Supplementary Materials

Characterising the asynchronous resurgence of common respiratory viruses following the onset of the COVID-19 pandemic

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Table of Contents

Supplementary results ***1***

Supplementary Table 1. Description of included studies **1**

Supplementary Table 2. Description of included surveillance reports. **3**

Supplementary Table 3. Description of included data from RSV GEN44 ..... **4**

Supplementary Table 4. Quality assessment results of included studies from the systematic literature search. **5**

Supplementary Table 5. Quality assessment results of included surveillance reports. **6**

Supplementary Table 6. Quality assessment results of data from RSV GEN. **10**

Supplementary Figure 1. Distribution of common respiratory virus activity in this study. **11**

Supplementary Figure 2. The virus-specific time interval (with 95% CI) between the peaks in two subsequent years in temperate regions. **12**

Supplementary Figure 3. The virus-specific time interval (with 95% CI) between the peaks in two subsequent years in tropics regions. **13**

Supplementary Figure 4. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by sites reporting influenza A virus subtypes. **14**

Supplementary Figure 5. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by sites reporting influenza A virus subtypes. **15**

Supplementary Figure 6. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by sites reporting PIV subtypes **16**

Supplementary Figure 7. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by sites reporting PIV subtypes **17**

Supplementary Figure 8. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in the temperate region. **18**

Supplementary Figure 9. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in the tropical region. **19**

Supplementary Figure 10. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in the northern temperate region. 20

Supplementary Figure 11. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in the northern temperate region. 21

Supplementary Figure 12. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in the southern temperate region. 22

Supplementary Figure 13. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in the southern temperate region. 23

Supplementary Figure 14. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in high-income countries. 24

Supplementary Figure 15. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in high-income countries. 25

Supplementary Figure 16. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by sites in non-high-income countries 26

Supplementary Figure 17. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in non-high-income countries. 27

Sensitivity analysis result 28

Supplementary Figure 18. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting positive proportion data. 28

Supplementary Figure 19. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting positive proportion data. 29

Supplementary Figure 20. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting positive cases data. 30

Supplementary Figure 21. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting positive cases data. 31

Supplementary Figure 22. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites using data extracted from systematic literature review. 32

Supplementary Figure 23. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites using data extracted from systematic literature review. 33

Supplementary Figure 24. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites using data extracted from databases. 34

Supplementary Figure 25. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites using data extracted from databases. 35

Supplementary Figure 26. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting monthly aggregated viral activity data. 36

Supplementary Figure 27. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting monthly aggregated viral activity data. 37

Supplementary Figure 28. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting weekly aggregated viral activity data. 38

Supplementary Figure 29. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting weekly aggregated viral activity data. 39

Supplementary Figure 30. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites providing moderate-to-high quality data. 40

Supplementary Figure 31. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites providing moderate-to-high quality data. 41

Supplementary Figure 32. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites providing all age group data. 42

Supplementary Figure 33. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites providing all age group data. 43

Ad-hoc analysis results *44*

Supplementary Figure 34. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset in study sites excluding Canadian data. 44

Supplementary Figure 35. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset in study sites excluding Canadian data. 45

Supplementary Figure 36. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset in study sites excluding Chinese data. 46

Supplementary Figure 37. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset in study sites excluding Chinese data. 47

Supplementary Figure 38. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset in study sites excluding Finnish data. 48

Supplementary Figure 39. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset in study sites excluding Finnish data. 49

Supplementary Figure 40. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, using nationally aggregated data from Canada and Finland. 50

Supplementary Figure 41. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, using nationally aggregated data from Canada and Finland. 51

Supplementary Figure 42. The virus-specific time interval (with 95% CI) between the onsets in two subsequent years across national (A), provincial (B), and municipal (C) levels in Canada. 52

Supplementary Figure 43. The virus-specific time interval (with 95% CI) between the peaks in two subsequent years across national (A), provincial (B), and municipal (C) levels in Canada....53

Supplementary Figure 44. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset across national (A), provincial (B), and municipal (C) levels in Canada. 54

Supplementary Figure 45. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset across national (A), provincial (B), and municipal (C) levels in Canada. 55

Supplementary Figure 46. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic, matched by study sites that had over 1000 positive cases for each virus. 56

Supplementary Figure 47. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic, matched by study sites that had over 1000 positive cases for each virus. 57

Supplementary methods*.... *58

Supplementary Methods 1. Search Strategy.....58

Supplementary Methods 2. Quality assessment form.....61

Reference*.... *62

Supplementary results

Supplementary Table 1.Description of included studies

Author	Country	Site name	Study period	Reported viruses	Reporting frequency	Indicator(s)
Sheila F Lumley1	United Kingdom	Oxford	2016/03-2021/07	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Proportion
Yohei Kume2	Japan	Fukushima	2018/01-2021/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Case
Hye Jin Shi3	Korea, Rep.	Incheon	2018/01-2021/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Proportion
Xiucui Han4	China	Hangzhou	2019/01-2021/10	IV, RSV, AdV	Month	Proportion & Case
A. A. Sominina5	Russian	Nationwide	2015/10-2021/05	IV, RSV, PIV, MPV, sCoV, RV, AdV	Week	Proportion
Pengcheng Liu6	China	Shanghai	2018/06-2022/01	IV, RSV, RV, AdV	Month	Proportion
Asmae Lamrani Hanchi7	Morocco	Marrakech	2018/01-2021/12	IV, RSV, RV	Month	Case
Chungmin Park8	Korea, Rep.	Nationwide	2018/01-2021/04	IV, RSV, PIV, MPV, sCoV, RV, AdV	Week	Proportion & Case
Lu Wan9	China	Wuhan	2018/01-2021/12	IV, RSV, PIV, AdV	Month	Proportion
Ron Dagan10	Israel	Negev	2016/01-2021/12	IV, RSV, PIV, MPV, RV, AdV	Month	Case
Norosoa Harline Razanajatovo11	Madagascar	Nationwide	2020/03-2022/05	IV, RSV, PIV, MPV, sCoV, RV, AdV	Week	Case
Dana Danino12	Israel	Negev	2016/01-2022/03	IV, RSV, PIV, AdV	Month	Case
Heping Wang13	China	Shenzhen	2018/07-2022/01	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Proportion
Ilana S. Fratty14	Israel	Nationwide	2019/08-2022/01	IV, RSV, PIV, MPV, AdV	Week	Case
Zaid Haddadin15	United States	Nashville	2018/04-2021/07	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Case
Yonatan Oster16	Israel	Jerusalem	2017/01-2022/06	IV, RSV, PIV, MPV, AdV	Month	Proportion & Case
Ying Li17	China	Wuhan	2019/01-2022/12	IV, RSV, PIV, HADV	Month	Proportion & Case
Chuang-Xing Lin18	China	Chaozhou	2020/01-2021/12	IV, RSV, PIV, MPV, RV, AdV	Month	Proportion
Yuan Feng19	China	Xiangtan	2018/01-2021/12	IV, RSV, PIV, ADV	Month	Case
Nicole Maison20	Germany	Munich	2019/01-2022/11	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Case
Xue Fu21	China	Guizhou	2018/11-2023/05	IV, RSV, PIV, AdV	Month	Proportion
Yuya Fukuda22	Japan	Hokkaido	2019/07-2023/06	IV, RSV, MPV, AdV	Month	Case
Rundong Cao23	China	Xuzhou	2015/01-2021/12	IV, RSV, PIV, sCoV,RV, AdV	Month	Case
Víctor Guadalupe-Fernández24	Spain	Catalonia	2016/06-2021/07	IV, RSV, PIV, AdV	Week	Case
Yingchan Hao25	China	Wuhan	2018/01-2022/12	IV, RSV, PIV, HADV	Month	Case
Mingyu Tang26	China	Shanghai	2019/01-2020/12	IV, RSV, PIV, RV, AdV	Month	Proportion
Jianbo Xia27	China	Wuhan	2017/01-2021/12	IV, RSV, PIV, AdV	Month	Proportion
Michaela Davids28	South Africa	Gauteng，Mpumalanga	2018/08-2022/04	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Case

J. Dina29	France	Normandy	2016/09-2022/08	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Proportion
Füsun Kırca30	Turkey	Ankara	2020/04-2022/10	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Case
Wai-Sing Chan31	China	Hong Kong	2014/01-2023/04	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Proportion

Supplementary Table 2. Description of included surveillance reports.

Database name	Site	Study period	Reported viruses	Reporting frequency	Indicator(s)
The National Respiratory and Enteric Virus Surveillance System32	United States	2017/07-2024/04	IV, RSV, PIV, MPV, sCoV, RV, AdV	Week	Proportion
Seattle Flu Alliance33	United States	2018/11-2022/02	IV, RSV, PIV, MPV, sCoV, RV, AdV	Week	Proportion & Case
Houston methodist-Respiratory Pathogen Epidemiology Snapshot34	United States	2019/08-2023/03	IV, RSV, RV	Week	Proportion & Case
Korea Disease Control and Prevention Agency35	Korea, Rep.	2017/01-2024/04	IV, RSV, PIV, MPV, sCoV, RV, AdV	Week	Case
Finnish National Infectious Diseases Register.36	Finland	2017/01-2023/12	IV, RSV, PIV, AdV	Month	Case
Taiwan National Infectious Disease Statistics System37	Taiwan, China	2018/10-2024/04	IV, RSV, PIV, AdV	Week	Case
Czech Republic National institutes of health38	Czech Republic	2017/09-2024/04	IV, RSV, PIV, MPV, sCoV, RV	Week	Case
FluWatch Surveillance39	Canada	2016/08-2024/04	IV, RSV, MPV, RV, AdV	Week	Case
PAHO–FluNet40	Bolivia	2018/01-2023/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Week	Case
PAHO–FluNet	Paraguay	2018/01-2023/12	IV, RSV, PIV, MPV, AdV	Week	Case
PAHO–FluNet	Colombia	2018/01-2023/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Week	Case
PAHO–FluNet	Argentina	2018/01-2023/12	IV, RSV, PIV, MPV, sCoV, AdV	Week	Case
PAHO–FluNet	Chile	2018/01-2023/12	IV, RSV, PIV, MPV, AdV	Week	Case
PAHO–FluNet	Costa Rica	2018/01-2023/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Week	Case
PAHO–FluNet	Guatemala	2018/01-2023/12	IV, RSV, PIV, MPV, sCoV, RV,	Week	Case
PAHO–FluNet	Mexico	2018/01-2023/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Week	Case
Weekly national flu reports41	England	2019/07-2023/04	IV, RSV, PIV, MPV, RV, AdV	Week	Proportion
Respiratory Scotland42	Scotland	2016/10-2024/04	IV, RSV, PIV, MPV, sCoV, RV,AdV	Week	Case
Arbeitsgemeinschaft Influenza43	Germany	2016/12-2024/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Week	Case

Supplementary Table 3. Description of included data from RSV GEN44.

Country	Site	Study period	Reported viruses	Reporting frequency	Indicator(s)
Argentina	Buenos Aires	2018/01-2023/12	IV, RSV, PIV, MPV, sCoV, RV, HadV	Month	Proportion & Case
Australia	Melbourne	2017/01-2023/12	IV, RSV, PIV, MPV , RV, HadV	Month	Proportion & Case
Canada	Halifax	2017/01-2023/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Proportion & Case
China	Shenzhen	2017/01-2023/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Proportion & Case
France	Marseille	2017/01-2023/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Proportion & Case
Georgia	Tbilisi	2017/01-2023/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Proportion & Case
Israel	Israel	2017/01-2023/12	IV, RSV, PIV, MPV, AdV	Month	Proportion & Case
Kenya	Kilifi	2017/01-2023/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Month	Proportion & Case
Netherlands	Surveillance	2017/01-2023/12	IV, RSV, MPV, SCoV, RV, AdV	Week	Case
Portugal	Lisbon	2017/01-2023/12	IV, RSV, PIV, MPV, RV, AdV	Month	Proportion & Case
Russia	Multi cities	2017/01-2023/12	IV, RSV, PIV, MPV, sCoV, RV, AdV	Week	Proportion & Case
Singapore	Singapore	2018/01-2023/12	IV, RSV, PIV, MPV, sCoV, AdV	Month	Proportion & Case
Spain	Barcelona	2017/01-2023/12	IV, RSV, PIV, MPV	Month	Proportion & Case
Thailand	Bangkok	2017/01-2023/12	IV, RSV, MPV	Month	Proportion & Case
United States	Alaska	2019/11-2023/12	IV, RSV, MPV, RV	Month	Proportion & Case

Supplementary Table 4. Quality assessment results of included studies from the systematic literature search.

Author	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Total point
Sheila F Lumley	yes	no	no	no	yes	yes	yes	not clear	4
Yohei Kume	no	no	no	no	no	yes	yes	not clear	2
Hye Jin Shi	yes	yes	no	yes	yes	yes	yes	no	6
Xiucui Han	no	no	no	yes	no	not clear	no	not clear	1
A. A. Sominina	yes	yes	yes	yes	yes	yes	yes	not clear	7
Pengcheng Liu	no	no	no	yes	no	no	no	not clear	1
Asmae Lamrani Hanchi	no	no	no	no	no	yes	no	not clear	1
Chungmin Park	yes	yes	yes	yes	no	yes	yes	not clear	6
Lu Wan	yes	no	no	yes	no	yes	no	no	3
Ron Dagan	no	no	no	yes	no	no	yes	no	2
Norosoa Harline Razanajatovo	yes	yes	yes	no	yes	yes	yes	no	6
Dana Danino	yes	no	no	yes	no	yes	no	not clear	3
Heping Wang	no	no	no	yes	no	no	yes	no	2
Ilana S. Fratty	no	yes	yes	no	no	yes	yes	not clear	4
Zaid Haddadin	no	yes	no	yes	no	yes	yes	not clear	4
Yonatan Oster	no	yes	no	no	no	yes	yes	no	3
Ying Li	no	no	no	no	no	yes	yes	not clear	2
Chuang-Xing Lin	no	no	no	no	no	yes	yes	not clear	2
Yuan Feng	no	no	no	no	no	yes	yes	not clear	2
Nicole Maison	no	no	no	no	no	yes	yes	not clear	2
Xue Fu	no	yes	no	no	no	yes	yes	not clear	3
Yuya Fukuda	yes	no	no	no	no	no	yes	not clear	2
Rundong Cao	no	no	no	no	no	yes	yes	not clear	2
Víctor Guadalupe-Fernández	yes	yes	yes	no	no	no	yes	not clear	4
Yingchan Hao	no	no	no	no	no	yes	yes	not clear	2
Mingyu Tang	no	no	no	no	no	no	yes	not clear	1
Jianbo Xia	no	no	no	no	no	yes	yes	not clear	2
Michaela Davids	yes	yes	no	no	no	yes	yes	not clear	4
J. Dina	yes	no	yes	yes	no	yes	yes	yes	6
Füsun Kırca	no	yes	no	yes	no	yes	yes	not clear	4
Wai-Sing Chan	yes	yes	no	yes	no	yes	yes	not clear	5

Supplementary Table 5. Quality assessment results of included surveillance reports.

Database name	Country	Location	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Total point
The National Respiratory and Enteric Virus Surveillance System	United States	Nationwide	yes	Yes	yes	yes	yes	yes	yes	not clear	7
Seattle Flu Alliance	United States	Seattle	yes	yes	yes	yes	yes	yes	yes	not clear	7
Houston methodist-Respiratory Pathogen Epidemiology Snapshot	United States	Houston	yes	yes	yes	yes	yes	yes	no	not clear	6
Korea Disease Control and Prevention Agency	Korea, Rep.	Nationwide	yes	yes	yes	yes	yes	yes	yes	not clear	7
Finnish National Infectious Diseases Register	Finland	Nationwide	yes	yes	no	yes	yes	yes	yes	not clear	6
Finnish National Infectious Diseases Register	Finland	Etelä-Pohjanmaan sairaanhoitopiiri	yes	yes	no	no	yes	yes	no	not clear	4
Finnish National Infectious Diseases Register	Finland	Helsingin ja Uudenmaan sairaanhoitopiiri	yes	yes	no	yes	yes	yes	no	not clear	5
Finnish National Infectious Diseases Register	Finland	Lapin sairaanhoitopiiri	yes	yes	no	no	yes	yes	no	not clear	4
Finnish National Infectious Diseases Register	Finland	Pirkanmaan sairaanhoitopiiri	yes	yes	no	no	yes	yes	no	not clear	4
Finnish National Infectious Diseases Register	Finland	Pohjois-Pohjanmaan sairaanhoitopiiri	yes	yes	no	yes	yes	yes	yes	not clear	6
Finnish National Infectious Diseases Register	Finland	Vaasan sairaanhoitopiiri	yes	yes	no	yes	yes	yes	yes	not clear	6

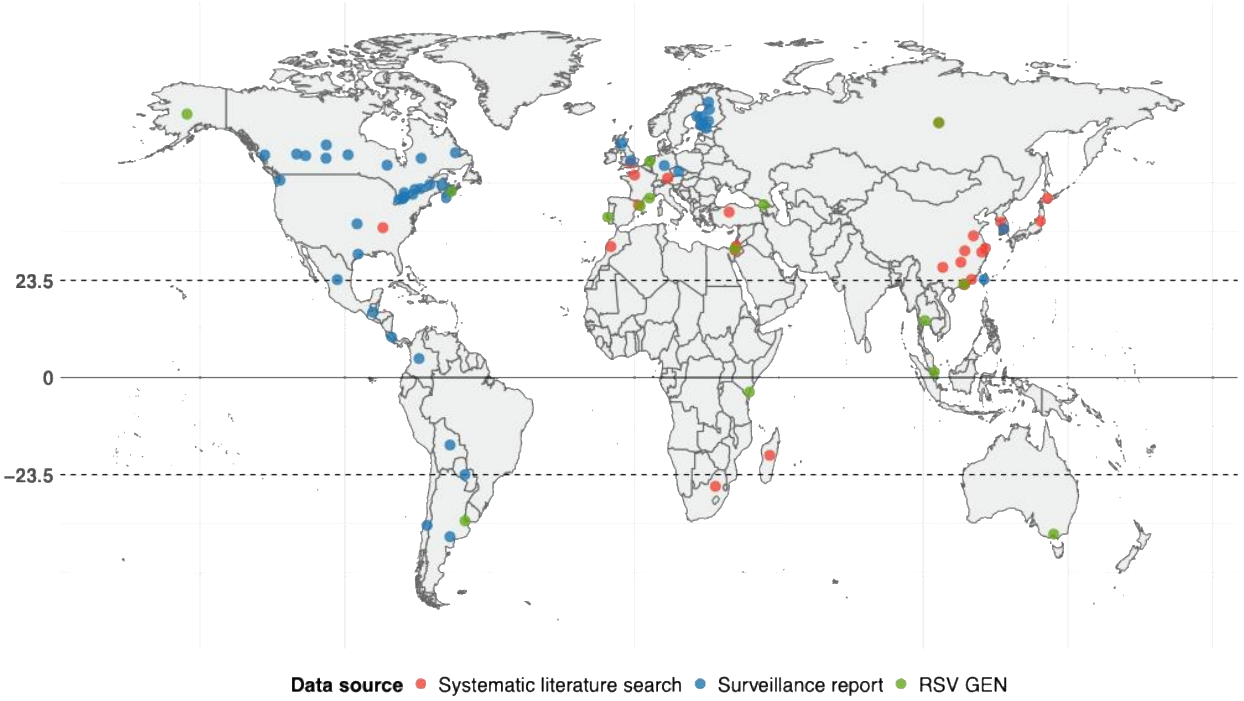
Finnish National Infectious Diseases Register	Finland	Varsinais-Suomen sairaanhoitopiiri	yes	yes	no	yes	yes	yes	yes	not clear	6
Taiwan National Infectious Disease Statistics System	China	Taiwan	yes	yes	yes	no	yes	yes	no	not clear	5
Czech Republic National institutes of health	Czech Republic	Nationwide	yes	yes	yes	no	yes	yes	yes	not clear	6
FluWatch Surveillance	Canada	Atlantic	yes	yes	yes	yes	yes	yes	yes	not clear	7
FluWatch Surveillance	Canada	New Brunswick, Atlantic	yes	yes	yes	no	no	yes	yes	not clear	5
FluWatch Surveillance	Canada	Newfoundland, Atlantic	yes	yes	yes	yes	yes	yes	yes	not clear	7
FluWatch Surveillance	Canada	Nova Scotia, Atlantic	yes	yes	yes	no	yes	yes	yes	not clear	6
FluWatch Surveillance	Canada	Alberta, Prairies	yes	yes	yes	yes	yes	yes	yes	not clear	7
FluWatch Surveillance	Canada	Manitoba, Prairies	yes	yes	yes	no	yes	yes	yes	not clear	6
FluWatch Surveillance	Canada	Prairies	yes	yes	yes	no	yes	yes	yes	not clear	6
FluWatch Surveillance	Canada	Saskatchewan, Prairies	yes	yes	yes	no	yes	yes	yes	not clear	6
FluWatch Surveillance	Canada	Hamilton, Province of Ontario	yes	yes	yes	no	yes	yes	yes	not clear	6
FluWatch Surveillance	Canada	Kingston, Province of Ontario	yes	yes	yes	no	yes	yes	yes	not clear	6
FluWatch Surveillance	Canada	London, Province of Ontario	yes	yes	yes	no	yes	yes	yes	not clear	6
FluWatch Surveillance	Canada	Orillia, Province of Ontario	yes	yes	yes	no	yes	yes	yes	not clear	6

