used to replace 1,036, making the series of cumulative deaths monotonicity consistent. The corrected series is presented in column 6, and the numbers of daily newly confirmed cases derived therefrom in column 7, with 108 deaths on 2.12.

Even though there was a surge in the data on newly confirmed cases on 1.27, no similar surge was observed in the number of daily new deaths. There was a reported surge in new deaths of 216 on 2.12, when the definition of a “confirmed” case in Hubei was changed to conform to the practice in the rest of the Mainland. However, the 216 figure turned out to be an error and was replaced by 108. But even the 108 deaths on 2.12 could be from two separate sources, the deaths under the old definition, reported to be 82¹⁴, and the additional deaths under the new definition, given by 26 (108-82). This provided the basis for us to reallocate the 26 “excess” new deaths on 2.12 to the days between 1.10 and 2.12 on a proportional basis. The adjusted numbers of new deaths are presented in column 8. They are approximately 2.9% (26/902¹⁵) higher than before.

¹⁴ The Health Commission of Hubei released the total number of new deaths of 216 according to the new definition on 2.12, and identified the number of new deaths due to the new definition to be 134 on 2.12. The number of new deaths on 2.12 in accordance with the old definition was therefore 82 (216-134).

¹⁵ 902 is the sum of the daily new deaths in column 7 from 1.10 to 2.11 plus the 82 deaths on 2.12.

Finally, we need to reallocate the 1,290 additional deaths announced on 4.16 to the days from 1.10 to 4.16. This is done proportionally. The adjusted numbers of new deaths are presented in column 9. They are approximately 50.0% ($1,290/2,579$ ¹⁶) higher than before. In column 10, the daily numbers of cumulative deaths of the final adjusted series are presented and they agree exactly with the original official cumulative data in column 2 between 4.16 and 5.31.

¹⁶ 2,579 is the sum of the daily new deaths in column 8 from 1.10 to 4.15 plus 0 death on 4.16 before the surge.

Table A1-6: Wuhan ex Imported: The Official and Adjusted Daily New Deaths

Date	Wuhan ex Imported: Cumulative Deaths (original official data)	Wuhan ex Imported: Implied New Deaths Derived from Official Cumulative Data	Wuhan ex Imported: New Deaths (original official data)	Consistency Check	Wuhan ex Imported: Cumulative Deaths (original official data corrected for inconsistencies)	Wuhan ex Imported: Implied New Deaths (corrected for inconsistencies)	Wuhan ex Imported: New Deaths (corrected for inconsistencies and adjusted for the surge of 2.12)	Wuhan ex Imported: New Deaths (corrected for inconsistencies and adjusted for the surges of 2.12 and 4.16)	Wuhan ex Imported: Cumulative Deaths (final adjusted)
				Column 3- Column 4					
1.10	1	1	1	0	1	1	1	2	2
1.11	1	0	0	0	1	0	0	0	2
1.12	1	0	0	0	1	0	0	0	2
1.13	1	0	0	0	1	0	0	0	2
1.14	1	0	0	0	1	0	0	0	2
1.15	2	1	1	0	2	1	1	2	4
1.16	2	0	0	0	2	0	0	0	4
1.17	2	0	0	0	2	0	0	0	4
1.18	3	1	1	0	3	1	1	2	5
1.19	4	1	1	0	4	1	1	2	7
1.20	6	2	2	0	6	2	2	3	10
1.21	9	3	3	0	9	3	3	5	14
1.22	17	8	8	0	17	8	8	12	27
1.23	23	6	6	0	23	6	6	9	36
1.24	38	15	15	0	38	15	15	23	59
1.25	45	7	7	0	45	7	7	11	70
1.26	63	18	18	0	63	18	19	28	98
1.27	85	22	22	0	85	22	23	34	132
1.28	104	19	19	0	104	19	20	29	161
1.29	129	25	25	0	129	25	26	39	200
1.30	159	30	30	0	159	30	31	46	246
1.31	192	33	33	0	192	33	34	51	297
2.01	224	32	32	0	224	32	33	49	346
2.02	265	41	41	0	265	41	42	63	409
2.03	313	48	48	0	313	48	49	74	484
2.04	362	49	49	0	362	49	50	76	559
2.05	414	52	52	0	414	52	53	80	639
2.06	478	64	64	0	478	64	66	99	738
2.07	545	67	67	0	545	67	69	103	842
2.08	608	63	63	0	608	63	65	97	939
2.09	681	73	73	0	681	73	75	113	1052
2.10	748	67	67	0	748	67	69	103	1155
2.11	820	72	72	0	820	72	74	111	1266
2.12	1036	216	216	0	928	108	84	127	1393
2.13	1016	-20	88	-108	1016	88	88	132	1525
2.14	1123	107	107	0	1123	107	107	161	1685
2.15	1233	110	110	0	1233	110	110	165	1850
2.16	1309	76	76	0	1309	76	76	114	1964
2.17	1381	72	72	0	1381	72	72	108	2072
2.18	1497	116	116	0	1497	116	116	174	2246
2.19	1585	88	88	0	1585	88	88	132	2378
2.20	1684	99	99	0	1684	99	99	149	2527
2.21	1774	90	90	0	1774	90	90	135	2662
2.22	1856	82	82	0	1856	82	82	123	2785
2.23	1987	131	131	0	1987	131	131	197	2981
2.24	2043	56	56	0	2043	56	56	84	3065
2.25	2085	42	42	0	2085	42	42	63	3128
2.26	2104	19	19	0	2104	19	19	29	3157
2.27	2132	28	28	0	2132	28	28	42	3199
2.28	2169	37	37	0	2169	37	37	56	3254
2.29	2195	26	26	0	2195	26	26	39	3293

(to be continued)

Table A1-6: Wuhan ex Imported: The Official and Adjusted Daily New Deaths (continued)