FluWatch Surveillance	Canada	Ottawa, Province of Ontario	yes	yes	yes	yes	yes	yes	yes	not clear	7
FluWatch Surveillance	Canada	Toronto, Province of Ontario	yes	yes	yes	yes	yes	yes	yes	not clear	7
FluWatch Surveillance	Canada	Province of Ontario	yes	yes	yes	yes	yes	yes	yes	not clear	7
FluWatch Surveillance	Canada	St. Joseph's - Hamilton, Province of Ontario	yes	yes	yes	yes	yes	yes	yes	not clear	7
FluWatch Surveillance	Canada	Montréal-Laval, Province of Québec	yes	yes	yes	yes	yes	yes	yes	not clear	7
FluWatch Surveillance	Canada	Province of Québec	yes	yes	yes	yes	yes	yes	yes	not clear	7
FluWatch Surveillance	Canada	Québec-Chaudière-Appalaches, Province of Québec	yes	yes	yes	yes	yes	yes	yes	not clear	7
FluWatch Surveillance	Canada	British Columbia	yes	yes	yes	no	yes	yes	yes	not clear	6
FluWatch Surveillance	Canada	Nationwide	yes	yes	yes	yes	yes	yes	yes	not clear	7
PAHO–FluNet	Bolivia	Nationwide	yes	yes	yes	no	yes	yes	yes	not clear	6
PAHO–FluNet	Paraguay	Nationwide	yes	yes	yes	no	yes	yes	yes	not clear	6
PAHO–FluNet	Colombia	Nationwide	yes	yes	yes	yes	yes	yes	yes	not clear	7
PAHO–FluNet	Argentina	Nationwide	yes	yes	yes	yes	yes	yes	yes	not clear	7
PAHO–FluNet	Chile	Nationwide	yes	yes	yes	no	yes	yes	yes	not clear	6
PAHO–FluNet	Costa Rica	Nationwide	yes	yes	yes	yes	yes	yes	yes	not clear	7
PAHO–FluNet	Guatemala	Nationwide	yes	yes	yes	no	yes	yes	yes	not clear	6
PAHO–FluNet	Mexico	Nationwide	yes	yes	yes	no	yes	yes	yes	not clear	6
Weekly national flu reports	United Kingdom	England	yes	yes	yes	yes	yes	yes	yes	not clear	7

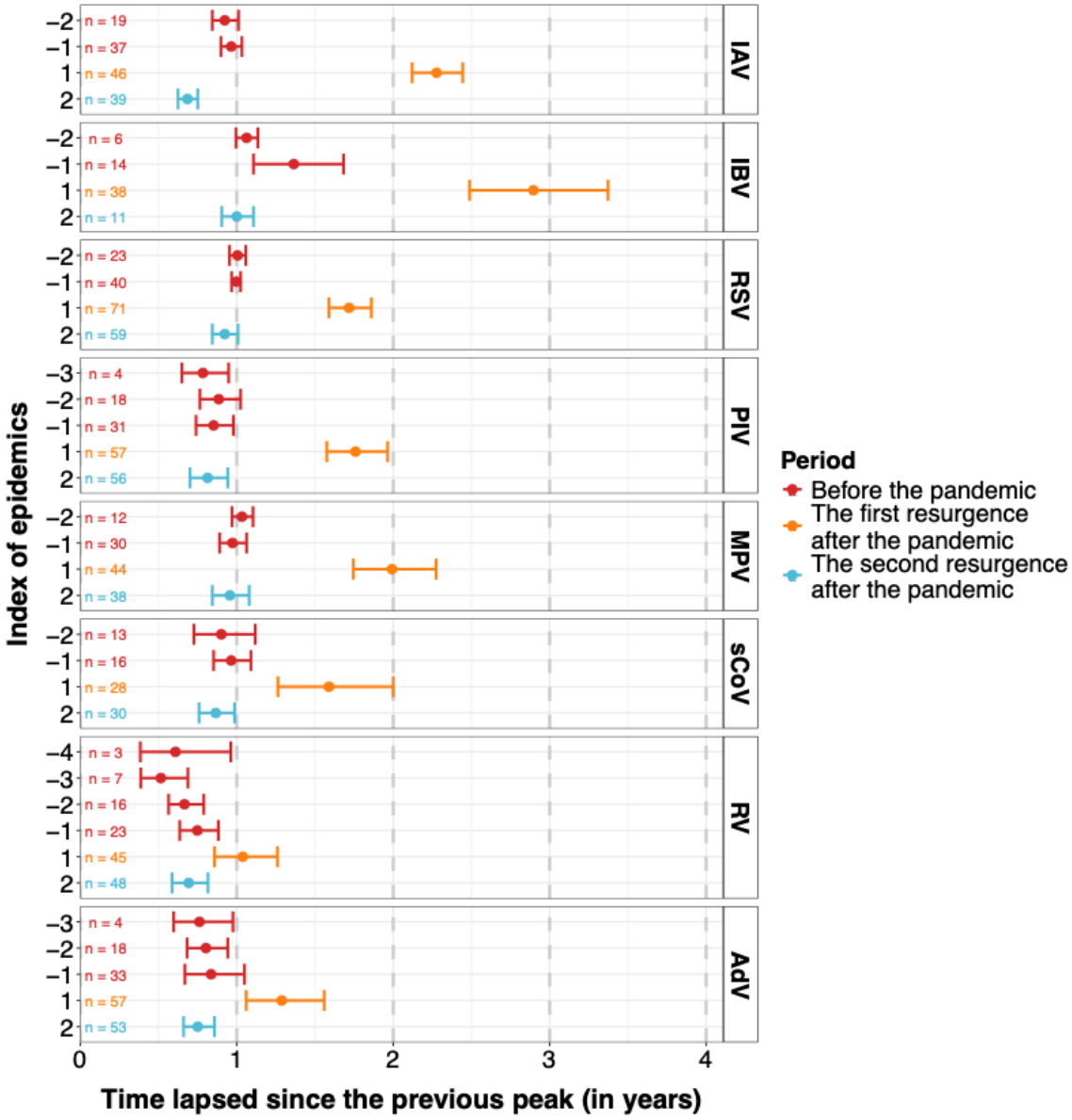
Public Health Scotland	United Kingdom	Scotland	yes	yes	yes	yes	yes	yes	yes	not clear	7
Arbeitsgemeinschaft Influenza	Germany	Nationwide	yes	yes	yes	yes	yes	yes	yes	not clear	7

Supplementary Table 6. Quality assessment results of data from RSV GEN.

Country	Location	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Total point
Argentina	Buenos Aires	yes	no	no	yes	yes	yes	yes	not clear	5
Australia	Melbourne	no	yes	no	yes	yes	yes	yes	not clear	5
Canada	Halifax	no	yes	no	no	yes	yes	yes	not clear	4
China	Shenzhen	no	yes	no	yes	yes	no	yes	not clear	4
France	Marseille	yes	yes	no	yes	yes	yes	yes	not clear	6
Georgia	Tbilisi	yes	yes	no	yes	yes	yes	yes	not clear	6
Israel	Israel	yes	yes	no	yes	yes	yes	yes	not clear	6
Kenya	Kilifi	no	no	no	no	yes	yes	no	not clear	2
Netherlands	Surveillance	yes	yes	yes	yes	yes	yes	yes	not clear	7
Portugal	Lisbon	no	no	no	yes	yes	yes	yes	not clear	4
Russia	Multi cities	yes	no	yes	no	yes	yes	yes	not clear	5
Singapore	Singapore	no	yes	no	yes	yes	yes	yes	not clear	5
Spain	Barcelona	no	no	no	yes	yes	yes	no	not clear	3
Thailand	Bangkok	yes	yes	no	yes	yes	yes	no	not clear	5
United States	Alaska	yes	no	no	no	no	yes	yes	not clear	3

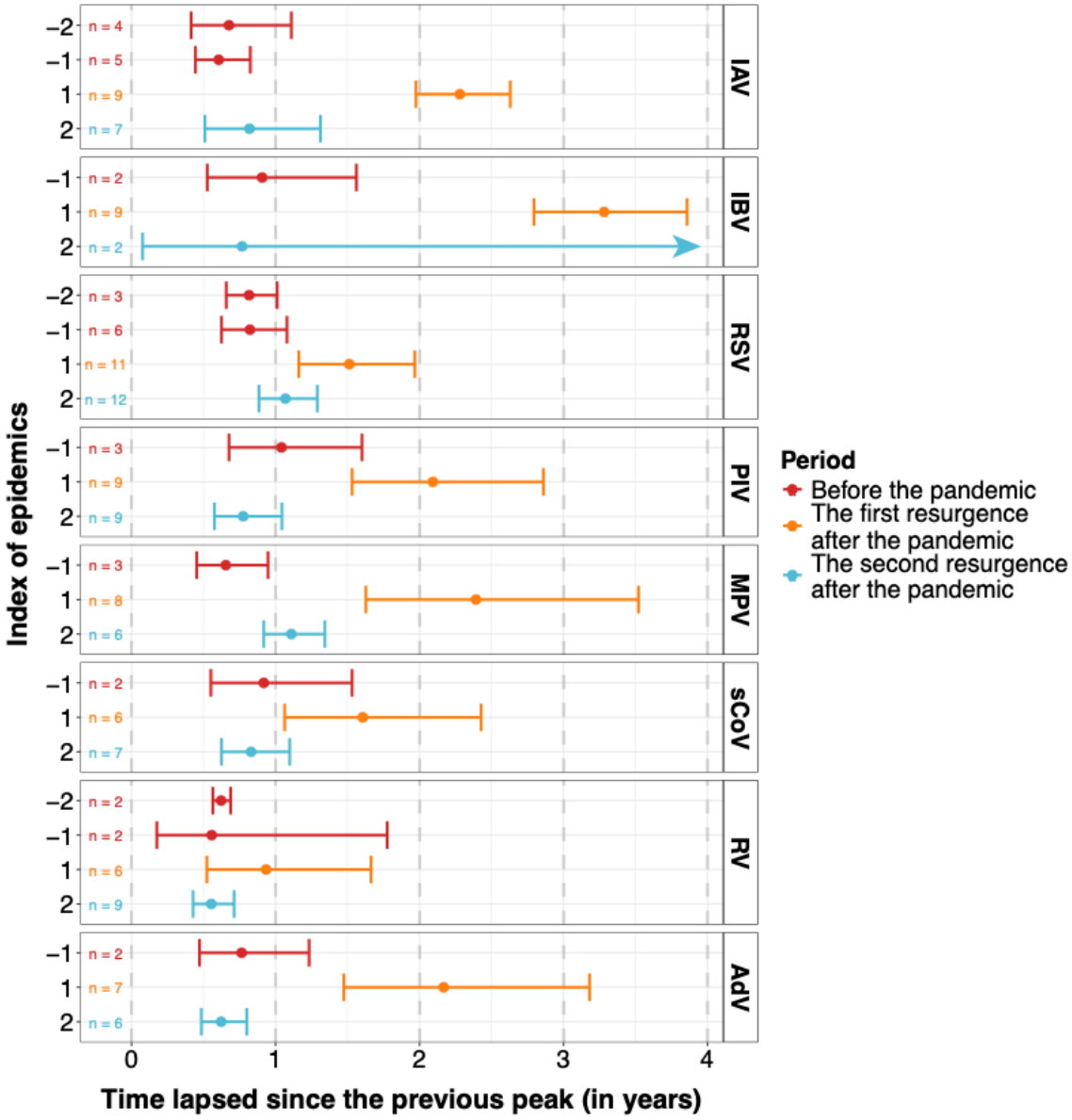


Supplementary Figure 1.Distribution of common respiratory virus activity in this study.



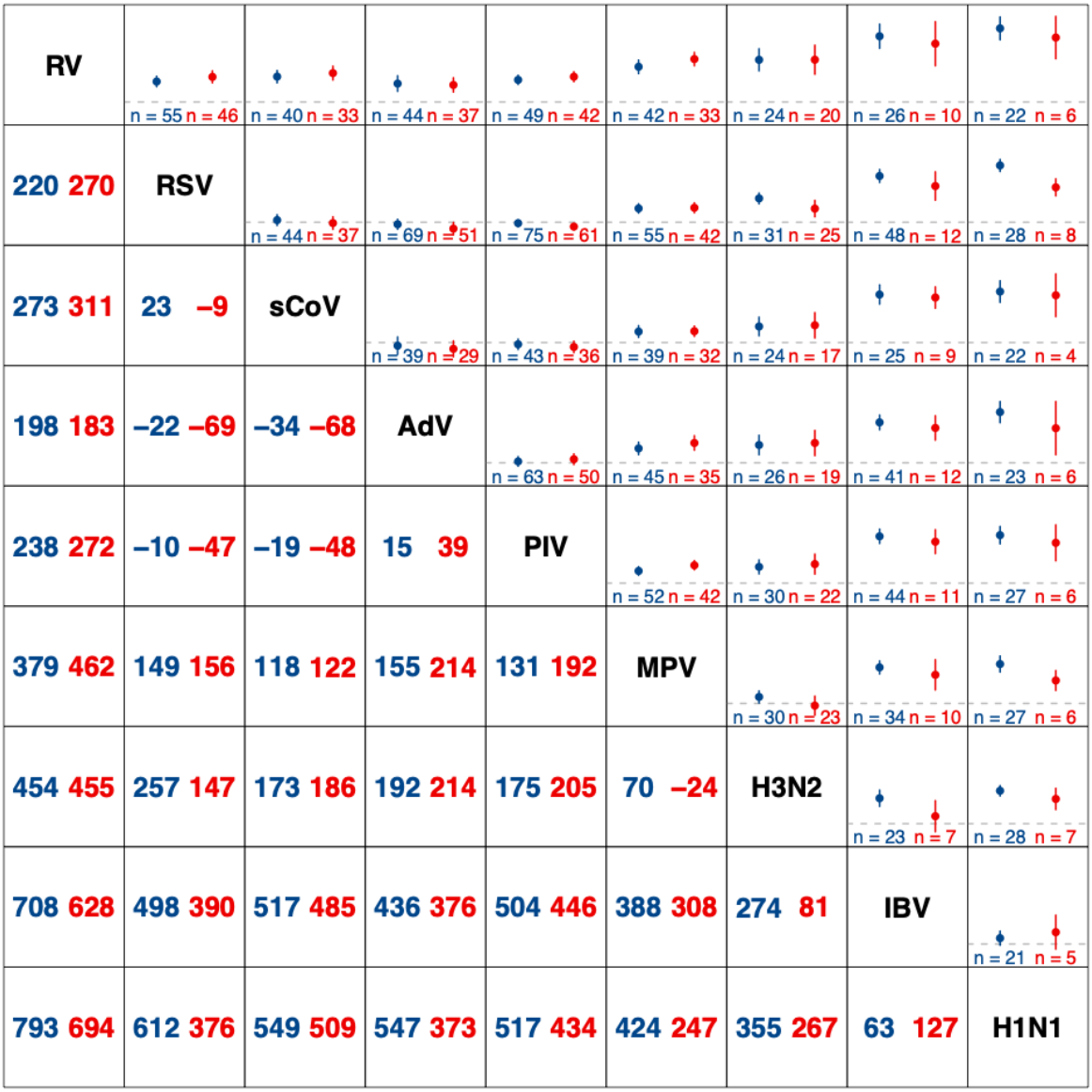
Supplementary Figure 2. The virus-specific time interval (with 95% CI) between the peaks in two subsequent years in temperate regions.

The x-axis represents the time lapsed since the previous onset or peak, measured in years. The left y-axis lists the index of epidemics relative to the onset of the COVID-19 pandemic, with negative numbers indicating epidemics occurring before the pandemic, and positive numbers indicating epidemics occurring after the onset of the pandemic. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



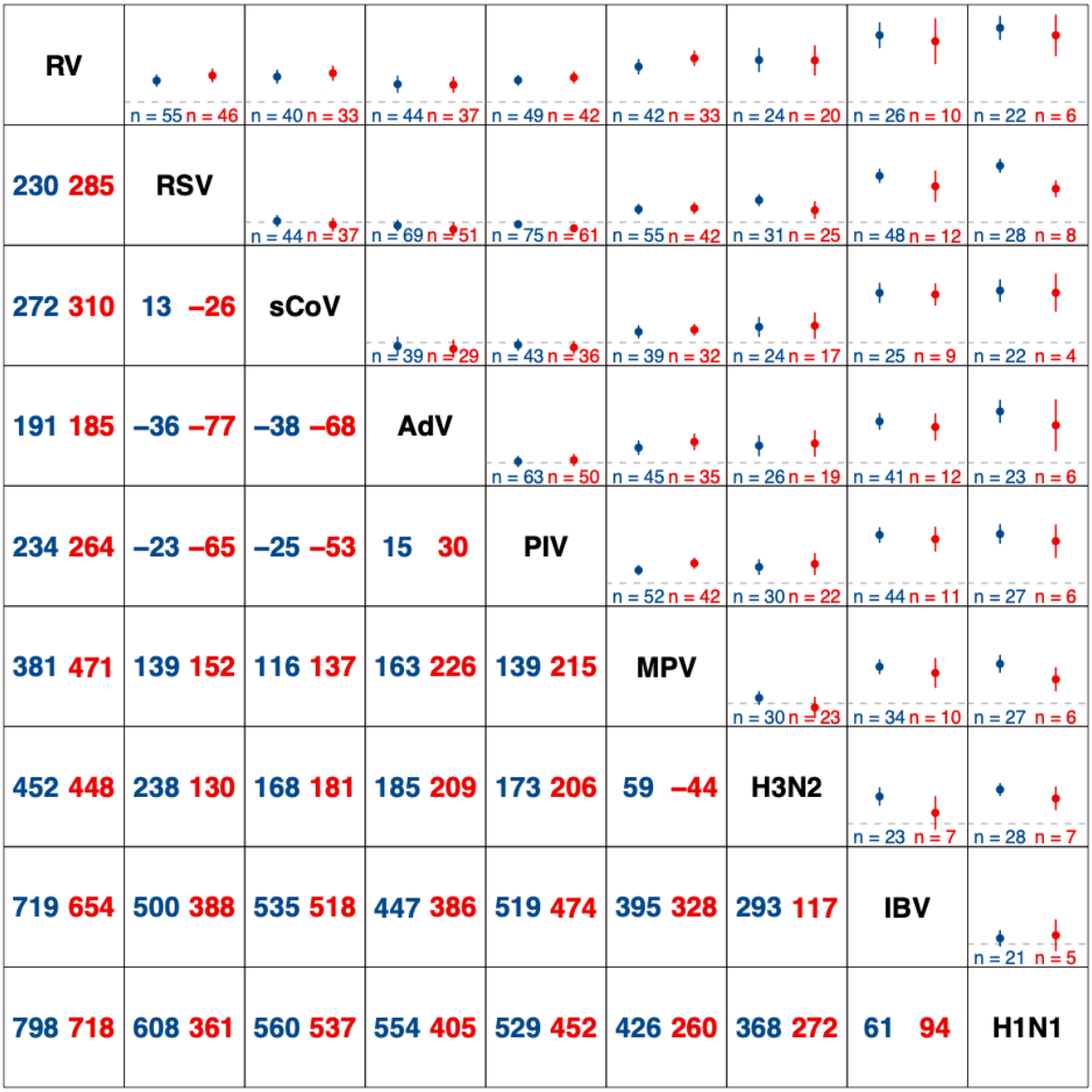
Supplementary Figure 3.The virus-specific time interval (with 95% CI) between the peaks in two subsequent years in tropics regions.