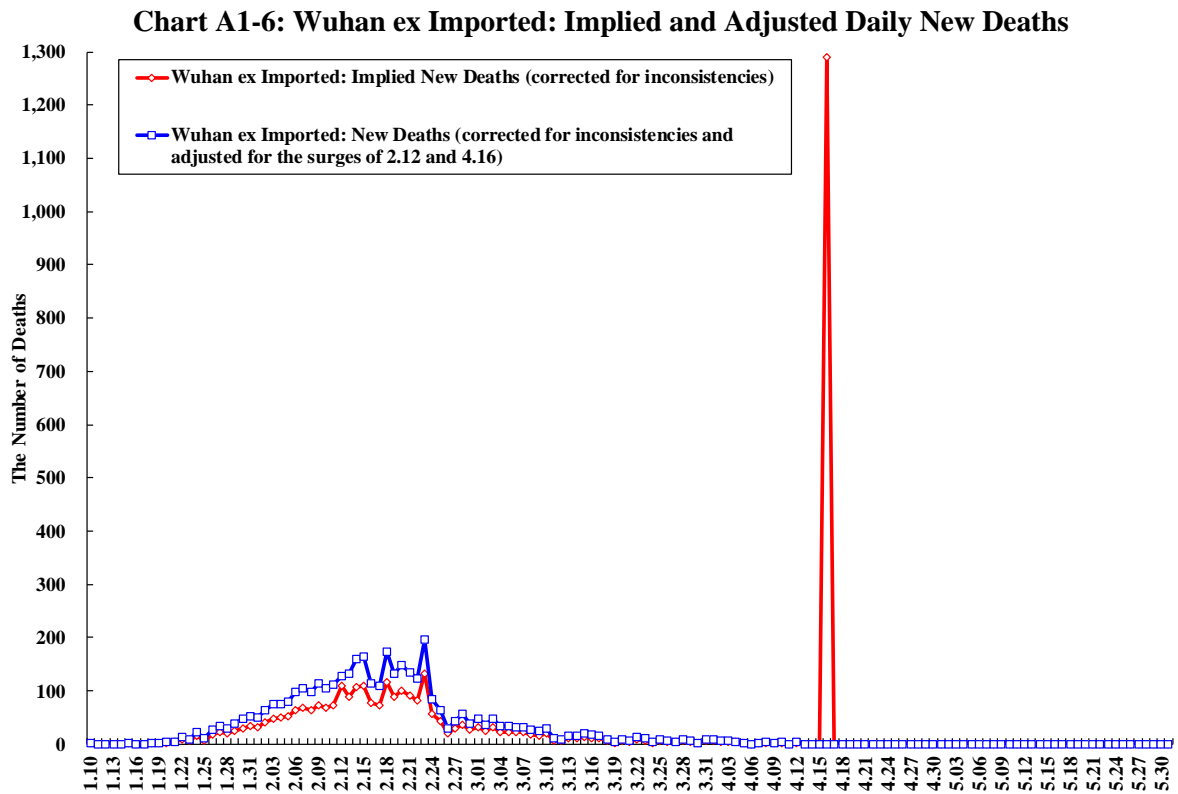
Date	Wuhan ex Imported: Cumulative Deaths (original official data)	Wuhan ex Imported: Implied New Deaths Derived from Official Cumulative Data	Wuhan ex Imported: New Deaths (original official data)	Consistency Check	Wuhan ex Imported: Cumulative Deaths (original official data corrected for inconsistencies)	Wuhan ex Imported: Implied New Deaths (corrected for inconsistencies)	Wuhan ex Imported: New Deaths (corrected for inconsistencies and adjusted for the surge of 2.12)	Wuhan ex Imported: New Deaths (corrected for inconsistencies and adjusted for the surges of 2.12 and 4.16)	Wuhan ex Imported: Cumulative Deaths (final adjusted)
					Column 3- Column 4				
3.01	2227	32	32	0	2227	32	32	48	3341
3.02	2251	24	24	0	2251	24	24	36	3377
3.03	2282	31	31	0	2282	31	31	47	3424
3.04	2305	23	23	0	2305	23	23	35	3458
3.05	2328	23	23	0	2328	23	23	35	3493
3.06	2349	21	21	0	2349	21	21	32	3524
3.07	2370	21	21	0	2370	21	21	32	3556
3.08	2388	18	18	0	2388	18	18	27	3583
3.09	2404	16	16	0	2404	16	16	24	3607
3.10	2423	19	19	0	2423	19	19	29	3635
3.11	2430	7	7	0	2430	7	7	11	3646
3.12	2436	6	6	0	2436	6	6	9	3655
3.13	2446	10	10	0	2446	10	10	15	3670
3.14	2456	10	10	0	2456	10	10	15	3685
3.15	2469	13	13	0	2469	13	13	20	3704
3.16	2480	11	11	0	2480	11	11	17	3721
3.17	2490	10	10	0	2490	10	10	15	3736
3.18	2496	6	6	0	2496	6	6	9	3745
3.19	2498	2	2	0	2498	2	2	3	3748
3.20	2504	6	6	0	2504	6	6	9	3757
3.21	2508	4	4	0	2508	4	4	6	3763
3.22	2517	9	9	0	2517	9	9	14	3776
3.23	2524	7	7	0	2524	7	7	11	3787
3.24	2526	2	2	0	2526	2	2	3	3790
3.25	2531	5	5	0	2531	5	5	8	3797
3.26	2535	4	4	0	2535	4	4	6	3803
3.27	2538	3	3	0	2538	3	3	5	3808
3.28	2543	5	5	0	2543	5	5	8	3815
3.29	2547	4	4	0	2547	4	4	6	3821
3.30	2548	1	1	0	2548	1	1	2	3823
3.31	2553	5	5	0	2553	5	5	8	3830
4.01	2559	6	6	0	2559	6	6	9	3839
4.02	2563	4	4	0	2563	4	4	6	3845
4.03	2567	4	4	0	2567	4	4	6	3851
4.04	2570	3	3	0	2570	3	3	5	3856
4.05	2571	1	1	0	2571	1	1	2	3857
4.06	2571	0	0	0	2571	0	0	0	3857
4.07	2572	1	1	0	2572	1	1	2	3859
4.08	2574	2	2	0	2574	2	2	3	3862
4.09	2575	1	1	0	2575	1	1	2	3863
4.10	2577	2	2	0	2577	2	2	3	3866
4.11	2577	0	0	0	2577	0	0	0	3866
4.12	2579	2	2	0	2579	2	2	3	3869
4.13	2579	0	0	0	2579	0	0	0	3869
4.14	2579	0	0	0	2579	0	0	0	3869
4.15	2579	0	0	0	2579	0	0	0	3869
4.16	3869	1290	1290	0	3869	1290	1290	0	3869
4.17	3869	0	0	0	3869	0	0	0	3869
4.18	3869	0	0	0	3869	0	0	0	3869
4.19	3869	0	0	0	3869	0	0	0	3869

(to be continued)

Table A1-6: Wuhan ex Imported: The Official and Adjusted Daily New Deaths (continued)

Date	Wuhan ex Imported: Cumulative Deaths (original official data)	Wuhan ex Imported: Implied New Deaths Derived from Official Cumulative Data	Wuhan ex Imported: New Deaths (original official data)	Consistency Check	Wuhan ex Imported: Cumulative Deaths (original official data corrected for inconsistencies)	Wuhan ex Imported: Implied New Deaths (corrected for inconsistencies)	Wuhan ex Imported: New Deaths (corrected for inconsistencies and adjusted for the surge of 2.12)	Wuhan ex Imported: New Deaths (corrected for inconsistencies and adjusted for the surges of 2.12 and 4.16)	Wuhan ex Imported: Cumulative Deaths (final adjusted)
	Column 3- Column 4								
4.20	3869	0	0	0	3869	0	0	0	3869
4.21	3869	0	0	0	3869	0	0	0	3869
4.22	3869	0	0	0	3869	0	0	0	3869
4.23	3869	0	0	0	3869	0	0	0	3869
4.24	3869	0	0	0	3869	0	0	0	3869
4.25	3869	0	0	0	3869	0	0	0	3869
4.26	3869	0	0	0	3869	0	0	0	3869
4.27	3869	0	0	0	3869	0	0	0	3869
4.28	3869	0	0	0	3869	0	0	0	3869
4.29	3869	0	0	0	3869	0	0	0	3869
4.30	3869	0	0	0	3869	0	0	0	3869
5.01	3869	0	0	0	3869	0	0	0	3869
5.02	3869	0	0	0	3869	0	0	0	3869
5.03	3869	0	0	0	3869	0	0	0	3869
5.04	3869	0	0	0	3869	0	0	0	3869
5.05	3869	0	0	0	3869	0	0	0	3869
5.06	3869	0	0	0	3869	0	0	0	3869
5.07	3869	0	0	0	3869	0	0	0	3869
5.08	3869	0	0	0	3869	0	0	0	3869
5.09	3869	0	0	0	3869	0	0	0	3869
5.10	3869	0	0	0	3869	0	0	0	3869
5.11	3869	0	0	0	3869	0	0	0	3869
5.12	3869	0	0	0	3869	0	0	0	3869
5.13	3869	0	0	0	3869	0	0	0	3869
5.14	3869	0	0	0	3869	0	0	0	3869
5.15	3869	0	0	0	3869	0	0	0	3869
5.16	3869	0	0	0	3869	0	0	0	3869
5.17	3869	0	0	0	3869	0	0	0	3869
5.18	3869	0	0	0	3869	0	0	0	3869
5.19	3869	0	0	0	3869	0	0	0	3869
5.20	3869	0	0	0	3869	0	0	0	3869
5.21	3869	0	0	0	3869	0	0	0	3869
5.22	3869	0	0	0	3869	0	0	0	3869
5.23	3869	0	0	0	3869	0	0	0	3869
5.24	3869	0	0	0	3869	0	0	0	3869
5.25	3869	0	0	0	3869	0	0	0	3869
5.26	3869	0	0	0	3869	0	0	0	3869
5.27	3869	0	0	0	3869	0	0	0	3869
5.28	3869	0	0	0	3869	0	0	0	3869
5.29	3869	0	0	0	3869	0	0	0	3869
5.30	3869	0	0	0	3869	0	0	0	3869
5.31	3869	0	0	0	3869	0	0	0	3869

In Chart A1-6, both the original implied official (corrected for inconsistencies, column 7, red line) and the final adjusted (column 9, blue line) data on new deaths in Wuhan are presented and compared. The areas under the two curves are the same, as they should be, since the cumulative total of the adjusted series must be the same as the cumulative total of the consistency-corrected original series.