The x-axis represents the time lapsed since the previous onset or peak, measured in years. The left y-axis lists the index of epidemics relative to the onset of the COVID-19 pandemic, with negative numbers indicating epidemics occurring before the pandemic, and positive numbers indicating epidemics occurring after the onset of the pandemic. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



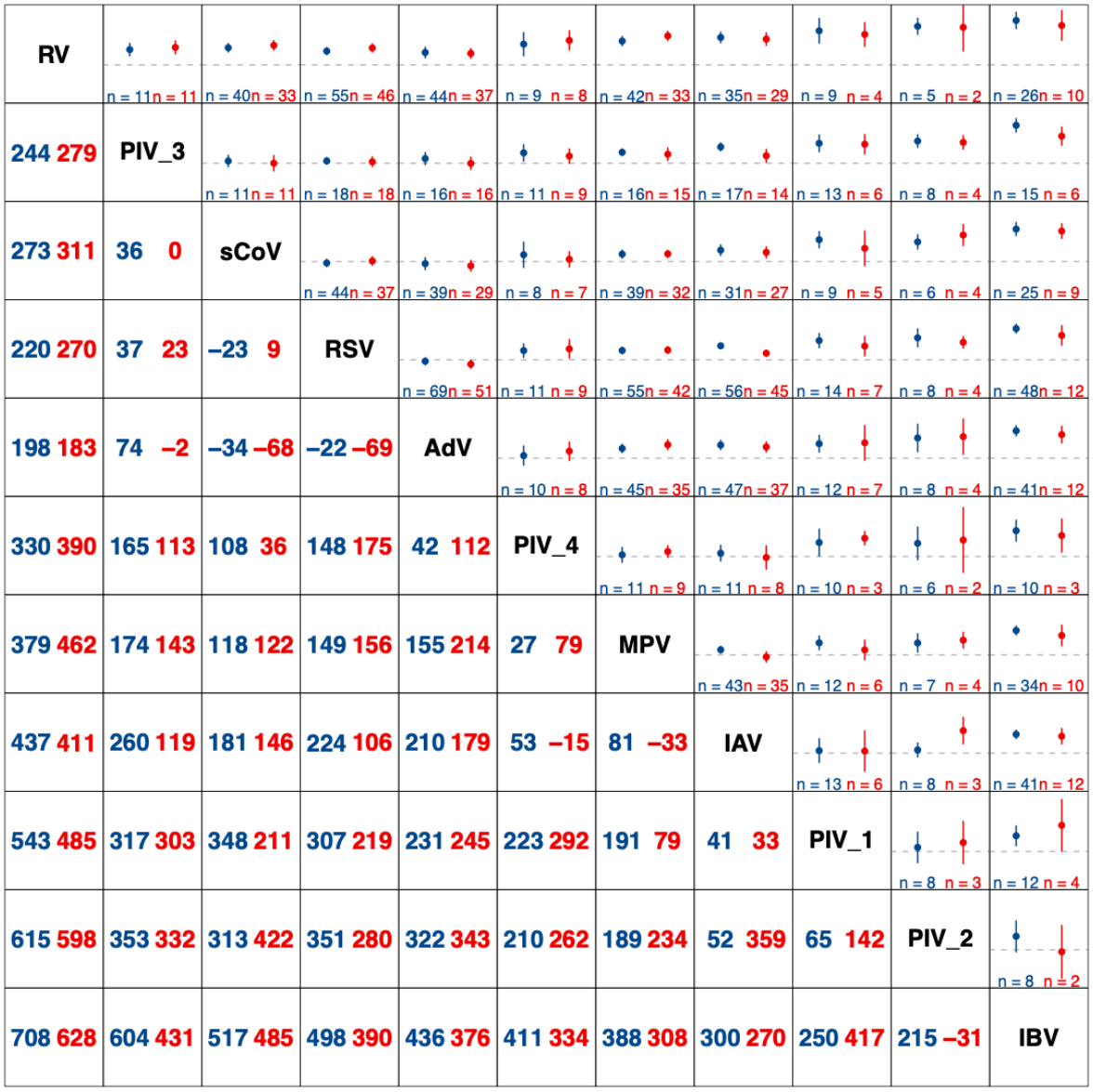
Supplementary Figure 4. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by sites reporting influenza A virus subtypes.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



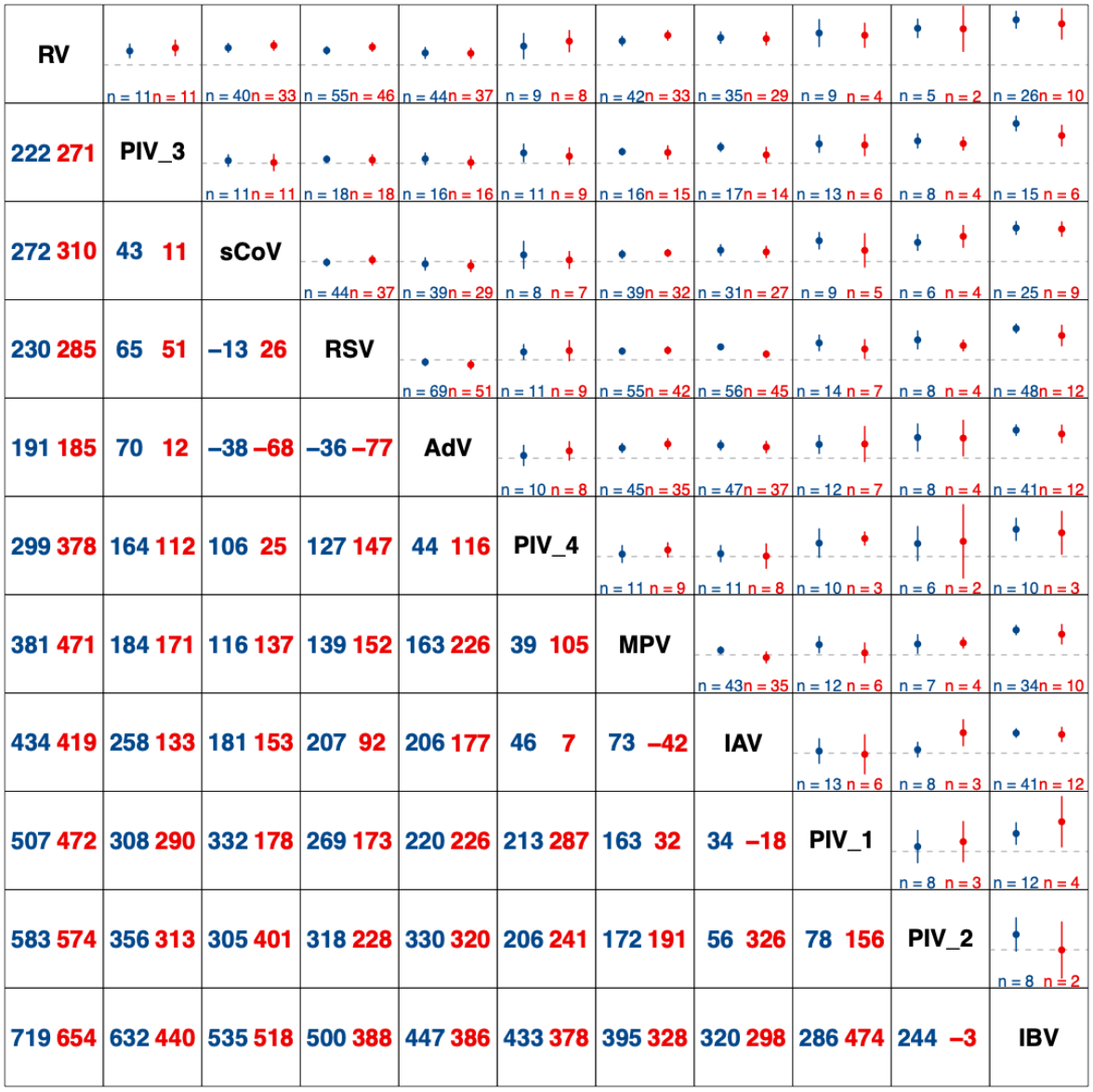
Supplementary Figure 5. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by sites reporting influenza A virus subtypes.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



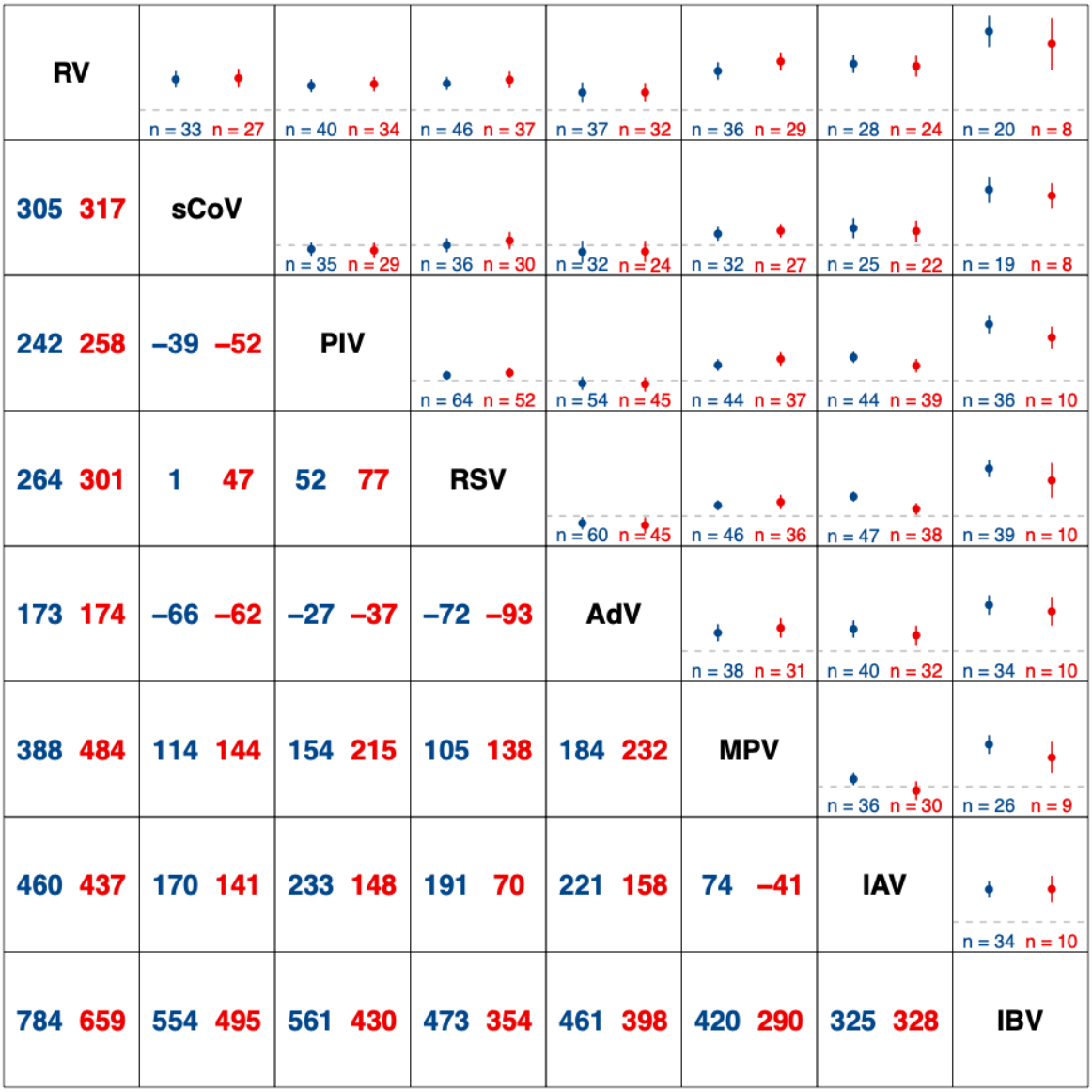
Supplementary Figure 6. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by sites reporting PIV subtypes.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



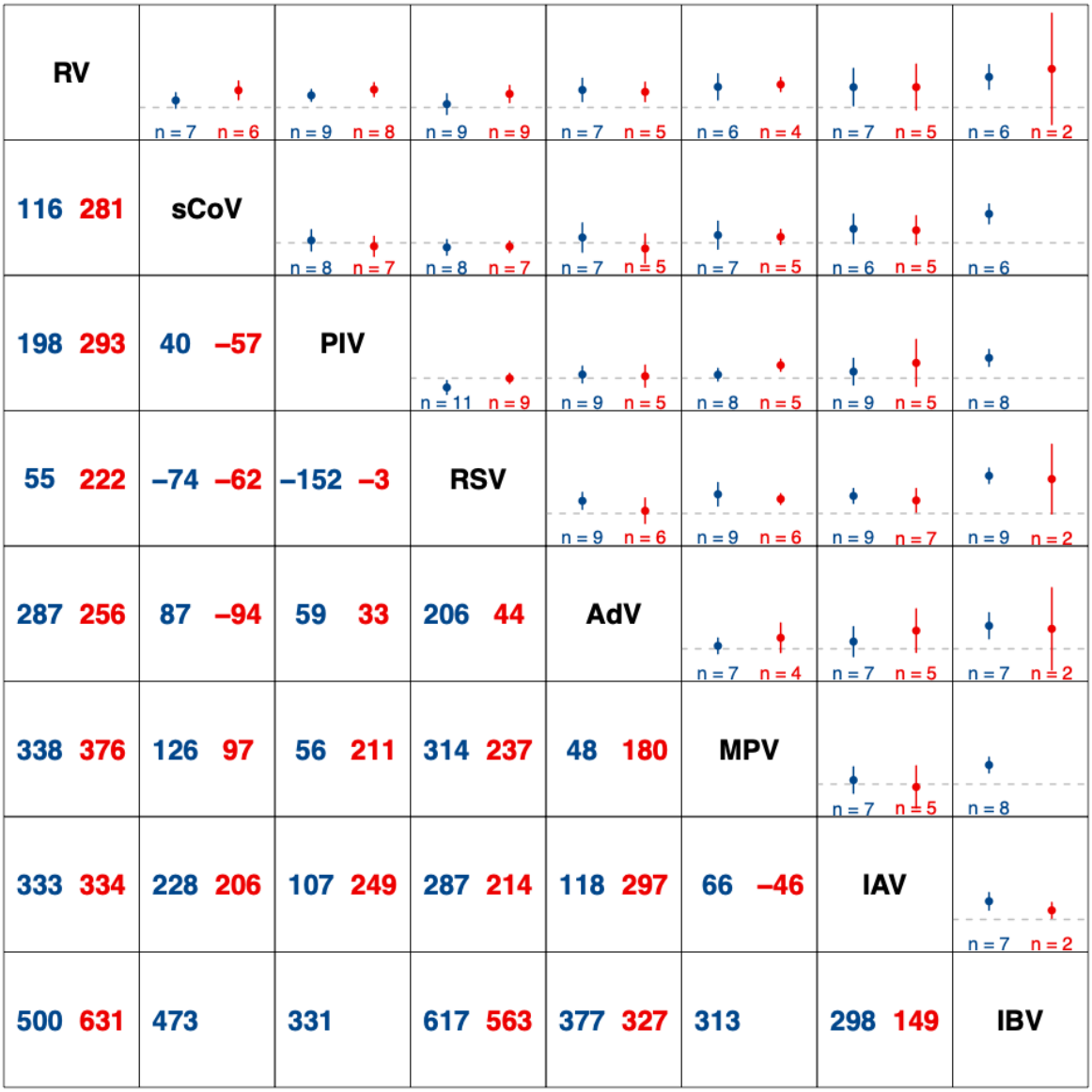
Supplementary Figure 7. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by sites reporting PIV subtypes.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



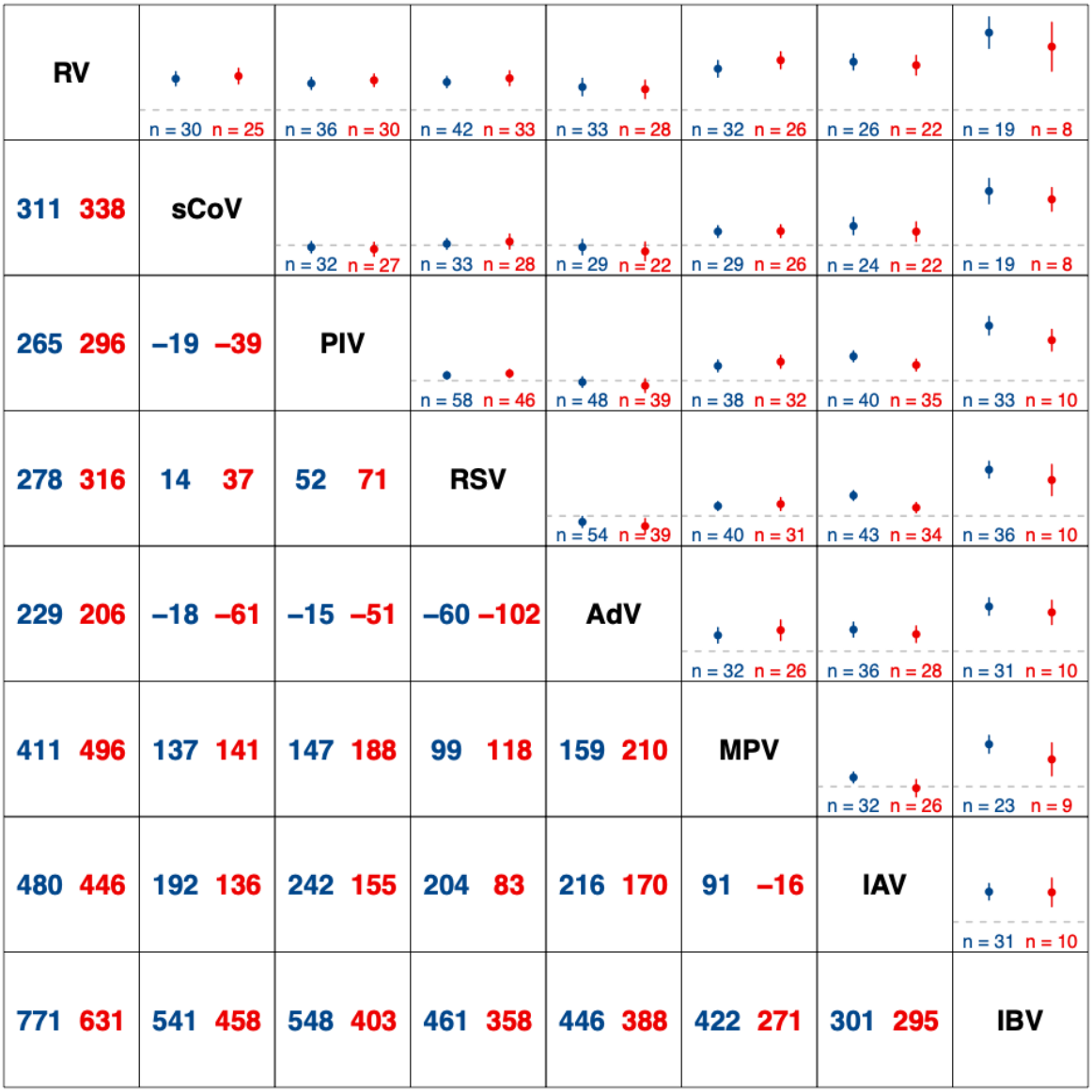
Supplementary Figure 8. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in the temperate region.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



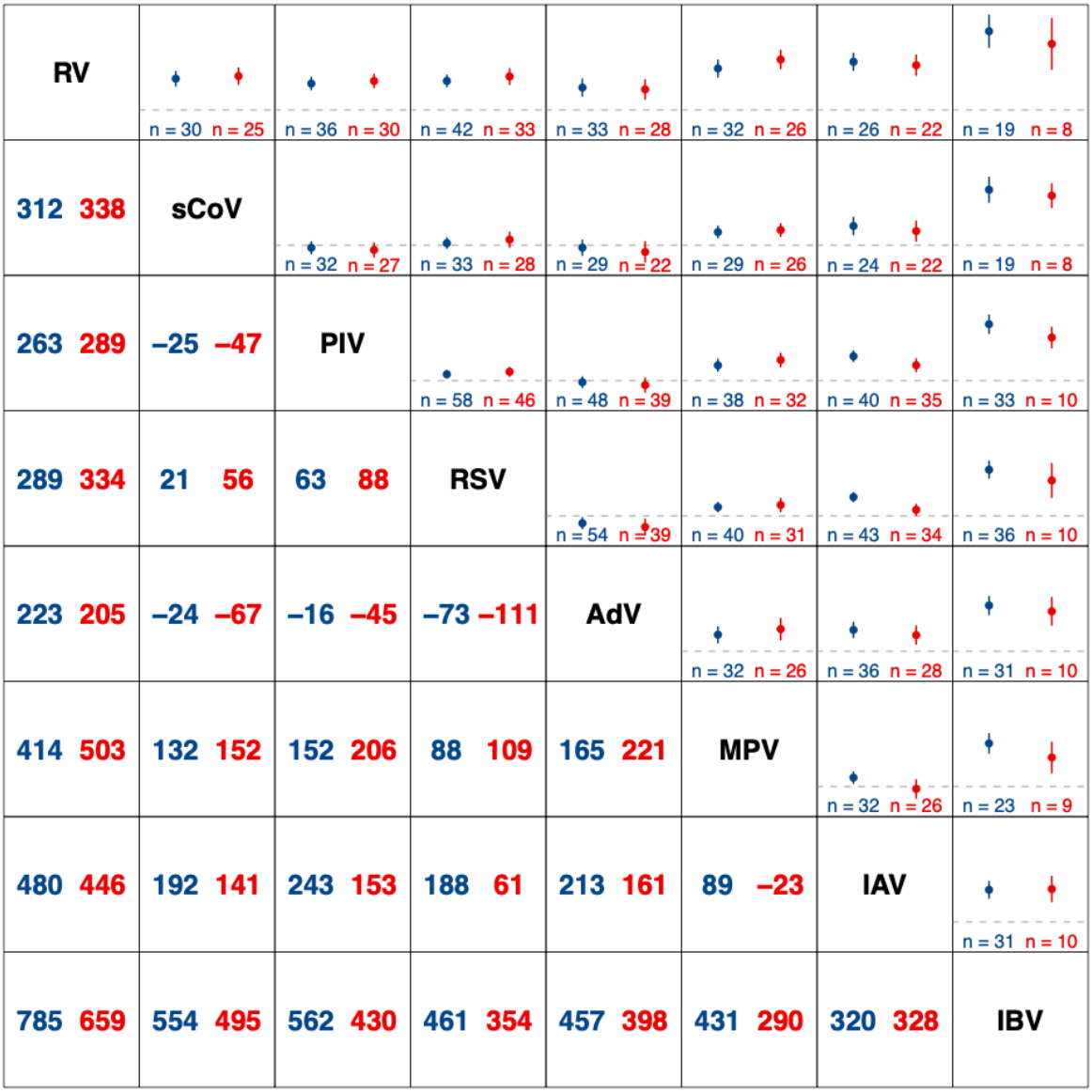
Supplementary Figure 9. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in the tropical region.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



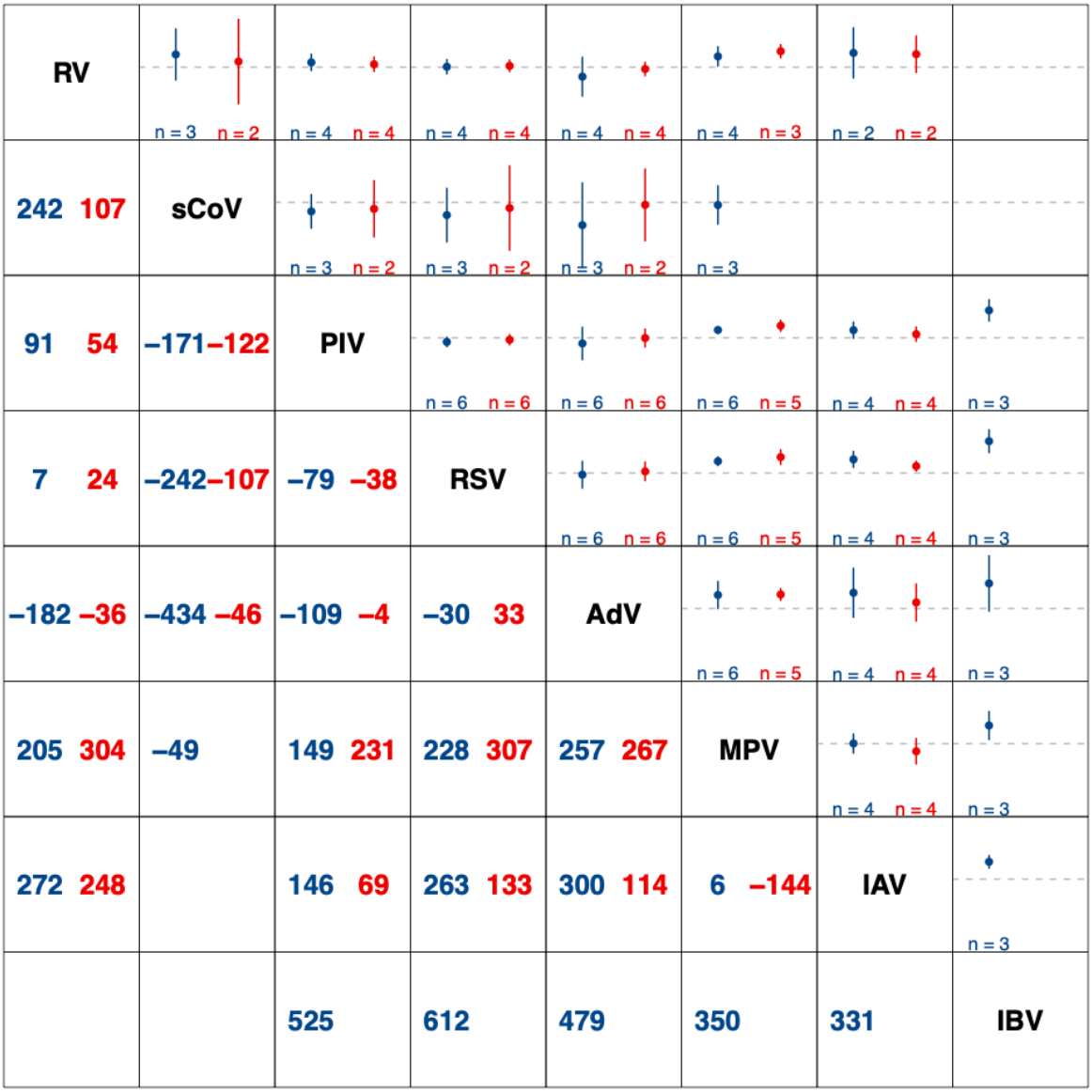
Supplementary Figure 10. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in the northern temperate region.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



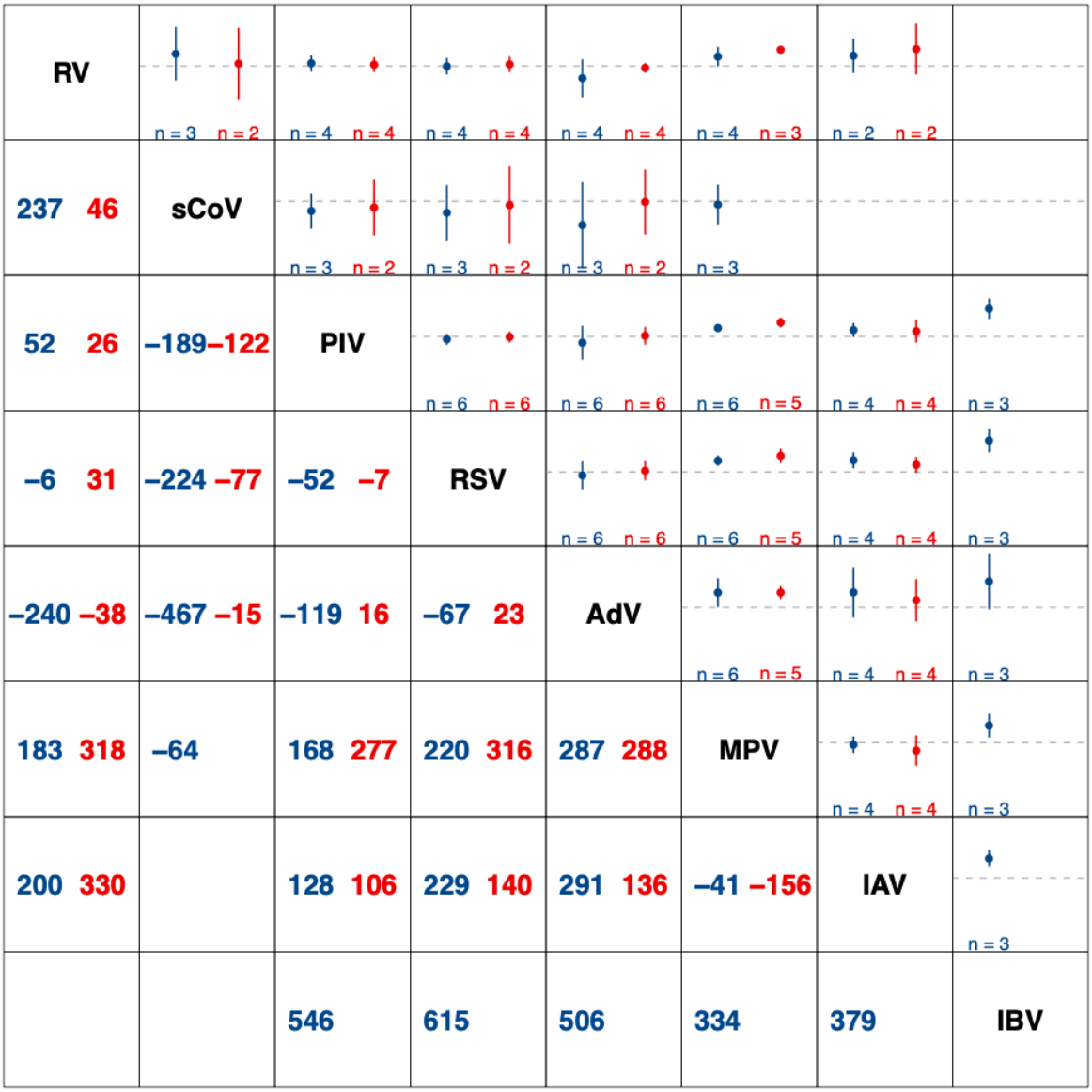
Supplementary Figure 11. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in the northern temperate region.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



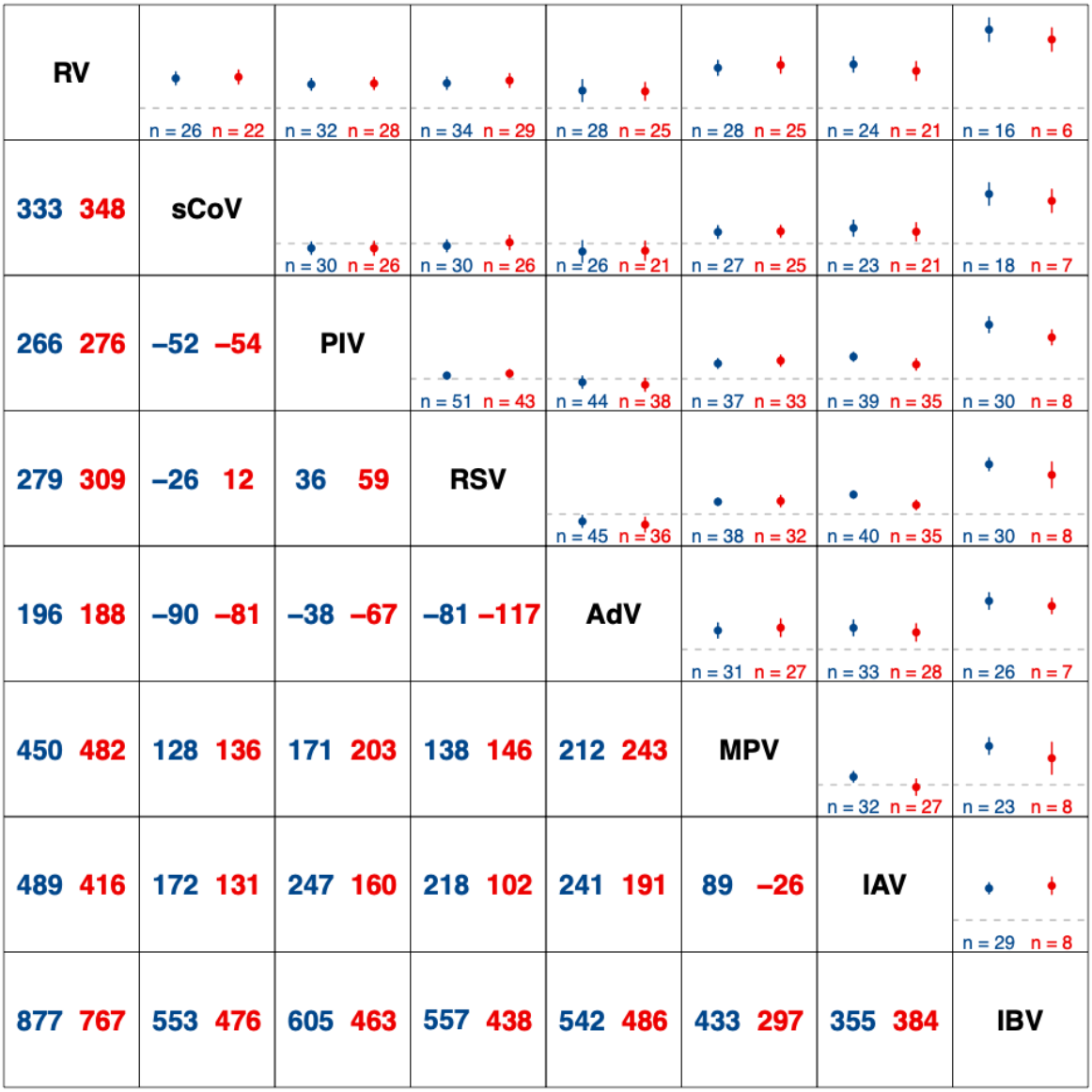
Supplementary Figure 12. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in the southern temperate region.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



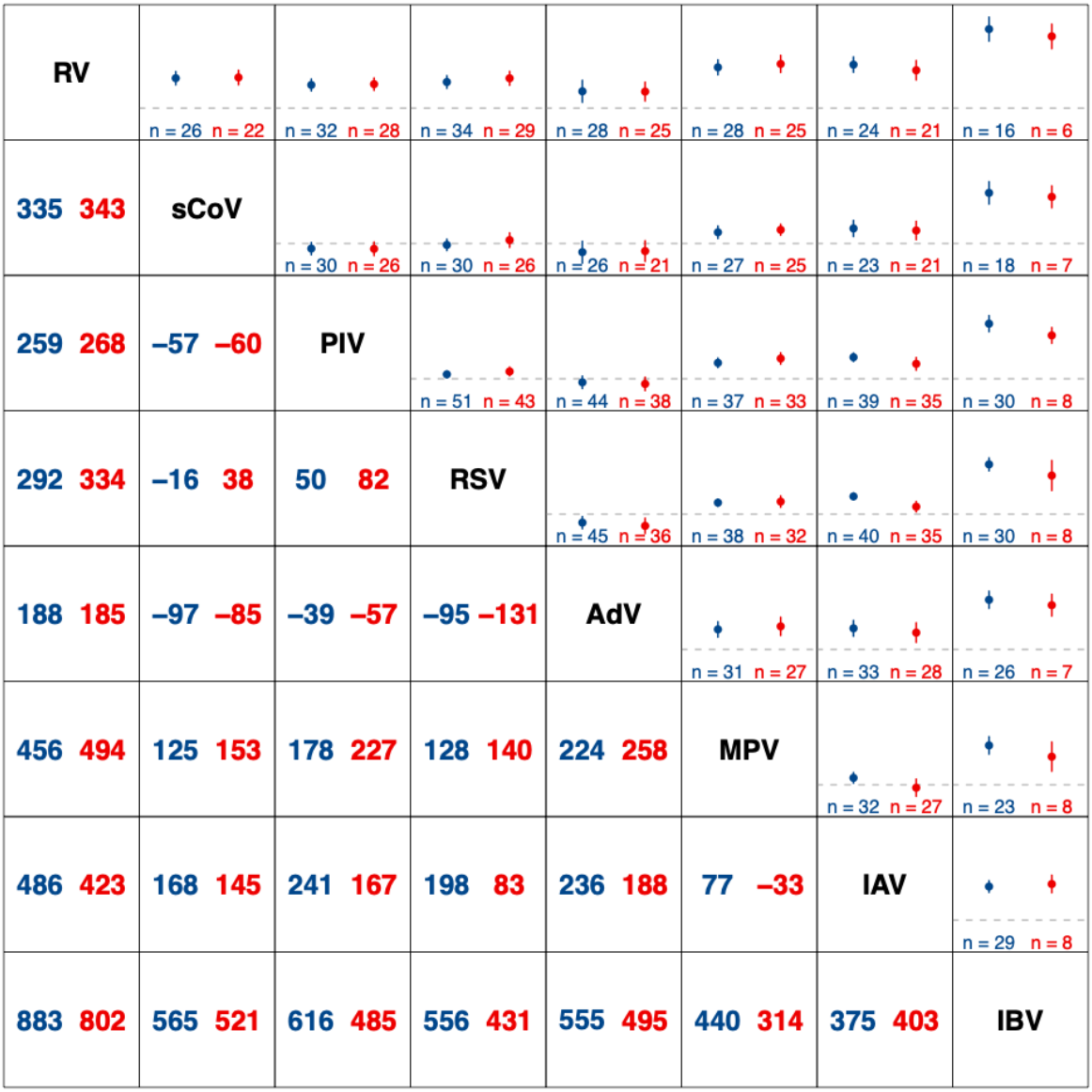
Supplementary Figure 13. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in the southern temperate region.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



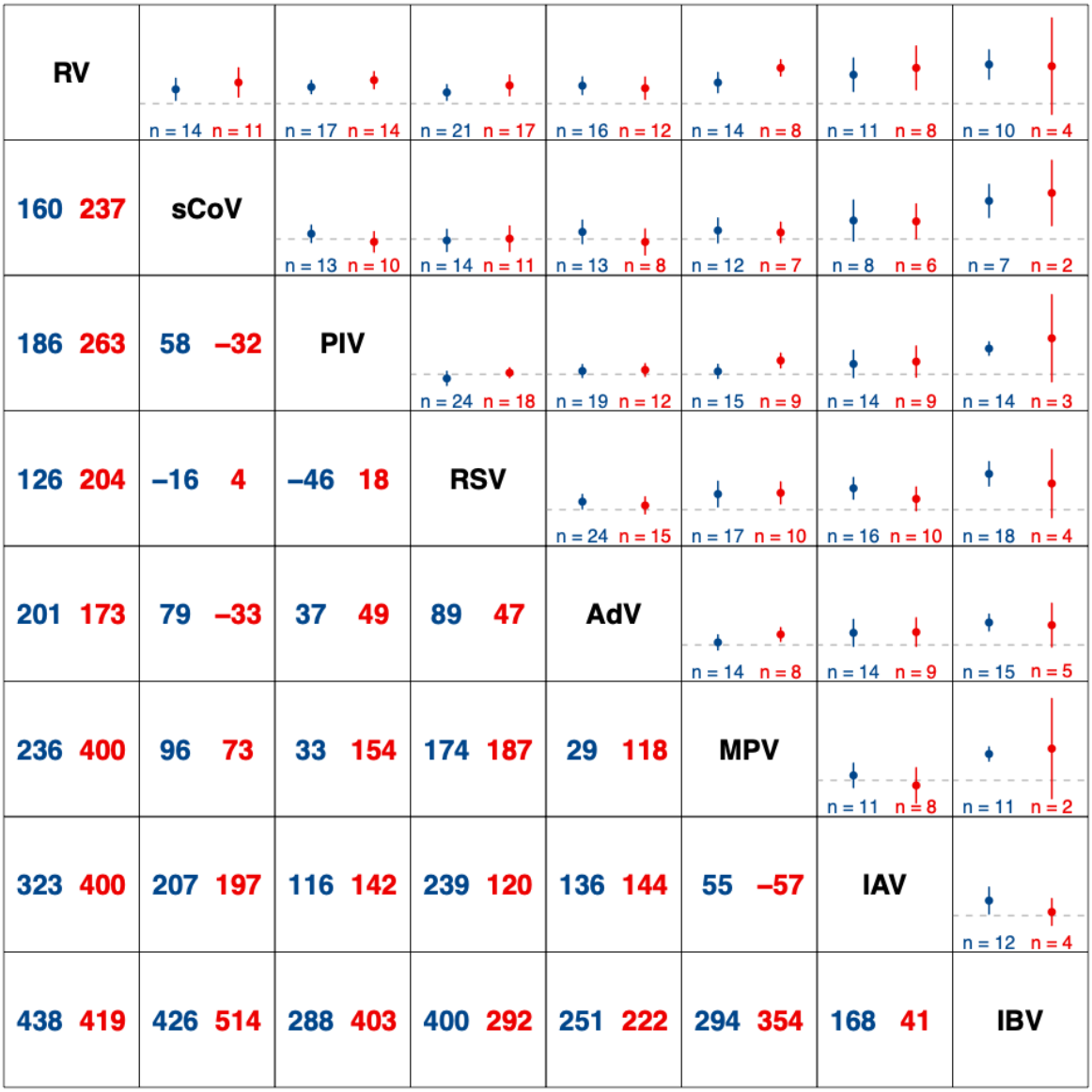
Supplementary Figure 14. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in high-income countries.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