Hubei ex Wuhan

In Table A1-7, the original official data on the cumulative deaths (column 2) and daily new deaths (column 4) in Hubei ex Wuhan are presented. The implied daily new deaths from the cumulative data are presented in column 3. Columns 3 and 4 are compared in column 5. They are actually the same on every date except for 2.13 when the difference is 23 and 2.14 when the difference is -23. We believe that this was simply a date-entry error. In addition, the daily new death data, which give 28 and 32 for 2.13 and 2.14 respectively seem much more reasonable. We therefore adopt the latter, resulting in a number of 302 for cumulative deaths on 2.13. There does not seem to be a surge on 2.12 despite the change in the definition of a confirmed case in Hubei. And there was no upward adjustment in either cases or deaths on 4.16. The implied daily new deaths corrected for inconsistencies in Hubei ex Wuhan are presented in column 7. The cumulative total numbers of deaths after 2.13 are identical for both the original official data (column 2) and the corrected data (column 8).

In Chart A1-7, the original implied daily new deaths for Hubei ex Wuhan (red line) are compared with the implied daily new deaths (blue line) with the inconsistencies corrected. We note that the areas under the curve are the same for both lines, reflecting the fact that the cumulative total number of deaths remains the same before and after the adjustments.

Table A1-7: Hubei ex Imported and Wuhan: The Official and Adjusted Daily New Deaths

Date	Hubei ex Imported and Wuhan: Cumulative Deaths (original official data)	Hubei ex Imported and Wuhan: Implied New Deaths Derived from Cumulative Deaths (original official data)	Hubei ex Imported and Wuhan: New Deaths (original official data)	Consistency Check	Hubei ex Imported and Wuhan: Cumulative Deaths (corrected for inconsistencies)	Hubei ex Imported and Wuhan: Implied New Deaths (corrected for inconsistencies)	Hubei ex Imported and Wuhan: Cumulative Deaths (final adjusted)
					Column 3- Column 4		
1.10	0	0	0	0	0	0	0
1.11	0	0	0	0	0	0	0
1.12	0	0	0	0	0	0	0
1.13	0	0	0	0	0	0	0
1.14	0	0	0	0	0	0	0
1.15	0	0	0	0	0	0	0
1.16	0	0	0	0	0	0	0
1.17	0	0	0	0	0	0	0
1.18	0	0	0	0	0	0	0
1.19	0	0	0	0	0	0	0
1.20	0	0	0	0	0	0	0
1.21	0	0	0	0	0	0	0
1.22	0	0	0	0	0	0	0
1.23	1	1	1	0	1	1	1
1.24	1	0	0	0	1	0	1
1.25	7	6	6	0	7	6	7
1.26	13	6	6	0	13	6	13
1.27	15	2	2	0	15	2	15
1.28	21	6	6	0	21	6	21
1.29	33	12	12	0	33	12	33
1.30	45	12	12	0	45	12	45
1.31	57	12	12	0	57	12	57
2.01	70	13	13	0	70	13	70
2.02	85	15	15	0	85	15	85
2.03	101	16	16	0	101	16	101
2.04	117	16	16	0	117	16	117
2.05	135	18	18	0	135	18	135
2.06	140	5	5	0	140	5	140
2.07	154	14	14	0	154	14	154
2.08	172	18	18	0	172	18	172
2.09	190	18	18	0	190	18	190
2.10	226	36	36	0	226	36	226
2.11	248	22	22	0	248	22	248
2.12	274	26	26	0	274	26	274
2.13	325	51	28	23	302	28	302
2.14	334	9	32	-23	334	32	334
2.15	363	29	29	0	363	29	363
2.16	387	24	24	0	387	24	387
2.17	408	21	21	0	408	21	408
2.18	424	16	16	0	424	16	424
2.19	444	20	20	0	444	20	444
2.20	460	16	16	0	460	16	460
2.21	476	16	16	0	476	16	476
2.22	490	14	14	0	490	14	490
2.23	508	18	18	0	508	18	508
2.24	520	12	12	0	520	12	520
2.25	530	10	10	0	530	10	530
2.26	537	7	7	0	537	7	537
2.27	550	13	13	0	550	13	550
2.28	558	8	8	0	558	8	558
2.29	566	8	8	0	566	8	566

(to be continued)

Table A1-7: Hubei ex Imported and Wuhan: The Official and Adjusted Daily New Deaths
(continued)

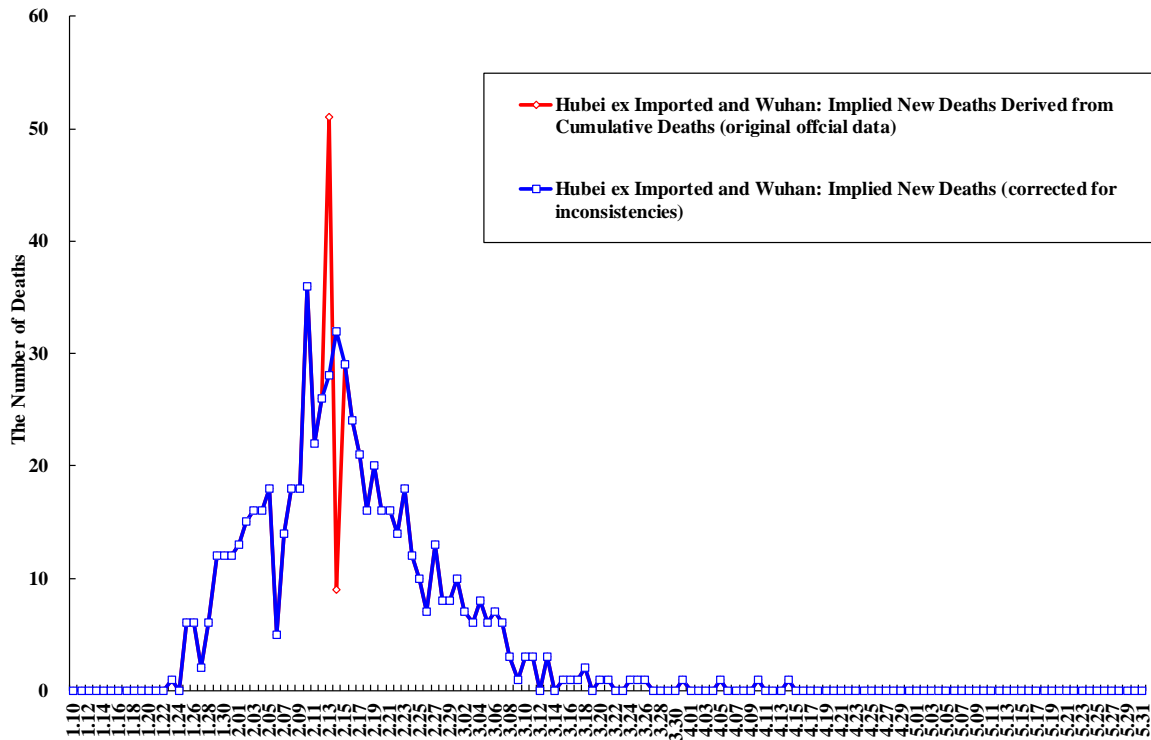
Date	Hubei ex Imported and Wuhan: Cumulative Deaths (original official data)	Hubei ex Imported and Wuhan: Implied New Deaths Derived from Cumulative Deaths (original official data)	Hubei ex Imported and Wuhan: New Deaths (original official data)	Consistency Check	Hubei ex Imported and Wuhan: Cumulative Deaths (corrected for inconsistencies)	Hubei ex Imported and Wuhan: Implied New Deaths (corrected for inconsistencies)	Hubei ex Imported and Wuhan: Cumulative Deaths (final adjusted)
					Column 3- Column 4		
3.01	576	10	10	0	576	10	576
3.02	583	7	7	0	583	7	583
3.03	589	6	6	0	589	6	589
3.04	597	8	8	0	597	8	597
3.05	603	6	6	0	603	6	603
3.06	610	7	7	0	610	7	610
3.07	616	6	6	0	616	6	616
3.08	619	3	3	0	619	3	619
3.09	620	1	1	0	620	1	620
3.10	623	3	3	0	623	3	623
3.11	626	3	3	0	626	3	626
3.12	626	0	0	0	626	0	626
3.13	629	3	3	0	629	3	629
3.14	629	0	0	0	629	0	629
3.15	630	1	1	0	630	1	630
3.16	631	1	1	0	631	1	631
3.17	632	1	1	0	632	1	632
3.18	634	2	2	0	634	2	634
3.19	634	0	0	0	634	0	634
3.20	635	1	1	0	635	1	635
3.21	636	1	1	0	636	1	636
3.22	636	0	0	0	636	0	636
3.23	636	0	0	0	636	0	636
3.24	637	1	1	0	637	1	637
3.25	638	1	1	0	638	1	638
3.26	639	1	1	0	639	1	639
3.27	639	0	0	0	639	0	639
3.28	639	0	0	0	639	0	639
3.29	639	0	0	0	639	0	639
3.30	639	0	0	0	639	0	639
3.31	640	1	1	0	640	1	640
4.01	640	0	0	0	640	0	640
4.02	640	0	0	0	640	0	640
4.03	640	0	0	0	640	0	640
4.04	640	0	0	0	640	0	640
4.05	641	1	1	0	641	1	641
4.06	641	0	0	0	641	0	641
4.07	641	0	0	0	641	0	641
4.08	641	0	0	0	641	0	641
4.09	641	0	0	0	641	0	641
4.10	642	1	1	0	642	1	642
4.11	642	0	0	0	642	0	642
4.12	642	0	0	0	642	0	642
4.13	642	0	0	0	642	0	642
4.14	643	1	1	0	643	1	643
4.15	643	0	0	0	643	0	643
4.16	643	0	0	0	643	0	643
4.17	643	0	0	0	643	0	643
4.18	643	0	0	0	643	0	643
4.19	643	0	0	0	643	0	643

(to be continued)

Table A1-7: Hubei ex Imported and Wuhan, The Official and Adjusted Daily New Deaths
(continued)

Date	Hubei ex Imported and Wuhan: Cumulative Deaths (original official data)	Hubei ex Imported and Wuhan: Implied New Deaths Derived from Cumulative Deaths (original official data)	Hubei ex Imported and Wuhan: New Deaths (original official data)	Consistency Check	Hubei ex Imported and Wuhan: Cumulative Deaths (corrected for inconsistencies)	Hubei ex Imported and Wuhan: Implied New Deaths (corrected for inconsistencies)	Hubei ex Imported and Wuhan: Cumulative Deaths (final adjusted)
	Column 3- Column 4						
4.20	643	0	0	0	643	0	643
4.21	643	0	0	0	643	0	643
4.22	643	0	0	0	643	0	643
4.23	643	0	0	0	643	0	643
4.24	643	0	0	0	643	0	643
4.25	643	0	0	0	643	0	643
4.26	643	0	0	0	643	0	643
4.27	643	0	0	0	643	0	643
4.28	643	0	0	0	643	0	643
4.29	643	0	0	0	643	0	643
4.30	643	0	0	0	643	0	643
5.01	643	0	0	0	643	0	643
5.02	643	0	0	0	643	0	643
5.03	643	0	0	0	643	0	643
5.04	643	0	0	0	643	0	643
5.05	643	0	0	0	643	0	643
5.06	643	0	0	0	643	0	643
5.07	643	0	0	0	643	0	643
5.08	643	0	0	0	643	0	643
5.09	643	0	0	0	643	0	643
5.10	643	0	0	0	643	0	643
5.11	643	0	0	0	643	0	643
5.12	643	0	0	0	643	0	643
5.13	643	0	0	0	643	0	643
5.14	643	0	0	0	643	0	643
5.15	643	0	0	0	643	0	643
5.16	643	0	0	0	643	0	643
5.17	643	0	0	0	643	0	643
5.18	643	0	0	0	643	0	643
5.19	643	0	0	0	643	0	643
5.20	643	0	0	0	643	0	643
5.21	643	0	0	0	643	0	643
5.22	643	0	0	0	643	0	643
5.23	643	0	0	0	643	0	643
5.24	643	0	0	0	643	0	643
5.25	643	0	0	0	643	0	643
5.26	643	0	0	0	643	0	643
5.27	643	0	0	0	643	0	643
5.28	643	0	0	0	643	0	643
5.29	643	0	0	0	643	0	643
5.30	643	0	0	0	643	0	643
5.31	643	0	0	0	643	0	643

**Chart A1-7: Hubei ex Imported and Wuhan:
Original and Corrected Implied Daily New Deaths**



Hubei

In Table A1-8, the original official data on the cumulative new deaths in the Province of Hubei as a whole are presented in column 2. The implied daily new deaths are presented in column 3 and they are compared with the adjusted data for Hubei, which consist of the sum of the adjusted data for Wuhan (column 4) and Hubei ex Wuhan (column 5), given in column 6. The adjusted series are larger than the original series because they reflect the effects of reallocation of the surges in new deaths on 2.12 and 4.16. Of course, the official and the adjusted data fully coincide after 4.16.

In Chart A1-8, the original implied daily new deaths for Hubei (red line) are compared with the adjusted daily new deaths (blue line) which has the inconsistencies corrected and the surges smoothed. We note that the areas under the curve are the same for both lines, reflecting the fact that the cumulative total number of deaths in Hubei remains the same before and after the adjustments.

Table A1-8: Hubei ex Imported: The Official and Adjusted Daily New Deaths

Date	Hubei ex Imported: Cumulative Deaths (original official data)	Hubei ex Imported: Implied Daily New Deaths (original official data)	Wuhan ex Imported: Daily New Deaths (final adjusted data)	Hubei ex Imported and Wuhan: Daily New Deaths (final adjusted data)	Hubei ex Imported : Daily New Deaths (final adjusted data)	Hubei ex Imported: Cumulative Deaths (final adjusted data)
			Column 9 of Table A1-6	Column 7 of Table A1-7	Column 4+Column 5	
1.10	1	1	2	0	2	2
1.11	1	0	0	0	0	2
1.12	1	0	0	0	0	2
1.13	1	0	0	0	0	2
1.14	1	0	0	0	0	2
1.15	2	1	2	0	2	4
1.16	2	0	0	0	0	4
1.17	2	0	0	0	0	4
1.18	3	1	2	0	2	5
1.19	4	1	2	0	2	7
1.20	6	2	3	0	3	10
1.21	9	3	5	0	5	14
1.22	17	8	12	0	12	27
1.23	24	7	9	1	10	37
1.24	39	15	23	0	23	60
1.25	52	13	11	6	17	77
1.26	76	24	28	6	34	111
1.27	100	24	34	2	36	147
1.28	125	25	29	6	35	182
1.29	162	37	39	12	51	233
1.30	204	42	46	12	58	291
1.31	249	45	51	12	63	354
2.01	294	45	49	13	62	416
2.02	350	56	63	15	78	494
2.03	414	64	74	16	90	585
2.04	479	65	76	16	92	676
2.05	549	70	80	18	98	774
2.06	618	69	99	5	104	878
2.07	699	81	103	14	117	996
2.08	780	81	97	18	115	1111
2.09	871	91	113	18	131	1242
2.10	974	103	103	36	139	1381
2.11	1068	94	111	22	133	1514
2.12	1310	242	127	26	153	1667
2.13	1341	31	132	28	160	1827
2.14	1457	116	161	32	193	2019
2.15	1596	139	165	29	194	2213
2.16	1696	100	114	24	138	2351
2.17	1789	93	108	21	129	2480
2.18	1921	132	174	16	190	2670
2.19	2029	108	132	20	152	2822
2.20	2144	115	149	16	165	2987
2.21	2250	106	135	16	151	3138
2.22	2346	96	123	14	137	3275
2.23	2495	149	197	18	215	3489
2.24	2563	68	84	12	96	3585
2.25	2615	52	63	10	73	3658
2.26	2641	26	29	7	36	3694
2.27	2682	41	42	13	55	3749
2.28	2727	45	56	8	64	3812
2.29	2761	34	39	8	47	3859