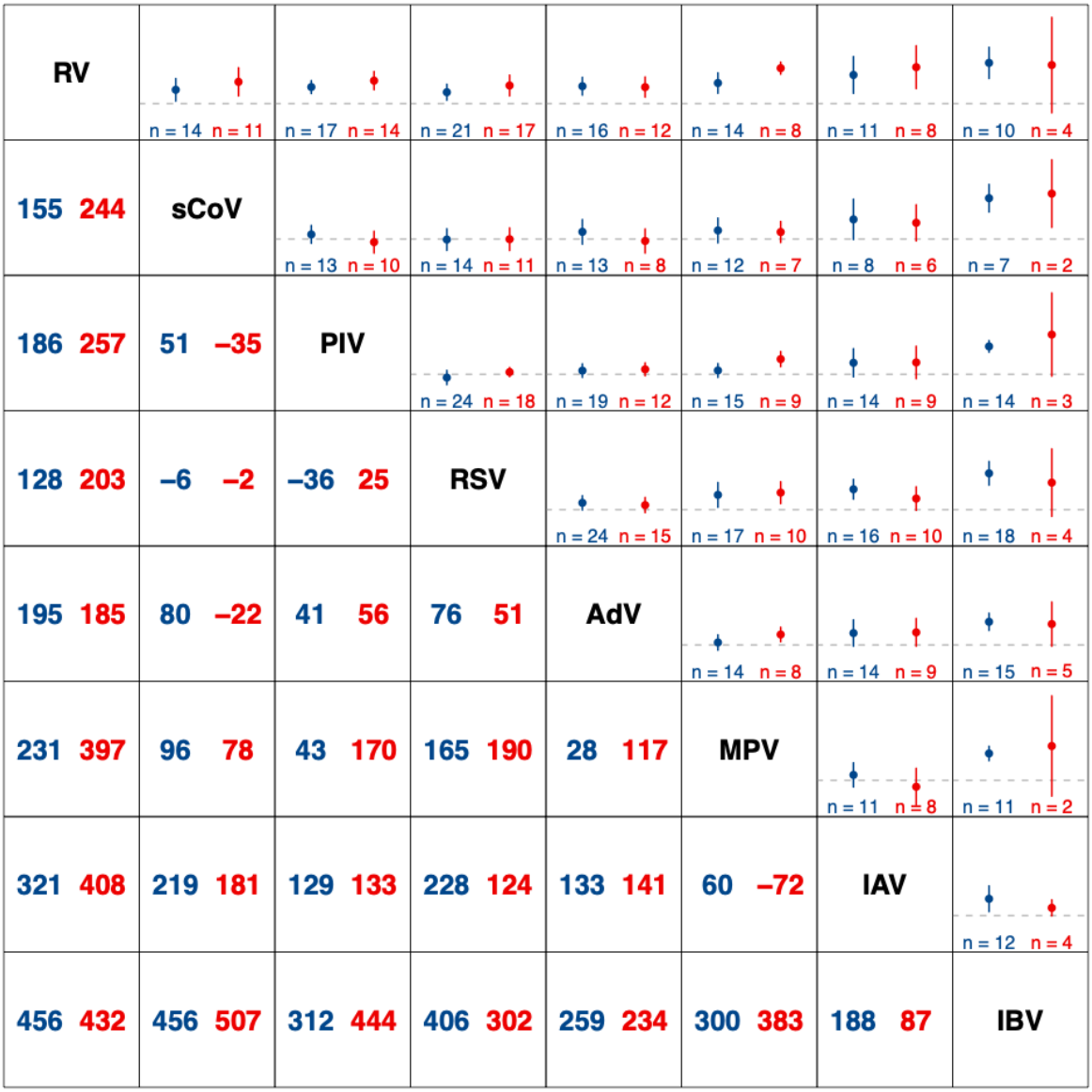
Supplementary Figure 15. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in high-income countries.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



Supplementary Figure 16. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by sites in non-high-income countries.

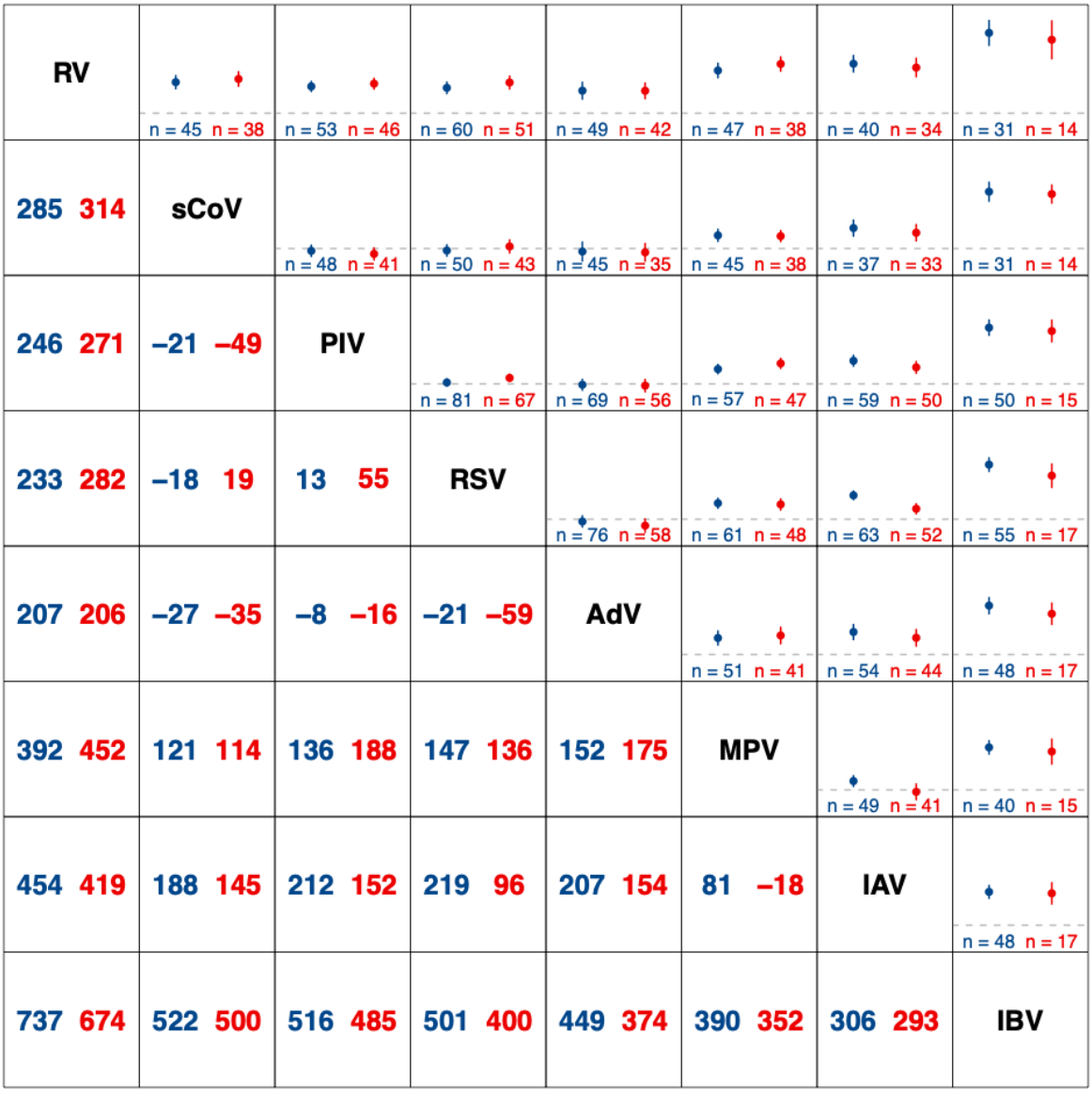
The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



Supplementary Figure 17. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites in non-high-income countries.

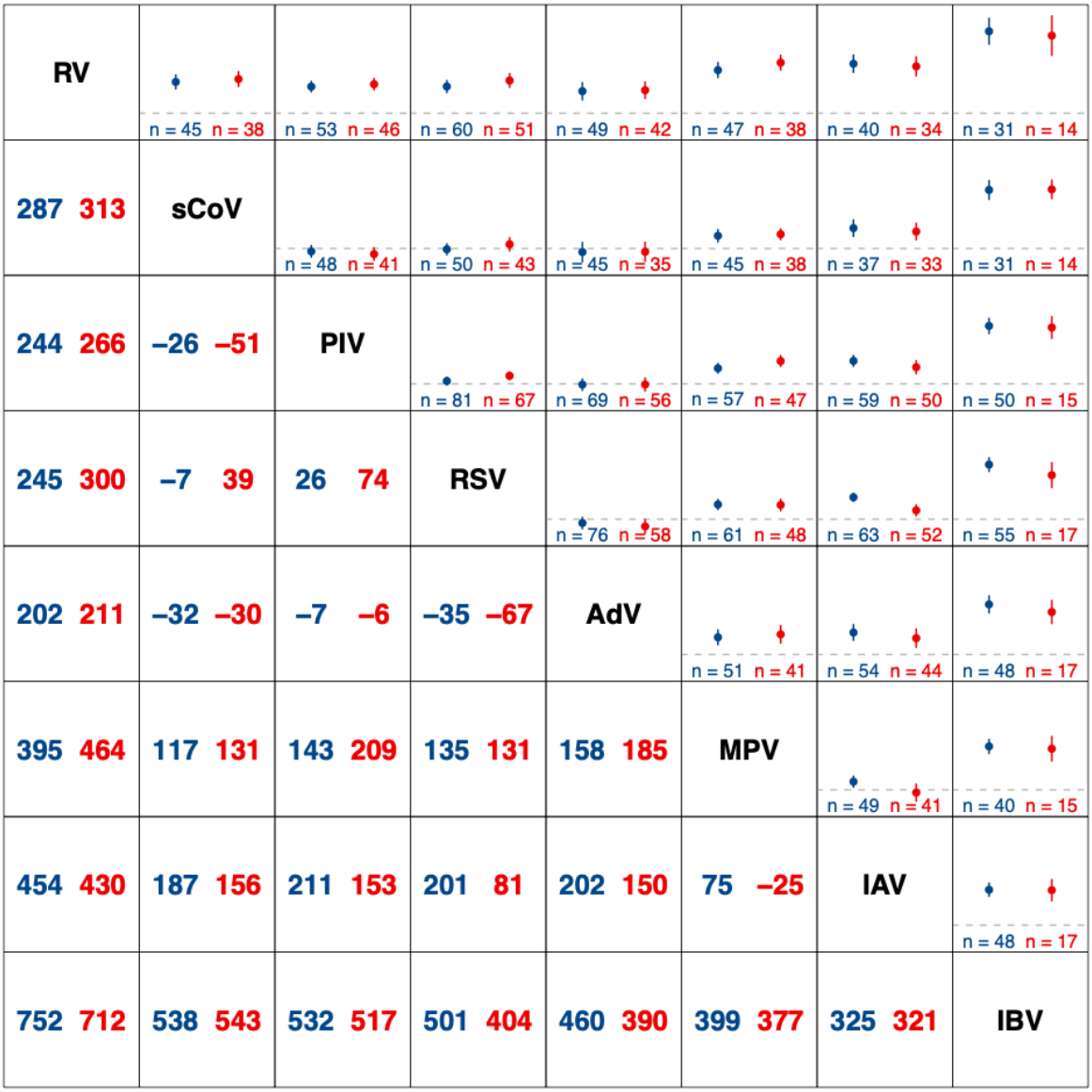
The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).

Sensitivity analysis result



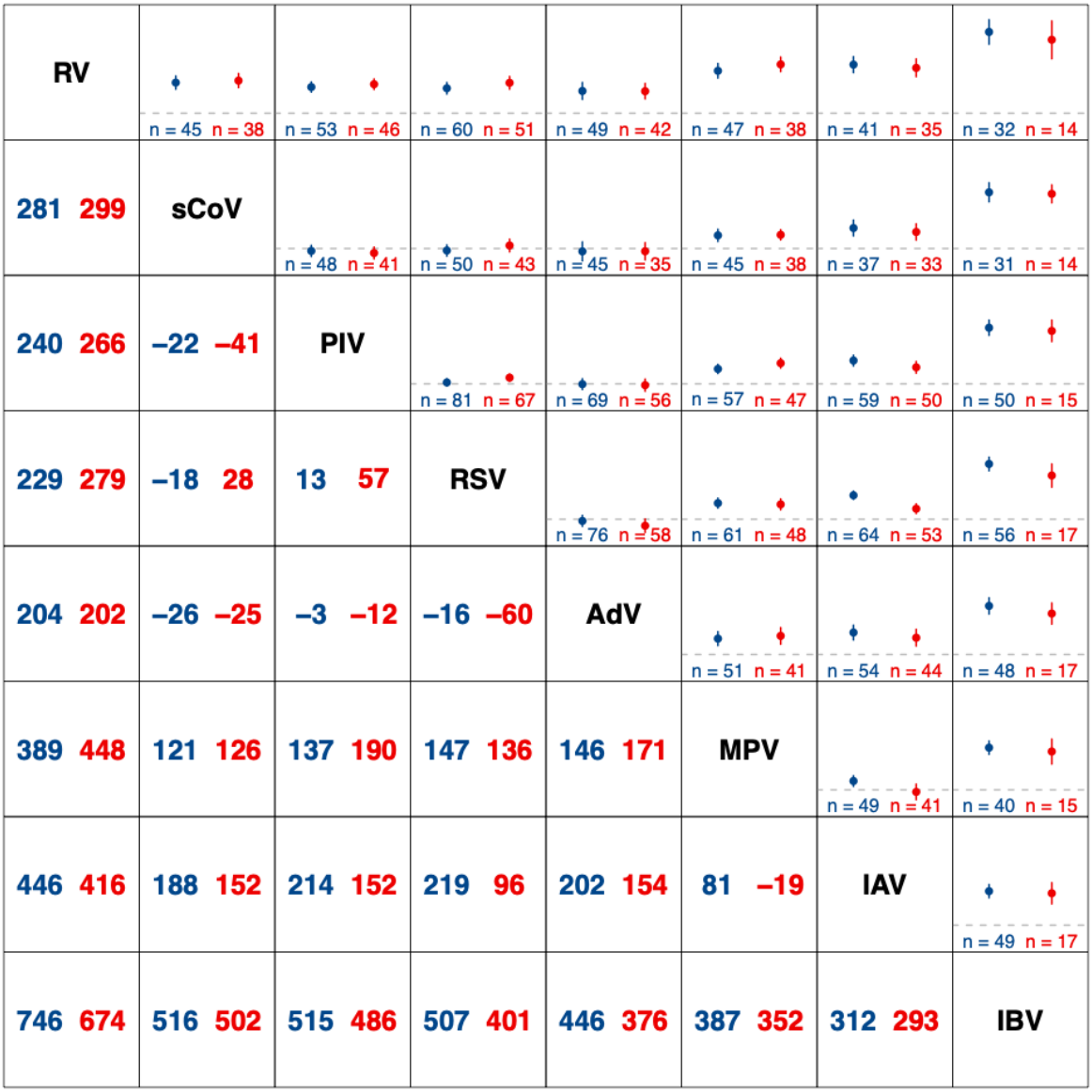
Supplementary Figure 18. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting positive proportion data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



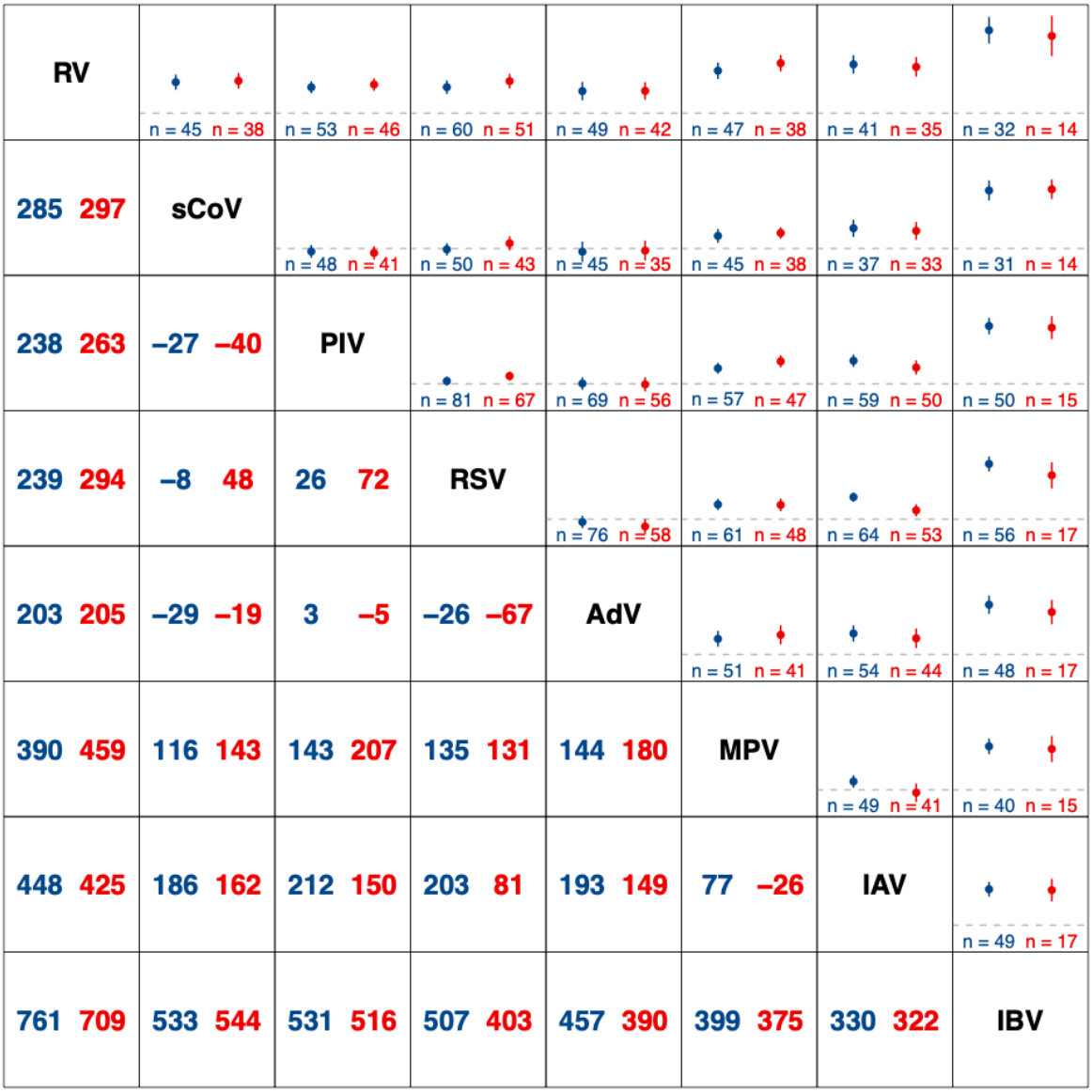
Supplementary Figure 19. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting positive proportion data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



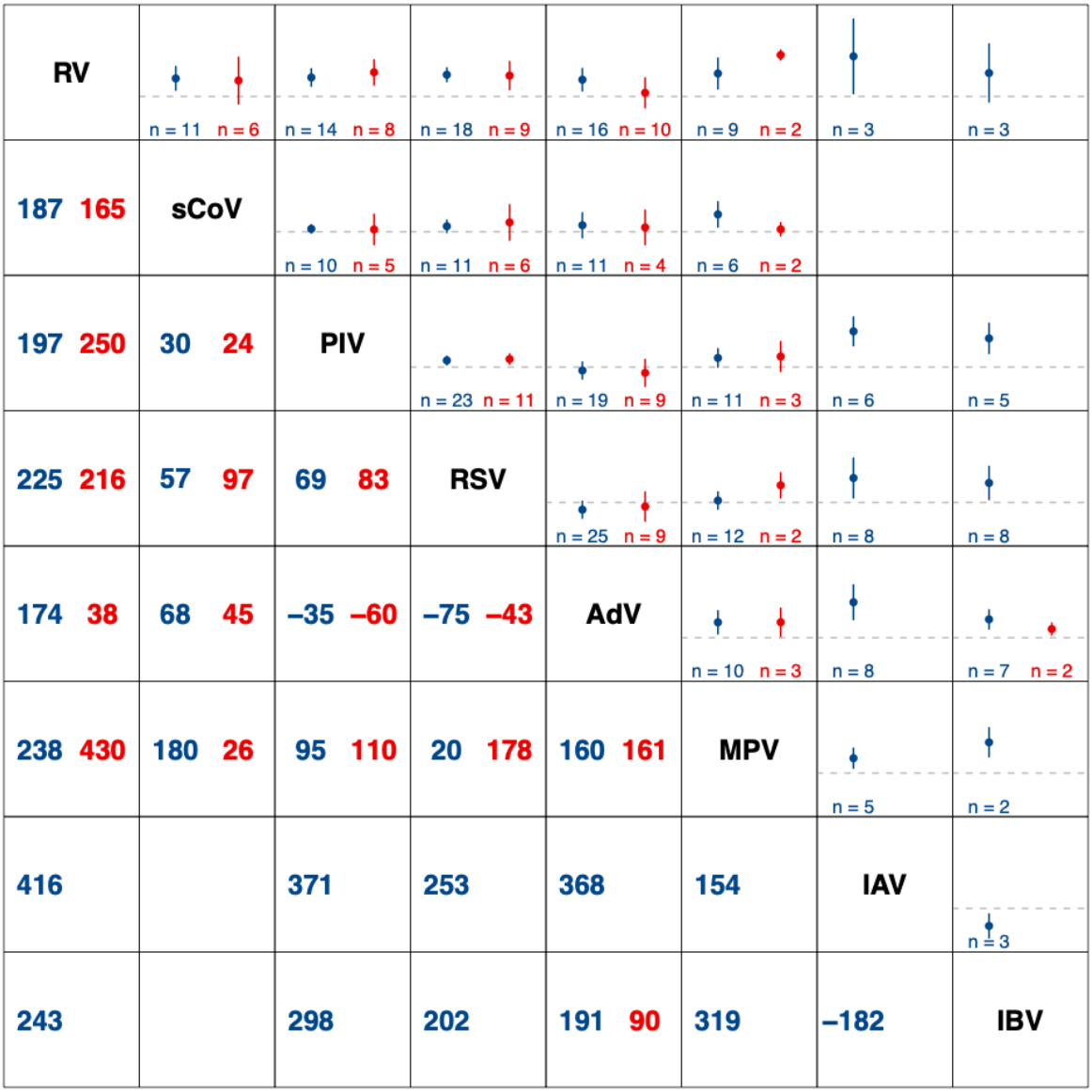
Supplementary Figure 20. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting positive cases data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