(to be continued)

Table A1-8: Hubei ex Imported: The Official and Adjusted Daily New Deaths (continued)

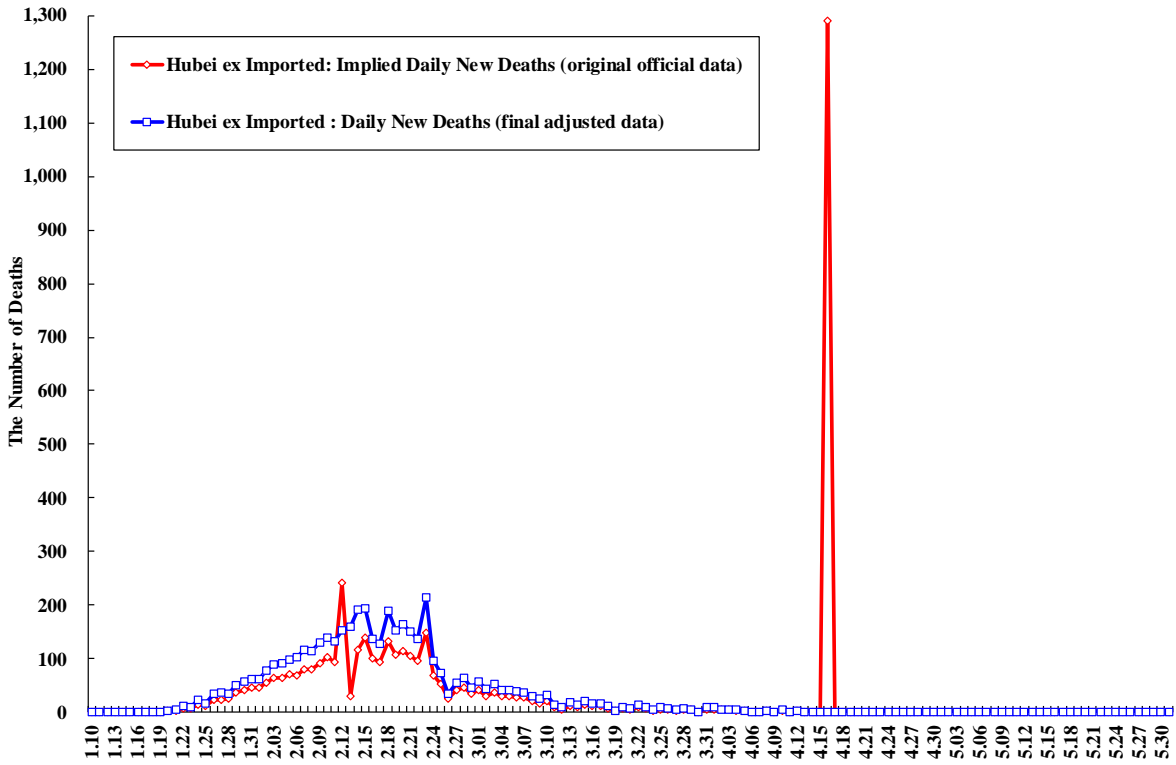
Date	Hubei ex Imported: Cumulative Deaths (original official data)	Hubei ex Imported: Implied Daily New Deaths (original official data)	Wuhan ex Imported: Daily New Deaths (final adjusted data)	Hubei ex Imported and Wuhan: Daily New Deaths (final adjusted data)	Hubei ex Imported : Daily New Deaths (final adjusted data)	Hubei ex Imported: Cumulative Deaths (final adjusted data)
			Column 9 of Table A1-6	Column 7 of Table A1-7	Column 4+Column 5	
3.01	2803	42	48	10	58	3917
3.02	2834	31	36	7	43	3960
3.03	2871	37	47	6	53	4013
3.04	2902	31	35	8	43	4055
3.05	2931	29	35	6	41	4096
3.06	2959	28	32	7	39	4134
3.07	2986	27	32	6	38	4172
3.08	3007	21	27	3	30	4202
3.09	3024	17	24	1	25	4227
3.10	3046	22	29	3	32	4258
3.11	3056	10	11	3	14	4272
3.12	3062	6	9	0	9	4281
3.13	3075	13	15	3	18	4299
3.14	3085	10	15	0	15	4314
3.15	3099	14	20	1	21	4334
3.16	3111	12	17	1	18	4352
3.17	3122	11	15	1	16	4368
3.18	3130	8	9	2	11	4379
3.19	3132	2	3	0	3	4382
3.20	3139	7	9	1	10	4392
3.21	3144	5	6	1	7	4399
3.22	3153	9	14	0	14	4412
3.23	3160	7	11	0	11	4423
3.24	3163	3	3	1	4	4427
3.25	3169	6	8	1	9	4435
3.26	3174	5	6	1	7	4442
3.27	3177	3	5	0	5	4447
3.28	3182	5	8	0	8	4454
3.29	3186	4	6	0	6	4460
3.30	3187	1	2	0	2	4462
3.31	3193	6	8	1	9	4470
4.01	3199	6	9	0	9	4479
4.02	3203	4	6	0	6	4485
4.03	3207	4	6	0	6	4491
4.04	3210	3	5	0	5	4496
4.05	3212	2	2	1	3	4498
4.06	3212	0	0	0	0	4498
4.07	3213	1	2	0	2	4500
4.08	3215	2	3	0	3	4503
4.09	3216	1	2	0	2	4504
4.10	3219	3	3	1	4	4508
4.11	3219	0	0	0	0	4508
4.12	3221	2	3	0	3	4511
4.13	3221	0	0	0	0	4511
4.14	3222	1	0	1	1	4512
4.15	3222	0	0	0	0	4512
4.16	4512	1290	0	0	0	4512
4.17	4512	0	0	0	0	4512
4.18	4512	0	0	0	0	4512
4.19	4512	0	0	0	0	4512

(to be continued)

Table A1-8: Hubei ex Imported, The Official and Adjusted Daily New Deaths (continued)

Date	Hubei ex Imported: Cumulative Deaths (original official data)	Hubei ex Imported: Implied Daily New Deaths (original official data)	Wuhan ex Imported: Daily New Deaths (final adjusted data)	Hubei ex Imported and Wuhan: Daily New Deaths (final adjusted data)	Hubei ex Imported : Daily New Deaths (final adjusted data)	Hubei ex Imported: Cumulative Deaths (final adjusted data)
			Column 9 of Table A1-6	Column 7 of Table A1-7	Column 4+Column 5	
4.20	4512	0	0	0	0	4512
4.21	4512	0	0	0	0	4512
4.22	4512	0	0	0	0	4512
4.23	4512	0	0	0	0	4512
4.24	4512	0	0	0	0	4512
4.25	4512	0	0	0	0	4512
4.26	4512	0	0	0	0	4512
4.27	4512	0	0	0	0	4512
4.28	4512	0	0	0	0	4512
4.29	4512	0	0	0	0	4512
4.30	4512	0	0	0	0	4512
5.01	4512	0	0	0	0	4512
5.02	4512	0	0	0	0	4512
5.03	4512	0	0	0	0	4512
5.04	4512	0	0	0	0	4512
5.05	4512	0	0	0	0	4512
5.06	4512	0	0	0	0	4512
5.07	4512	0	0	0	0	4512
5.08	4512	0	0	0	0	4512
5.09	4512	0	0	0	0	4512
5.10	4512	0	0	0	0	4512
5.11	4512	0	0	0	0	4512
5.12	4512	0	0	0	0	4512
5.13	4512	0	0	0	0	4512
5.14	4512	0	0	0	0	4512
5.15	4512	0	0	0	0	4512
5.16	4512	0	0	0	0	4512
5.17	4512	0	0	0	0	4512
5.18	4512	0	0	0	0	4512
5.19	4512	0	0	0	0	4512
5.20	4512	0	0	0	0	4512
5.21	4512	0	0	0	0	4512
5.22	4512	0	0	0	0	4512
5.23	4512	0	0	0	0	4512
5.24	4512	0	0	0	0	4512
5.25	4512	0	0	0	0	4512
5.26	4512	0	0	0	0	4512
5.27	4512	0	0	0	0	4512
5.28	4512	0	0	0	0	4512
5.29	4512	0	0	0	0	4512
5.30	4512	0	0	0	0	4512
5.31	4512	0	0	0	0	4512

Chart A1-8: Hubei ex Imported: Implied and Adjusted Daily New Deaths



Mainland ex Hubei

In Table A1-9, the original official data on the cumulative deaths on the Mainland and in Hubei are presented in columns 2 and 3 respectively. In column 4, the original official data on the cumulative number of deaths in Mainland ex Hubei are calculated as the difference between columns 2 and 3. The first check is whether these cumulative numbers in column 4 are monotonically increasing over time. They are not. The cumulative number was 57 on 2.12 and 39 on 2.13. Obviously, either 57 or 39 or both must be errors. In column 5, we derive the implied number of daily new deaths from the cumulative data. In column 6, the original official data on the daily new deaths in Mainland ex Hubei are presented. Columns 5 and 6 agree completely except on 2.13 and 2.14. However, if we adopt the official number of daily new deaths on 2.13 of 5, the cumulative number on 2.13 becomes 62, and if we add the official number of daily new deaths on 2.14 of 4 on 2.14, we obtain 66, precisely the same as the cumulative number of deaths on 2.14 in column 4. We conclude that this must be the appropriate correction of the inconsistency in the original official cumulative data. As there has been no change in the definition of a “confirmed” case outside of Hubei, and there were no upward adjustments of either confirmed cases or deaths, no further adjustment is necessary. Once the consistency correction is made, the implied series of new deaths in Mainland ex Hubei (column 8) turn out to be exactly the same as the original official data on daily new deaths (column 6). Since the two series are identical, so are their cumulative totals. In addition, the two lines will be identical. Thus, only one line, the blue line, will be presented in Chart A1-9.

Table A1-9: Mainland ex Imported and Hubei: Original and Corrected Daily New Deaths

Date	Mainland ex Imported: Cumulative Deaths (original official data)	Hubei ex Imported: Cumulative Deaths (original official data)	Mainland ex Imported and Hubei: Cumulative Deaths	Mainland ex Imported and Hubei: Implied Daily New Deaths	Mainland ex Imported and Hubei: Daily New Deaths (original official data)	Mainland ex Imported and Hubei: Cumulative Deaths (corrected for inconsistencies)	Mainland ex Imported and Hubei: Derived Daily New Deaths (corrected for inconsistencies)
			Column 2-Column 3	from Column 4			
1.10	1	1	0	0	0	0	0
1.11	1	1	0	0	0	0	0
1.12	1	1	0	0	0	0	0
1.13	1	1	0	0	0	0	0
1.14	1	1	0	0	0	0	0
1.15	2	2	0	0	0	0	0
1.16	2	2	0	0	0	0	0
1.17	2	2	0	0	0	0	0
1.18	3	3	0	0	0	0	0
1.19	4	4	0	0	0	0	0
1.20	6	6	0	0	0	0	0
1.21	9	9	0	0	0	0	0
1.22	17	17	0	0	0	0	0
1.23	25	24	1	1	1	1	1
1.24	41	39	2	1	1	2	1
1.25	56	52	4	2	2	4	2
1.26	80	76	4	0	0	4	0
1.27	106	100	6	2	2	6	2
1.28	132	125	7	1	1	7	1
1.29	170	162	8	1	1	8	1
1.30	213	204	9	1	1	9	1
1.31	259	249	10	1	1	10	1
2.01	304	294	10	0	0	10	0
2.02	361	350	11	1	1	11	1
2.03	425	414	11	0	0	11	0
2.04	490	479	11	0	0	11	0
2.05	563	549	14	3	3	14	3
2.06	636	618	18	4	4	18	4
2.07	722	699	23	5	5	23	5
2.08	811	780	31	8	8	31	8
2.09	908	871	37	6	6	37	6
2.10	1016	974	42	5	5	42	5
2.11	1113	1068	45	3	3	45	3
2.12	1367	1310	57	12	12	57	12
2.13	1380	1341	39	-18	5	62	5
2.14	1523	1457	66	27	4	66	4
2.15	1665	1596	69	3	3	69	3
2.16	1770	1696	74	5	5	74	5
2.17	1868	1789	79	5	5	79	5
2.18	2004	1921	83	4	4	83	4
2.19	2118	2029	89	6	6	89	6
2.20	2236	2144	92	3	3	92	3
2.21	2345	2250	95	3	3	95	3
2.22	2442	2346	96	1	1	96	1
2.23	2592	2495	97	1	1	97	1
2.24	2663	2563	100	3	3	100	3
2.25	2715	2615	100	0	0	100	0
2.26	2744	2641	103	3	3	103	3
2.27	2788	2682	106	3	3	106	3
2.28	2835	2727	108	2	2	108	2
2.29	2870	2761	109	1	1	109	1

(to be continued)

Table A1-9: Mainland ex Imported and Hubei: Original and Corrected Daily New Deaths
(continued)