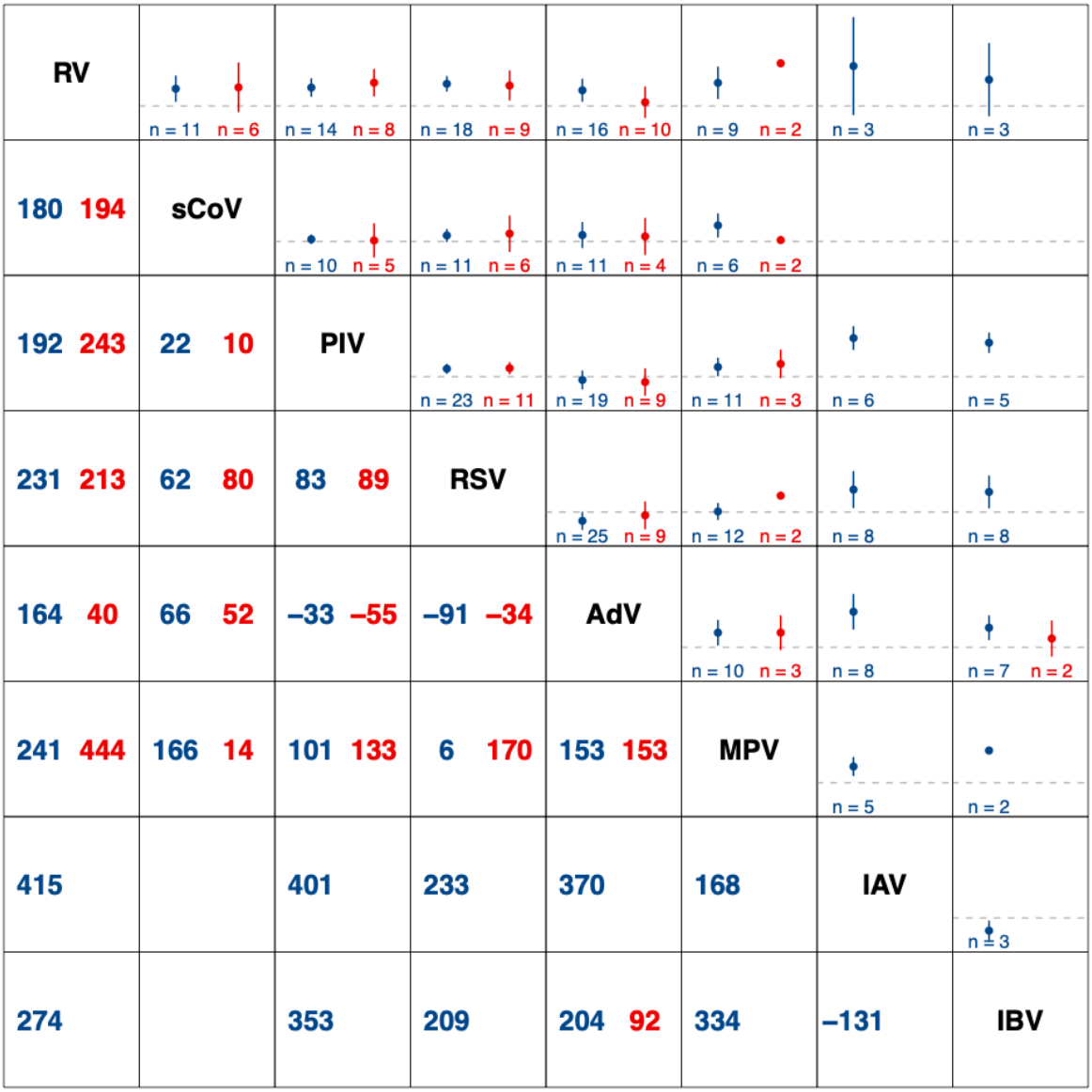
Supplementary Figure 21. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting positive cases data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



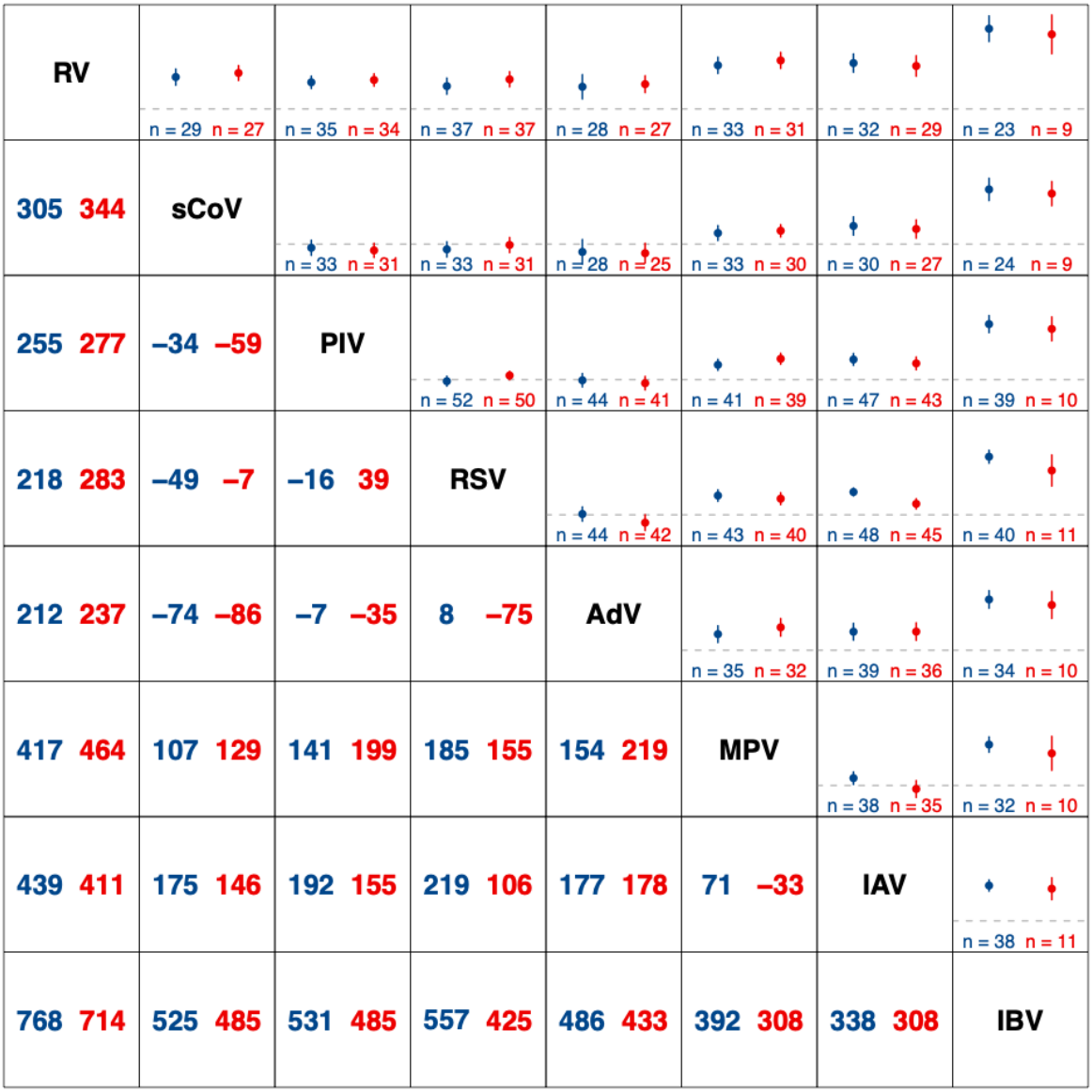
Supplementary Figure 22. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites using data extracted from systematic literature review.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



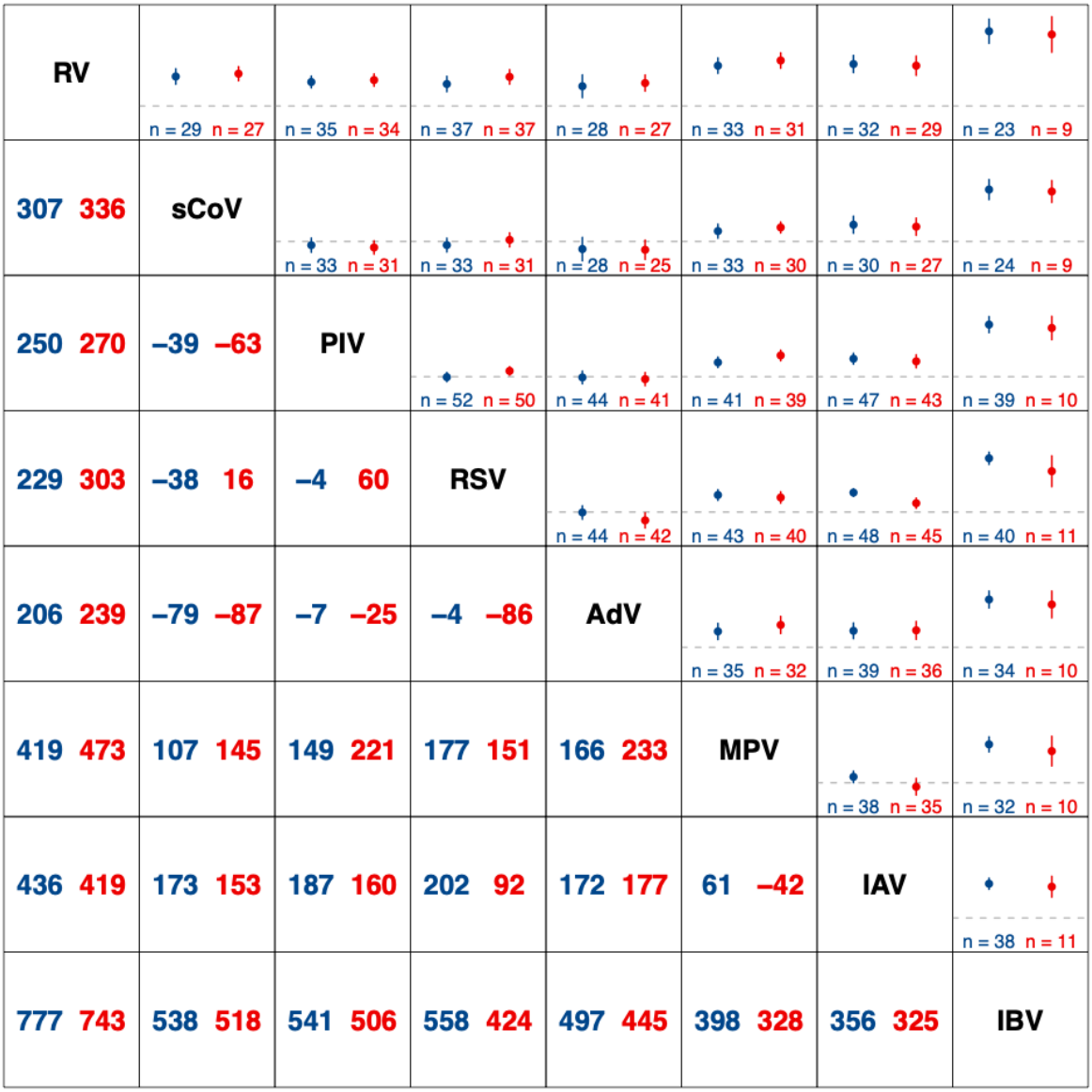
Supplementary Figure 23. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites using data extracted from systematic literature review.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



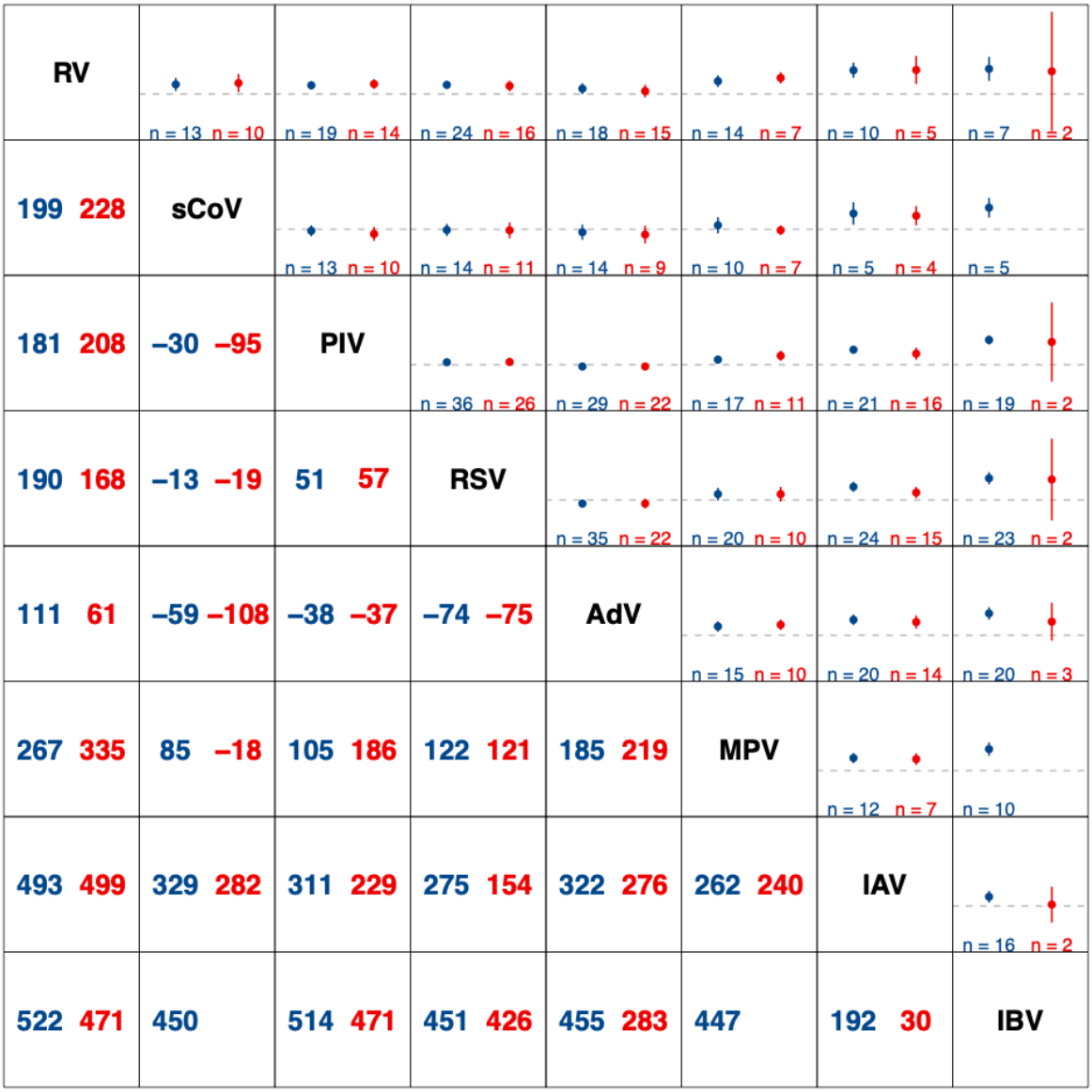
Supplementary Figure 24. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites using data extracted from databases.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



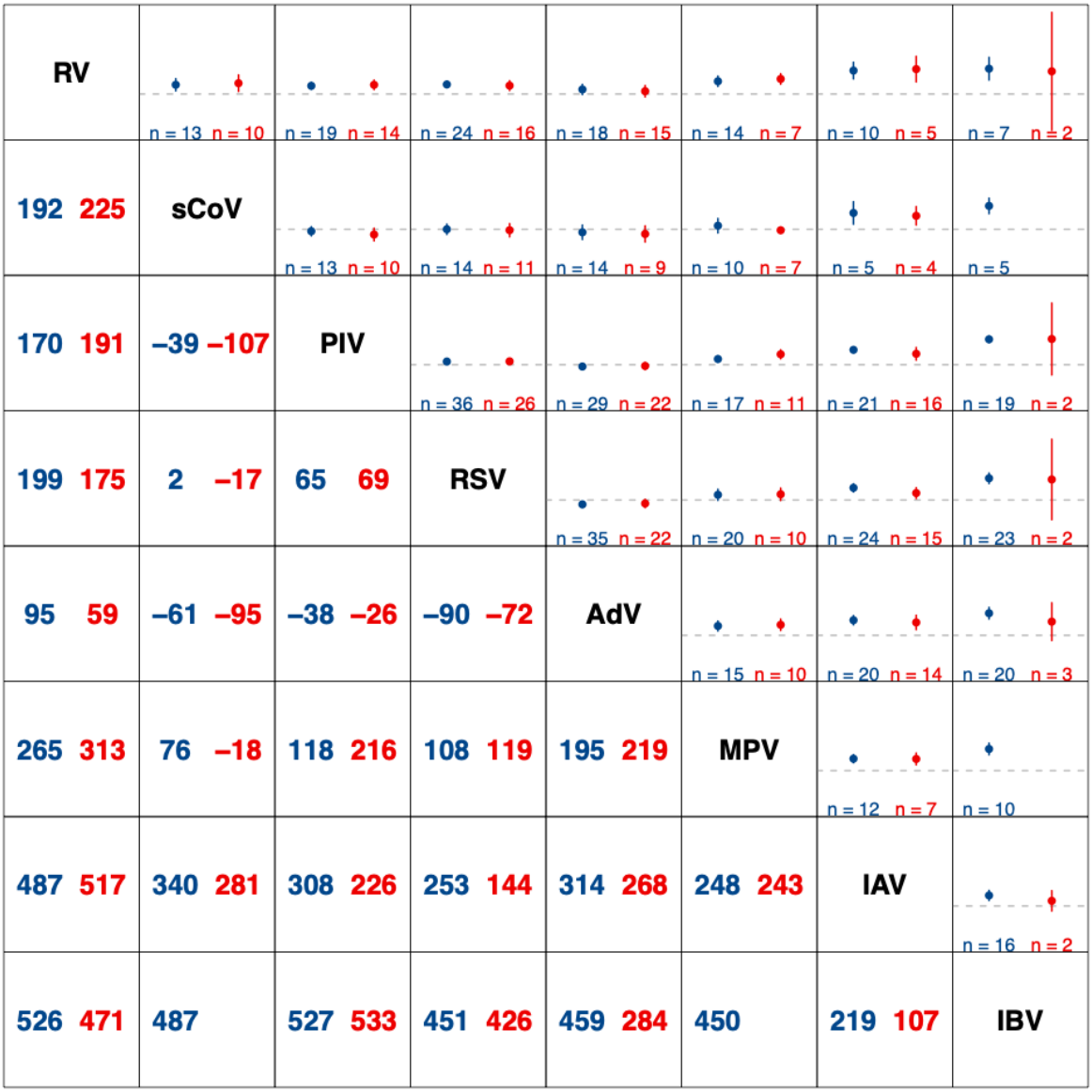
Supplementary Figure 25.The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites using data extracted from databases.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