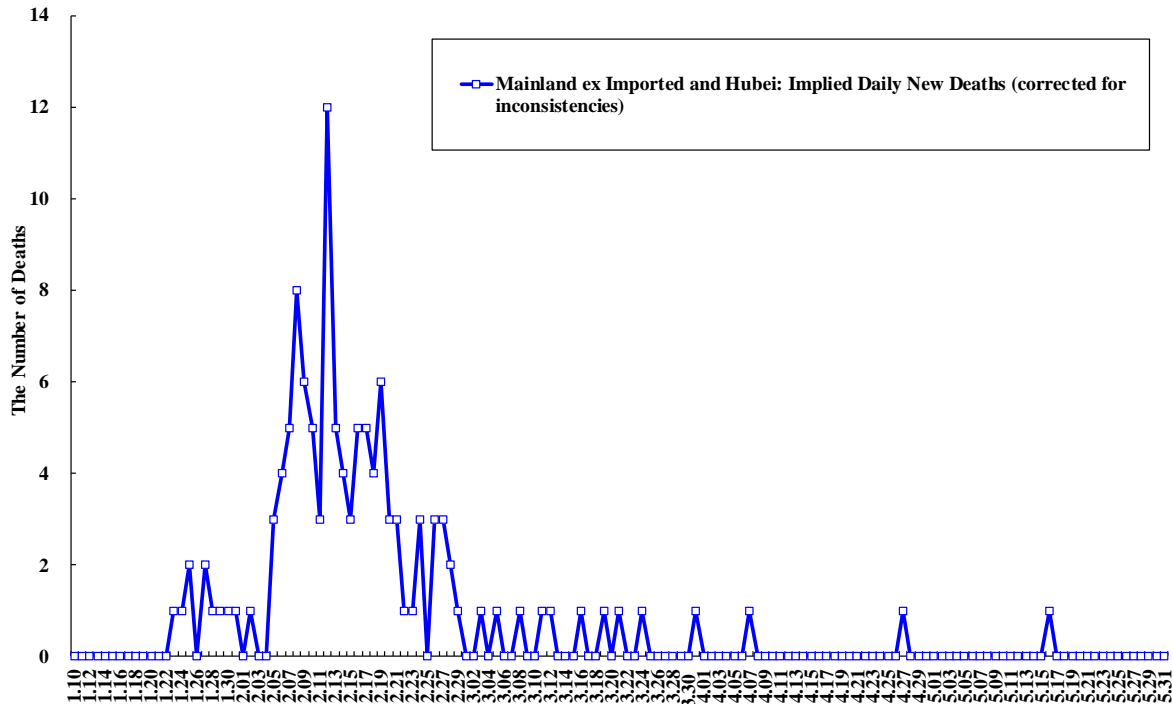
Date	Mainland ex Imported: Cumulative Deaths (original official data)	Hubei ex Imported: Cumulative Deaths (original official data)	Mainland ex Imported and Hubei: Cumulative Deaths	Mainland ex Imported and Hubei: Implied Daily New Deaths	Mainland ex Imported and Hubei: Daily New Deaths (original official data)	Mainland ex Imported and Hubei: Cumulative Deaths (corrected for inconsistencies)	Mainland ex Imported and Hubei: Derived Daily New Deaths (corrected for inconsistencies)
			Column 2- Column 3	from Column 4			
3.01	2912	2803	109	0	0	109	0
3.02	2943	2834	109	0	0	109	0
3.03	2981	2871	110	1	1	110	1
3.04	3012	2902	110	0	0	110	0
3.05	3042	2931	111	1	1	111	1
3.06	3070	2959	111	0	0	111	0
3.07	3097	2986	111	0	0	111	0
3.08	3119	3007	112	1	1	112	1
3.09	3136	3024	112	0	0	112	0
3.10	3158	3046	112	0	0	112	0
3.11	3169	3056	113	1	1	113	1
3.12	3176	3062	114	1	1	114	1
3.13	3189	3075	114	0	0	114	0
3.14	3199	3085	114	0	0	114	0
3.15	3213	3099	114	0	0	114	0
3.16	3226	3111	115	1	1	115	1
3.17	3237	3122	115	0	0	115	0
3.18	3245	3130	115	0	0	115	0
3.19	3248	3132	116	1	1	116	1
3.20	3255	3139	116	0	0	116	0
3.21	3261	3144	117	1	1	117	1
3.22	3270	3153	117	0	0	117	0
3.23	3277	3160	117	0	0	117	0
3.24	3281	3163	118	1	1	118	1
3.25	3287	3169	118	0	0	118	0
3.26	3292	3174	118	0	0	118	0
3.27	3295	3177	118	0	0	118	0
3.28	3300	3182	118	0	0	118	0
3.29	3304	3186	118	0	0	118	0
3.30	3305	3187	118	0	0	118	0
3.31	3312	3193	119	1	1	119	1
4.01	3318	3199	119	0	0	119	0
4.02	3322	3203	119	0	0	119	0
4.03	3326	3207	119	0	0	119	0
4.04	3329	3210	119	0	0	119	0
4.05	3331	3212	119	0	0	119	0
4.06	3331	3212	119	0	0	119	0
4.07	3333	3213	120	1	1	120	1
4.08	3335	3215	120	0	0	120	0
4.09	3336	3216	120	0	0	120	0
4.10	3339	3219	120	0	0	120	0
4.11	3339	3219	120	0	0	120	0
4.12	3341	3221	120	0	0	120	0
4.13	3341	3221	120	0	0	120	0
4.14	3342	3222	120	0	0	120	0
4.15	3342	3222	120	0	0	120	0
4.16	4632	4512	120	0	0	120	0
4.17	4632	4512	120	0	0	120	0
4.18	4632	4512	120	0	0	120	0
4.19	4632	4512	120	0	0	120	0

(to be continued)

Table A1-9: Mainland ex Imported and Hubei, Original and Corrected Daily New Deaths
(continued)

Date	Mainland ex Imported: Cumulative Deaths (original official data)	Hubei ex Imported: Cumulative Deaths (original official data)	Mainland ex Imported and Hubei: Cumulative Deaths	Mainland ex Imported and Hubei: Implied Daily New Deaths	Mainland ex Imported and Hubei: Daily New Deaths (original official data)	Mainland ex Imported and Hubei: Cumulative Deaths (corrected for inconsistencies)	Mainland ex Imported and Hubei: Derived Daily New Deaths (corrected for inconsistencies)
			Column 2- Column 3	from Column 4			
4.20	4632	4512	120	0	0	120	0
4.21	4632	4512	120	0	0	120	0
4.22	4632	4512	120	0	0	120	0
4.23	4632	4512	120	0	0	120	0
4.24	4632	4512	120	0	0	120	0
4.25	4632	4512	120	0	0	120	0
4.26	4632	4512	120	0	0	120	0
4.27	4633	4512	121	1	1	121	1
4.28	4633	4512	121	0	0	121	0
4.29	4633	4512	121	0	0	121	0
4.30	4633	4512	121	0	0	121	0
5.01	4633	4512	121	0	0	121	0
5.02	4633	4512	121	0	0	121	0
5.03	4633	4512	121	0	0	121	0
5.04	4633	4512	121	0	0	121	0
5.05	4633	4512	121	0	0	121	0
5.06	4633	4512	121	0	0	121	0
5.07	4633	4512	121	0	0	121	0
5.08	4633	4512	121	0	0	121	0
5.09	4633	4512	121	0	0	121	0
5.10	4633	4512	121	0	0	121	0
5.11	4633	4512	121	0	0	121	0
5.12	4633	4512	121	0	0	121	0
5.13	4633	4512	121	0	0	121	0
5.14	4633	4512	121	0	0	121	0
5.15	4633	4512	121	0	0	121	0
5.16	4634	4512	122	1	0	122	1
5.17	4634	4512	122	0	0	122	0
5.18	4634	4512	122	0	0	122	0
5.19	4634	4512	122	0	0	122	0
5.20	4634	4512	122	0	0	122	0
5.21	4634	4512	122	0	0	122	0
5.22	4634	4512	122	0	0	122	0
5.23	4634	4512	122	0	0	122	0
5.24	4634	4512	122	0	0	122	0
5.25	4634	4512	122	0	0	122	0
5.26	4634	4512	122	0	0	122	0
5.27	4634	4512	122	0	0	122	0
5.28	4634	4512	122	0	0	122	0
5.29	4634	4512	122	0	0	122	0
5.30	4634	4512	122	0	0	122	0
5.31	4634	4512	122	0	0	122	0

Chart A1-9: Mainland ex Imported and Hubei: Corrected Implied Daily New Deaths



The Mainland as a Whole

In Table A1-10, the original official data on the cumulative deaths on the entire Mainland are presented (column 2). There were similar surges in the number of daily new deaths on 2.12 and 4.16. The implied daily new deaths (column 3) are compared with the adjusted data for the Mainland (column 6), which consist of the sum of the adjusted data for Mainland ex Hubei and Hubei. The adjusted data are always greater than the implied data except for the surge dates of 2.12 and 4.16 because of the reallocation of the surges. Of course, the official and the adjusted cumulative data fully coincide after 4.16.

In Chart A1-10, the original implied daily new deaths for the Mainland as a whole (red line) are compared with the adjusted daily new deaths (blue line) which have the inconsistencies corrected and the surges smoothed. We note that the areas under the curve are the same for both lines, reflecting the fact that the cumulative total number of deaths remains the same before and after the adjustments.

Table A1-10: Mainland ex Imported: Original Implied and Adjusted Daily New Deaths

Date	Mainland ex Imported: Cumulative Deaths (original official data)	Mainland ex Imported: Implied New Deaths (original official data)	Mainland ex Imported and Hubei: Derived Daily New Deaths (corrected for inconsistencies)	Hubei ex Imported: Daily New Deaths (corrected for inconsistencies and adjusted for surges)	Mainland ex Imported: Implied Daily New Deaths (corrected for inconsistencies and adjusted for surges)	Mainland ex Imported: Cumulative Deaths (corrected for inconsistencies and adjusted for surges)
	Column 2 of Table A1-9		Column 8 of Table A1-9	Column 6 of Table A1-8	Column 4+Column 5	
1.10	1	1	0	2	2	2
1.11	1	0	0	0	0	2
1.12	1	0	0	0	0	2
1.13	1	0	0	0	0	2
1.14	1	0	0	0	0	2
1.15	2	1	0	2	2	3
1.16	2	0	0	0	0	3
1.17	2	0	0	0	0	3
1.18	3	1	0	2	2	5
1.19	4	1	0	2	2	6
1.20	6	2	0	3	3	9
1.21	9	3	0	5	5	14
1.22	17	8	0	12	12	26
1.23	25	8	1	10	11	37
1.24	41	16	1	23	24	62
1.25	56	15	2	17	19	80
1.26	80	24	0	34	34	114
1.27	106	26	2	36	38	152
1.28	132	26	1	35	36	189
1.29	170	38	1	51	52	240
1.30	213	43	1	58	59	299
1.31	259	46	1	63	64	363
2.01	304	45	0	62	62	426
2.02	361	57	1	78	79	505
2.03	425	64	0	90	90	595
2.04	490	65	0	92	92	687
2.05	563	73	3	98	101	788
2.06	636	73	4	104	108	896
2.07	722	86	5	117	122	1018
2.08	811	89	8	115	123	1141
2.09	908	97	6	131	137	1278
2.10	1016	108	5	139	144	1422
2.11	1113	97	3	133	136	1559
2.12	1367	254	12	153	165	1723
2.13	1380	13	5	160	165	1888
2.14	1523	143	4	193	197	2085
2.15	1665	142	3	194	197	2282
2.16	1770	105	5	138	143	2425
2.17	1868	98	5	129	134	2559
2.18	2004	136	4	190	194	2753
2.19	2118	114	6	152	158	2911
2.20	2236	118	3	165	168	3078
2.21	2345	109	3	151	154	3232
2.22	2442	97	1	137	138	3370
2.23	2592	150	1	215	216	3586
2.24	2663	71	3	96	99	3685
2.25	2715	52	0	73	73	3758
2.26	2744	29	3	36	39	3796
2.27	2788	44	3	55	58	3854
2.28	2835	47	2	64	66	3920
2.29	2870	35	1	47	48	3968

(to be continued)

Table A1-10: Mainland ex Imported: Original Implied and Adjusted Daily New Deaths
(continued)

Date	Mainland ex Imported: Cumulative Deaths (original official data)	Mainland ex Imported: Implied New Deaths (original official data)	Mainland ex Imported and Hubei: Derived Daily New Deaths (corrected for inconsistencies)	Hubei ex Imported: Daily New Deaths (corrected for inconsistencies and adjusted for surges)	Mainland ex Imported: Implied Daily New Deaths (corrected for inconsistencies and adjusted for surges)	Mainland ex Imported: Cumulative Deaths (corrected for inconsistencies and adjusted for surges)
	Column 2 of Table A1-9		Column 8 of Table A1-9	Column 6 of Table A1-8	Column 4+Column 5	
3.01	2912	42	0	58	58	4026
3.02	2943	31	0	43	43	4069
3.03	2981	38	1	53	54	4122
3.04	3012	31	0	43	43	4165
3.05	3042	30	1	41	42	4206
3.06	3070	28	0	39	39	4245
3.07	3097	27	0	38	38	4282
3.08	3119	22	1	30	31	4313
3.09	3136	17	0	25	25	4338
3.10	3158	22	0	32	32	4370
3.11	3169	11	1	14	15	4384
3.12	3176	7	1	9	10	4394
3.13	3189	13	0	18	18	4412
3.14	3199	10	0	15	15	4427
3.15	3213	14	0	21	21	4448
3.16	3226	13	1	18	19	4466
3.17	3237	11	0	16	16	4482
3.18	3245	8	0	11	11	4493
3.19	3248	3	1	3	4	4497
3.20	3255	7	0	10	10	4507
3.21	3261	6	1	7	8	4515
3.22	3270	9	0	14	14	4529
3.23	3277	7	0	11	11	4539
3.24	3281	4	1	4	5	4544
3.25	3287	6	0	9	9	4553
3.26	3292	5	0	7	7	4560
3.27	3295	3	0	5	5	4564
3.28	3300	5	0	8	8	4572
3.29	3304	4	0	6	6	4578
3.30	3305	1	0	2	2	4579
3.31	3312	7	1	9	10	4589
4.01	3318	6	0	9	9	4598
4.02	3322	4	0	6	6	4604
4.03	3326	4	0	6	6	4610
4.04	3329	3	0	5	5	4614
4.05	3331	2	0	3	3	4617
4.06	3331	0	0	0	0	4617
4.07	3333	2	1	2	3	4619
4.08	3335	2	0	3	3	4622
4.09	3336	1	0	2	2	4624
4.10	3339	3	0	4	4	4628
4.11	3339	0	0	0	0	4628
4.12	3341	2	0	3	3	4631
4.13	3341	0	0	0	0	4631
4.14	3342	1	0	1	1	4632
4.15	3342	0	0	0	0	4632
4.16	4632	1290	0	0	0	4632
4.17	4632	0	0	0	0	4632
4.18	4632	0	0	0	0	4632
4.19	4632	0	0	0	0	4632

(to be continued)

Table A1-10: Mainland ex Imported: Original Implied and Adjusted Daily New Deaths
(continued)

Date	Mainland ex Imported: Cumulative Deaths (original official data)	Mainland ex Imported: Implied New Deaths (original official data)	Mainland ex Imported and Hubei: Derived Daily New Deaths (corrected for inconsistencies)	Hubei ex Imported: Daily New Deaths (corrected for inconsistencies and adjusted for surges)	Mainland ex Imported: Implied Daily New Deaths (corrected for inconsistencies and adjusted for surges)	Mainland ex Imported: Cumulative Deaths (corrected for inconsistencies and adjusted for surges)
	Column 2 of Table A1-9		Column 8 of Table A1-9	Column 6 of Table A1-8	Column 4+Column 5	
4.20	4632	0	0	0	0	4632
4.21	4632	0	0	0	0	4632
4.22	4632	0	0	0	0	4632
4.23	4632	0	0	0	0	4632
4.24	4632	0	0	0	0	4632
4.25	4632	0	0	0	0	4632
4.26	4632	0	0	0	0	4632
4.27	4633	1	1	0	1	4633
4.28	4633	0	0	0	0	4633
4.29	4633	0	0	0	0	4633
4.30	4633	0	0	0	0	4633
5.01	4633	0	0	0	0	4633
5.02	4633	0	0	0	0	4633
5.03	4633	0	0	0	0	4633
5.04	4633	0	0	0	0	4633
5.05	4633	0	0	0	0	4633
5.06	4633	0	0	0	0	4633
5.07	4633	0	0	0	0	4633
5.08	4633	0	0	0	0	4633
5.09	4633	0	0	0	0	4633
5.10	4633	0	0	0	0	4633
5.11	4633	0	0	0	0	4633
5.12	4633	0	0	0	0	4633
5.13	4633	0	0	0	0	4633
5.14	4633	0	0	0	0	4633
5.15	4633	0	0	0	0	4633
5.16	4634	1	1	0	1	4634
5.17	4634	0	0	0	0	4634
5.18	4634	0	0	0	0	4634
5.19	4634	0	0	0	0	4634
5.20	4634	0	0	0	0	4634
5.21	4634	0	0	0	0	4634
5.22	4634	0	0	0	0	4634
5.23	4634	0	0	0	0	4634
5.24	4634	0	0	0	0	4634
5.25	4634	0	0	0	0	4634
5.26	4634	0	0	0	0	4634
5.27	4634	0	0	0	0	4634
5.28	4634	0	0	0	0	4634
5.29	4634	0	0	0	0	4634
5.30	4634	0	0	0	0	4634
5.31	4634	0	0	0	0	4634

Chart A1-10: Mainland ex Imported: Original Implied and Adjusted Daily New Deaths