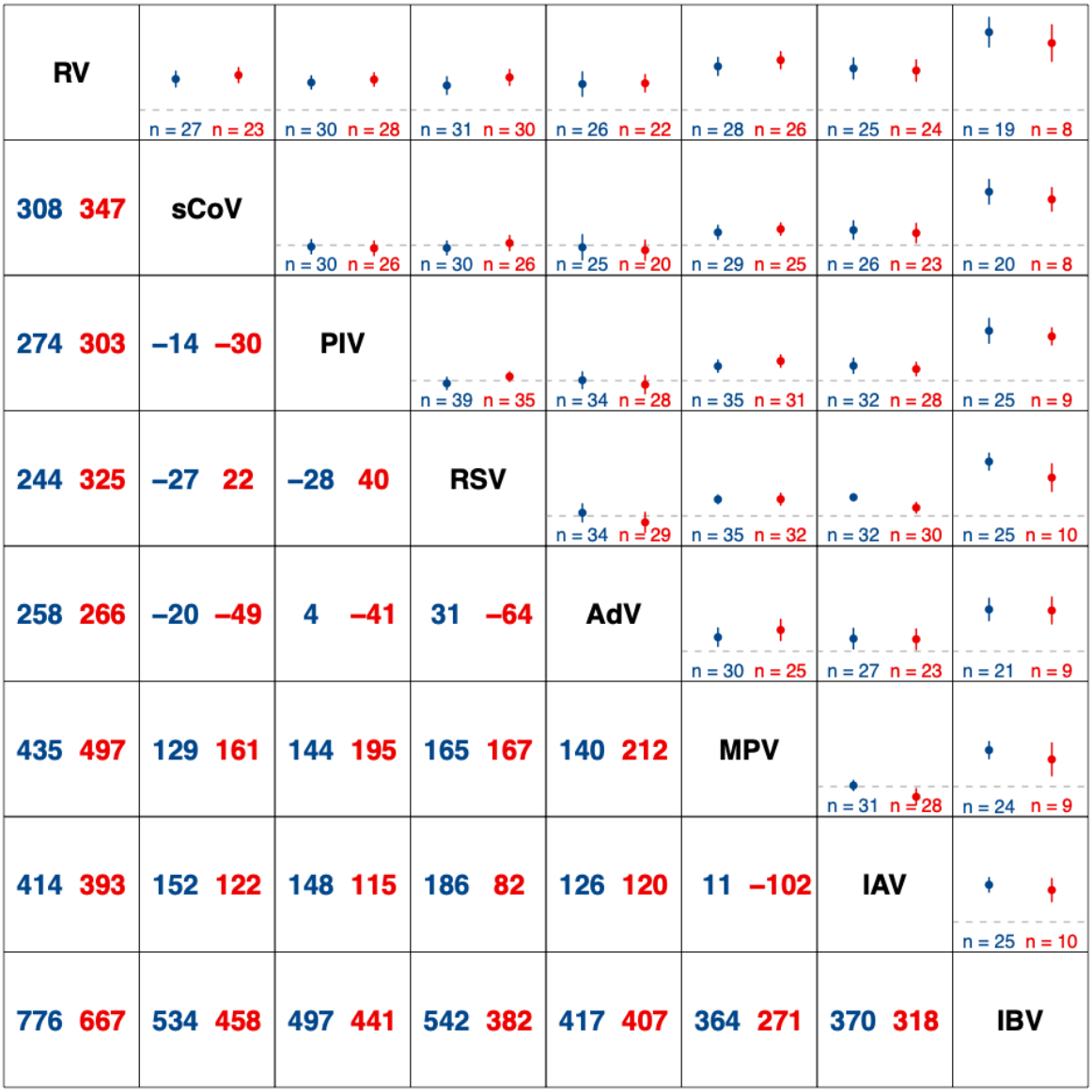
Supplementary Figure 26. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting monthly aggregated viral activity data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



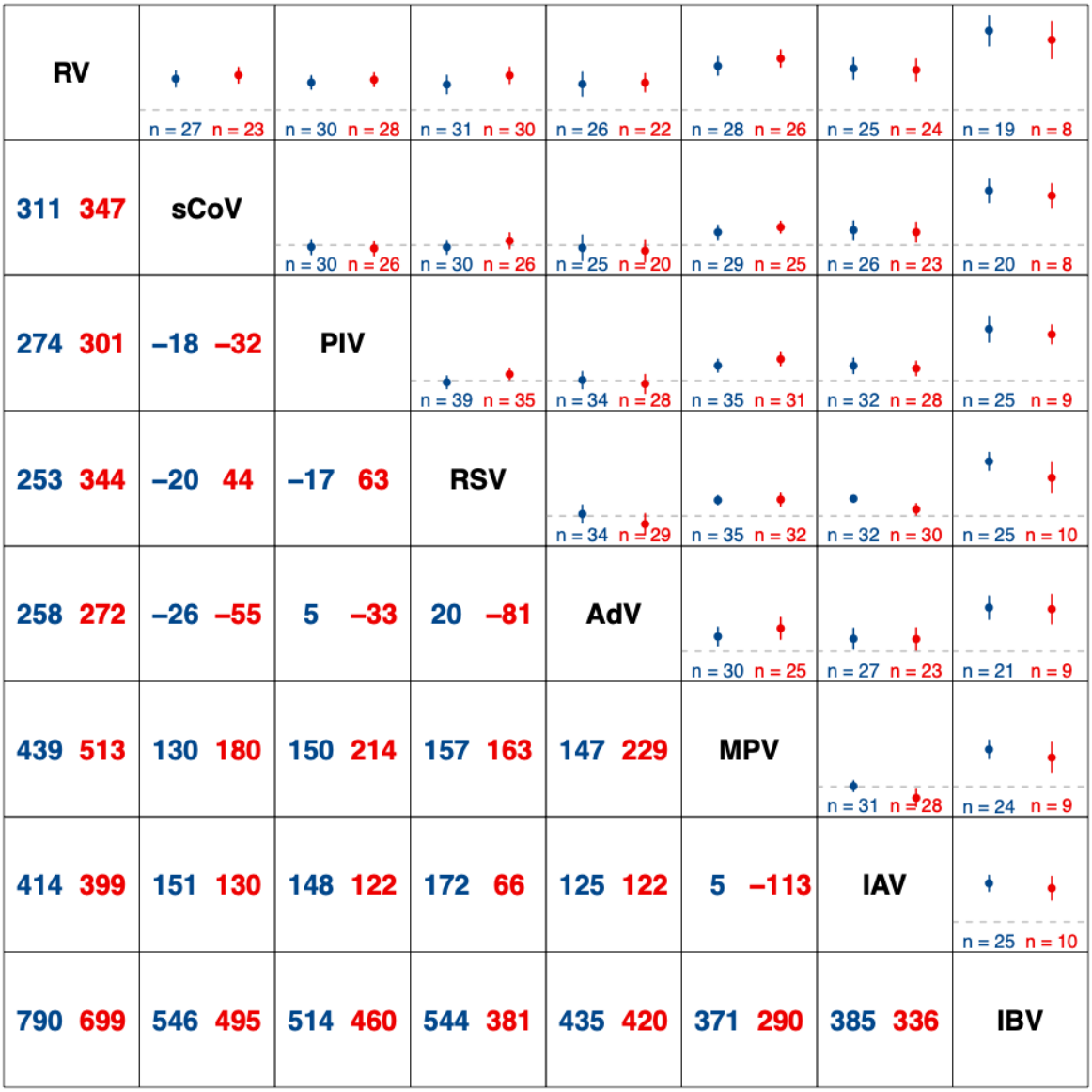
Supplementary Figure 27. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting monthly aggregated viral activity data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



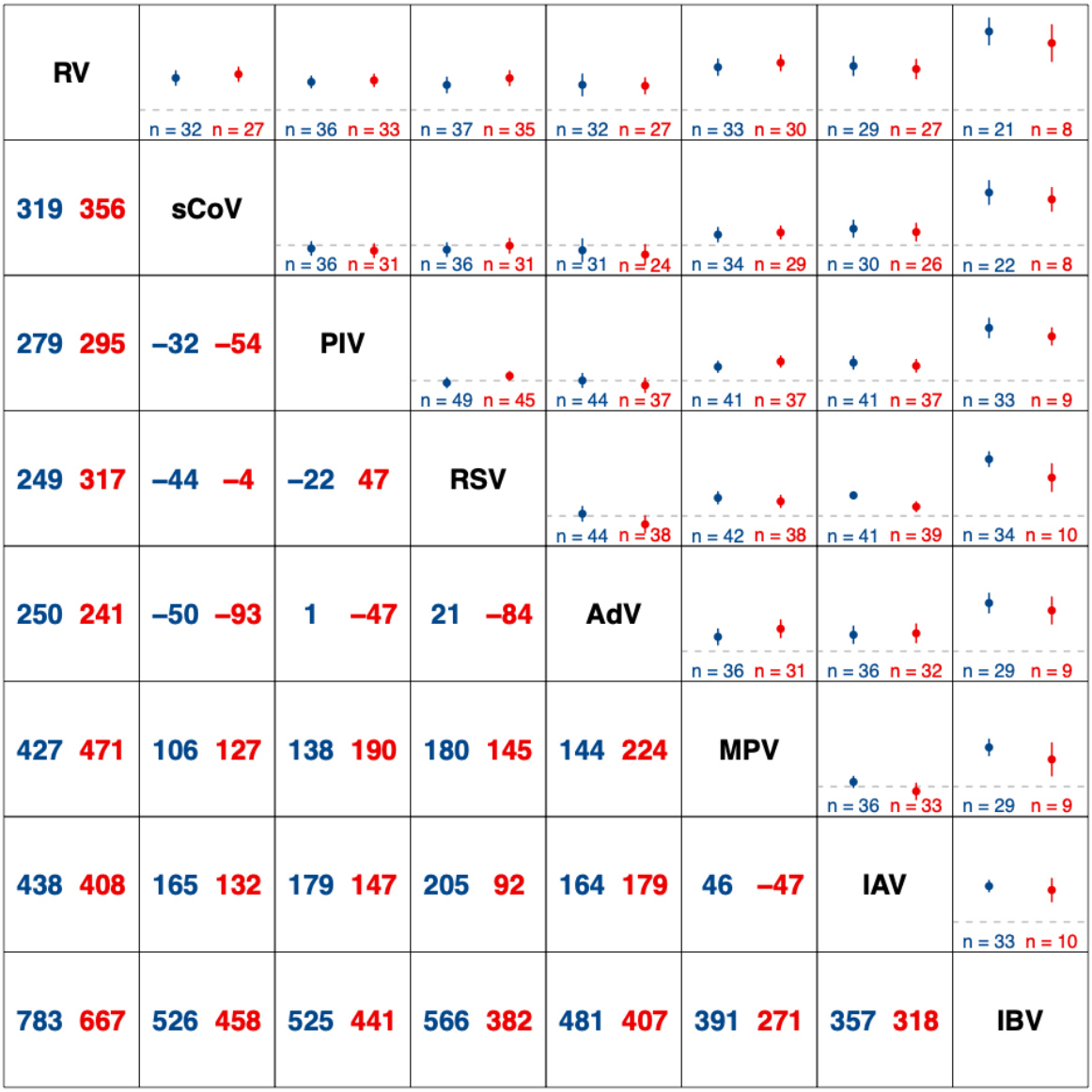
Supplementary Figure 28. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting weekly aggregated viral activity data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



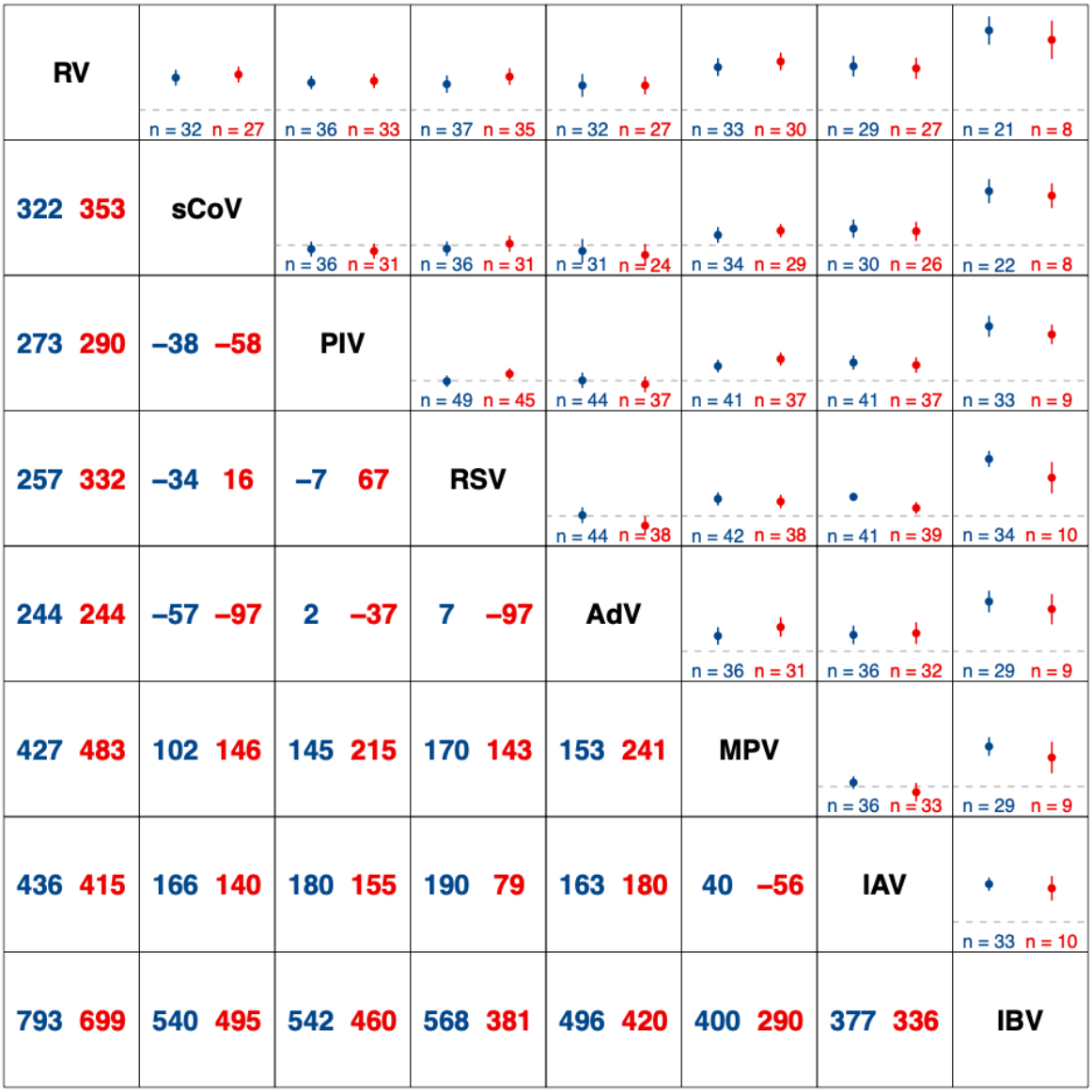
Supplementary Figure 29. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites reporting weekly aggregated viral activity data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



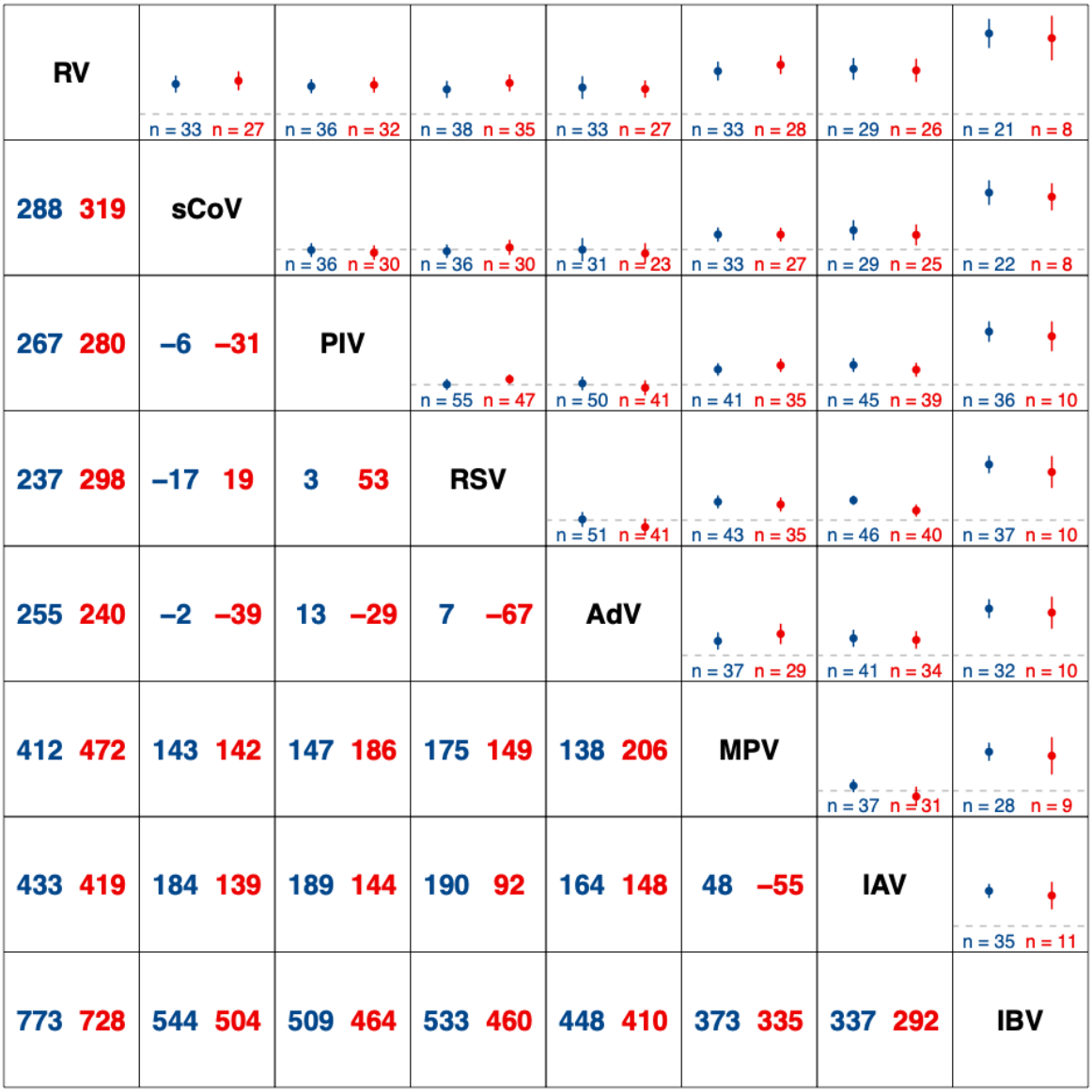
Supplementary Figure 30. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites providing moderate-to-high quality data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



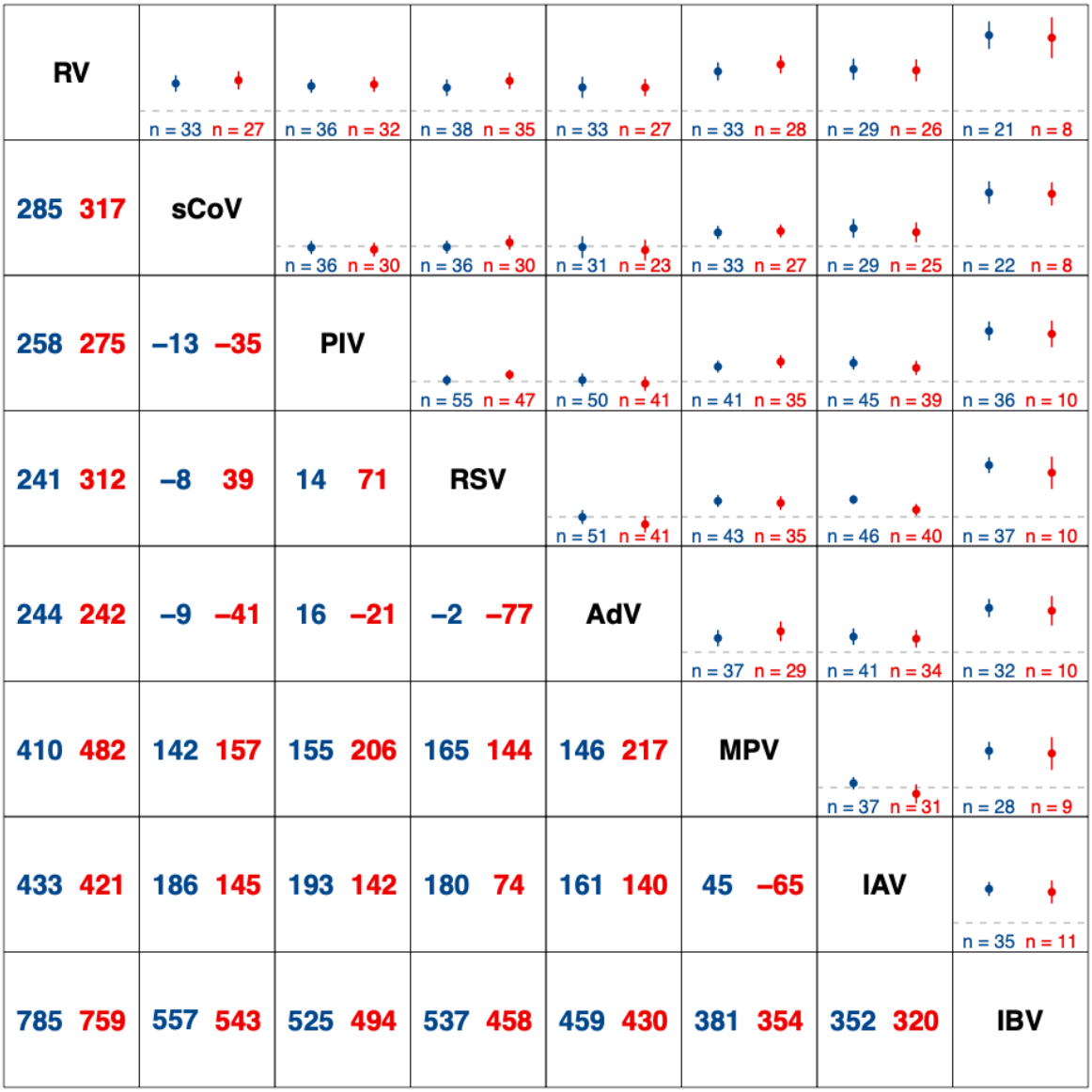
Supplementary Figure 31. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites providing moderate-to-high quality data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



Supplementary Figure 32. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites providing all age group data.

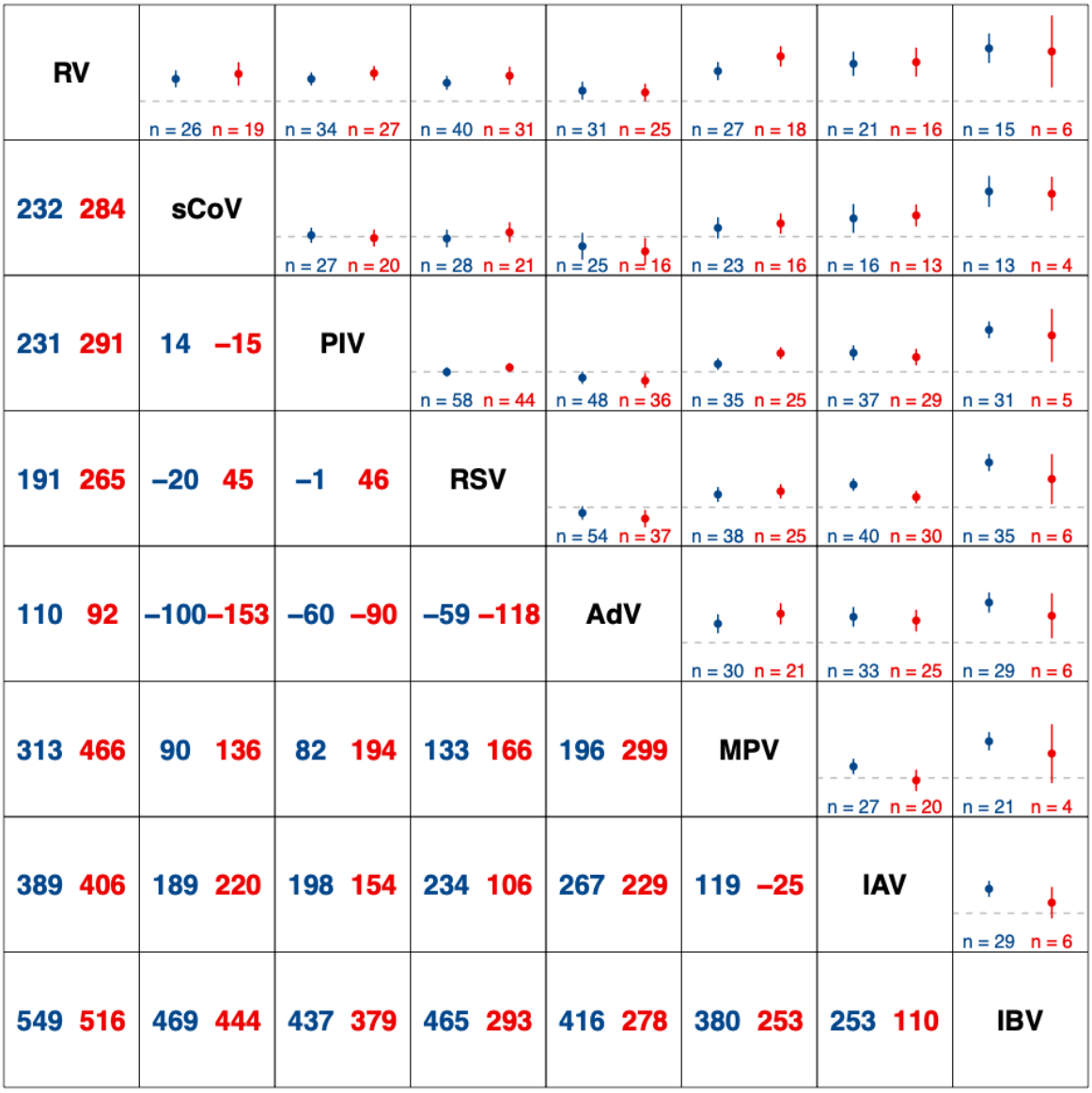
The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



Supplementary Figure 33. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, matched by study sites providing all age group data.

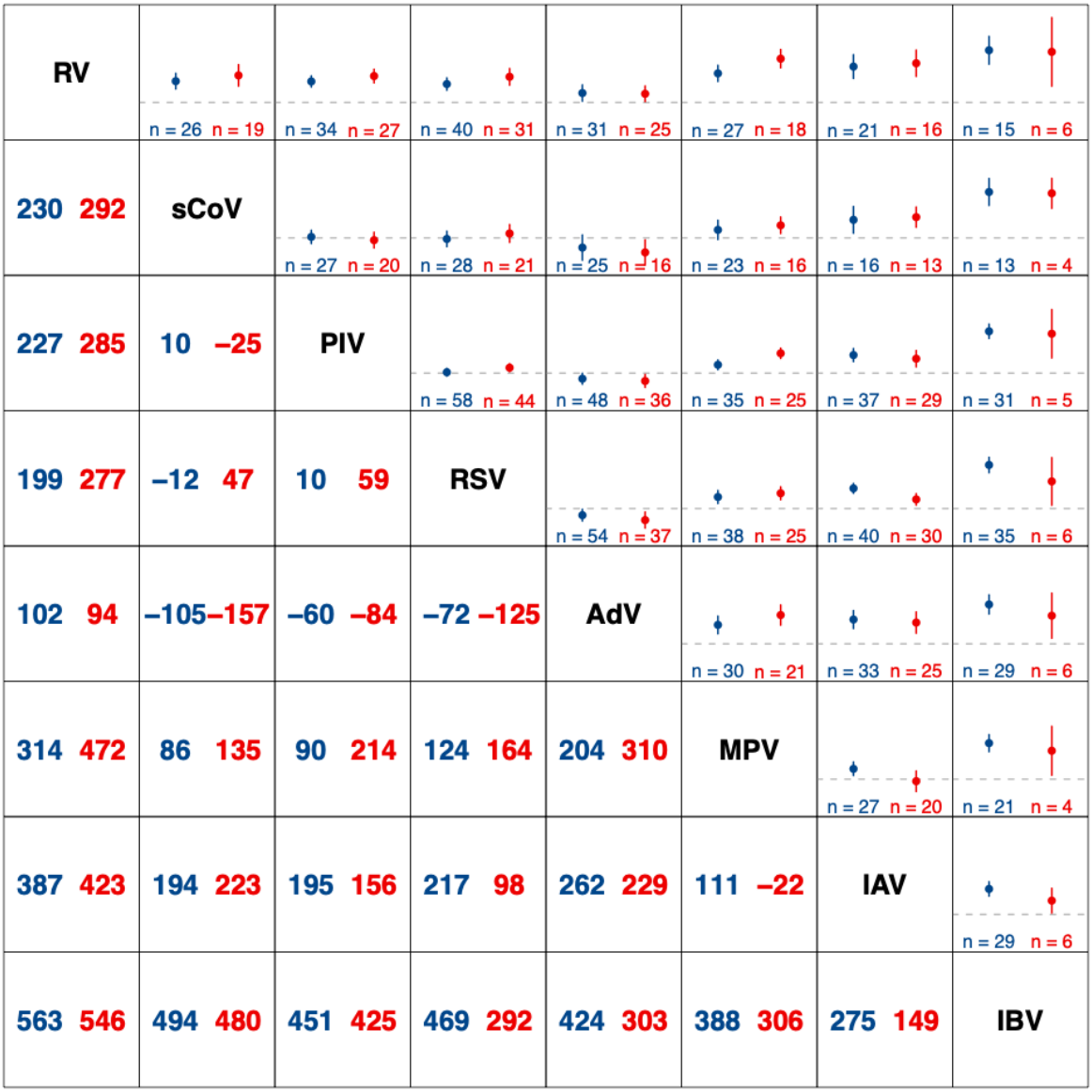
The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).

Ad-hoc analysis results



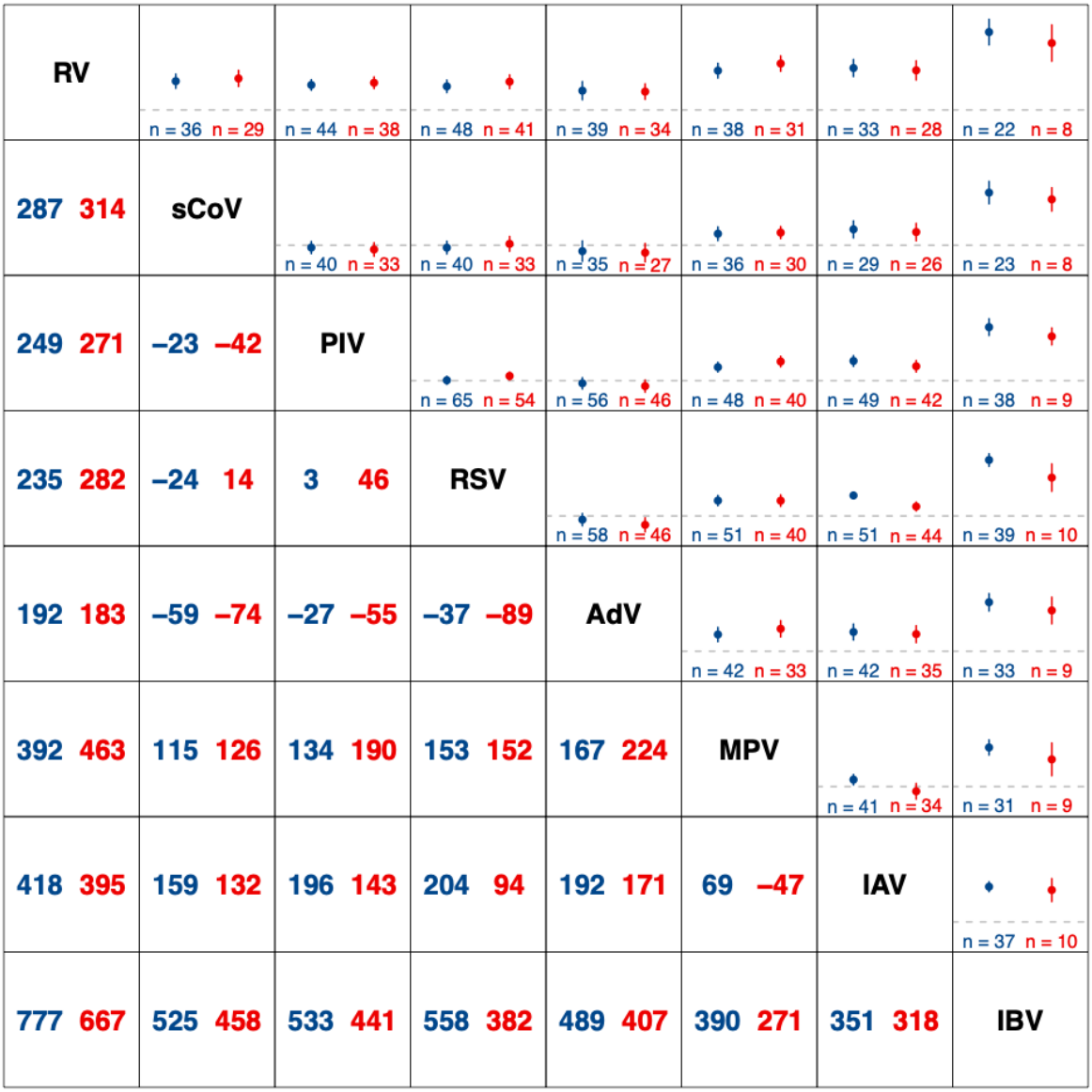
Supplementary Figure 34. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset in study sites excluding Canadian data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



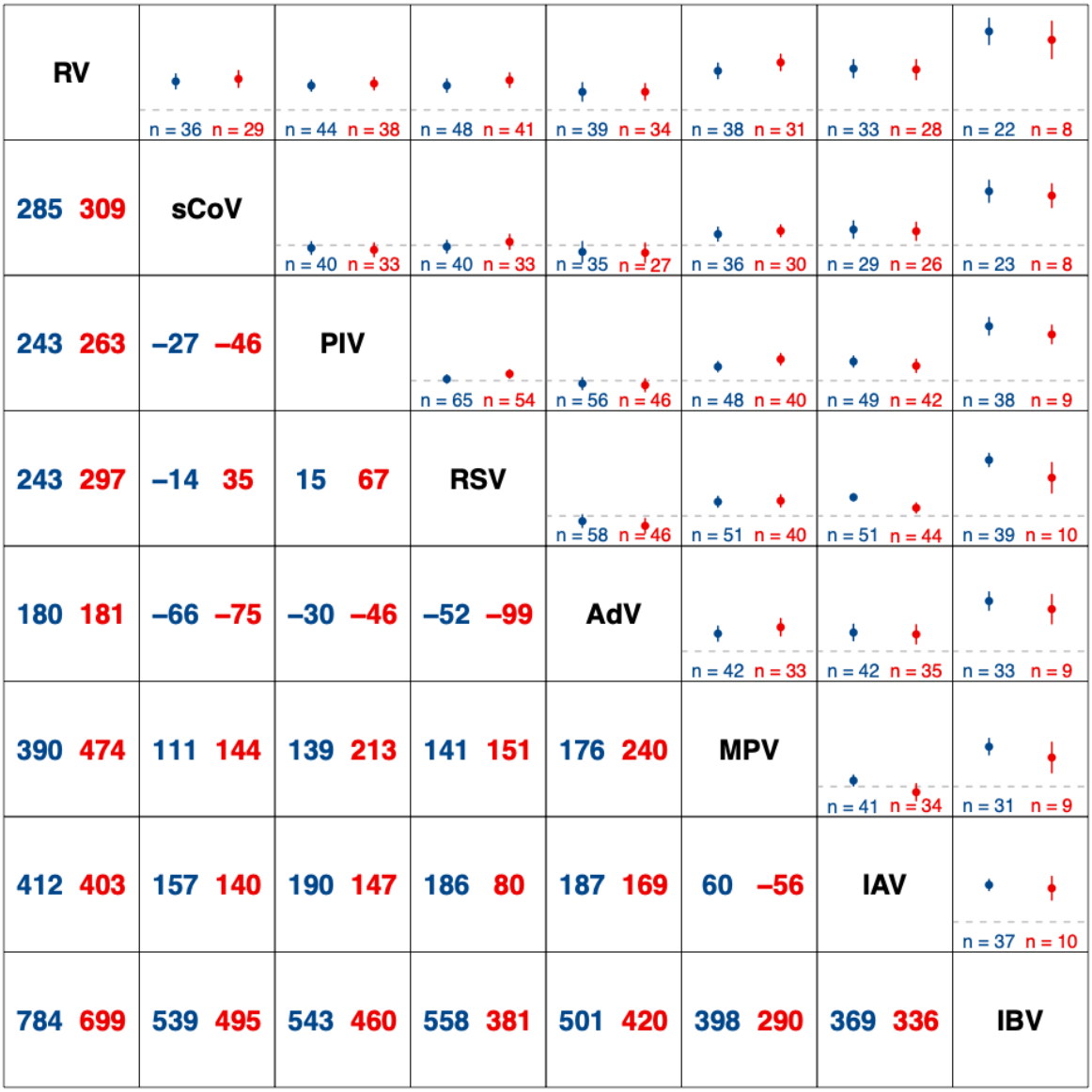
Supplementary Figure 35. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset in study sites excluding Canadian data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



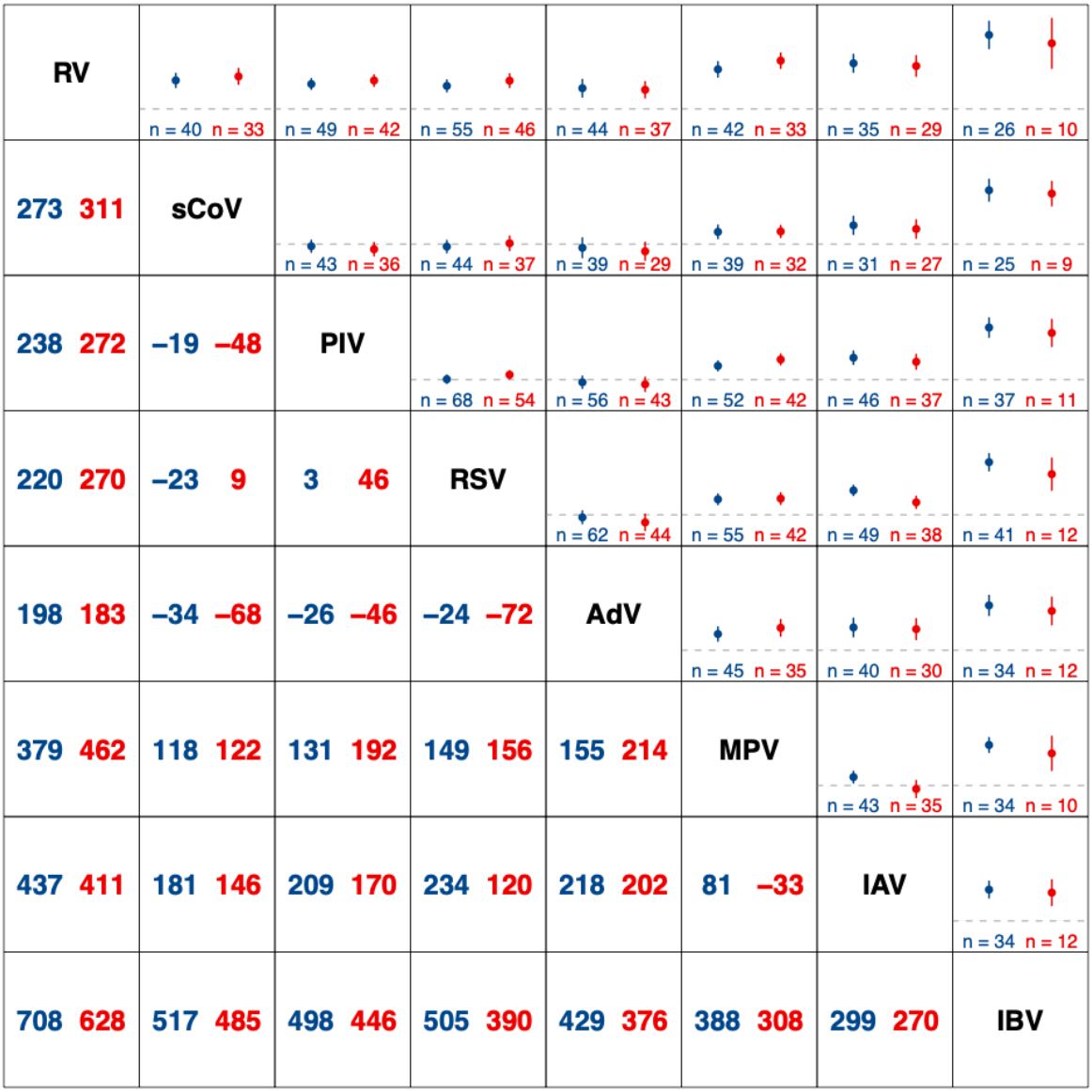
Supplementary Figure 36. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset in study sites excluding Chinese data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



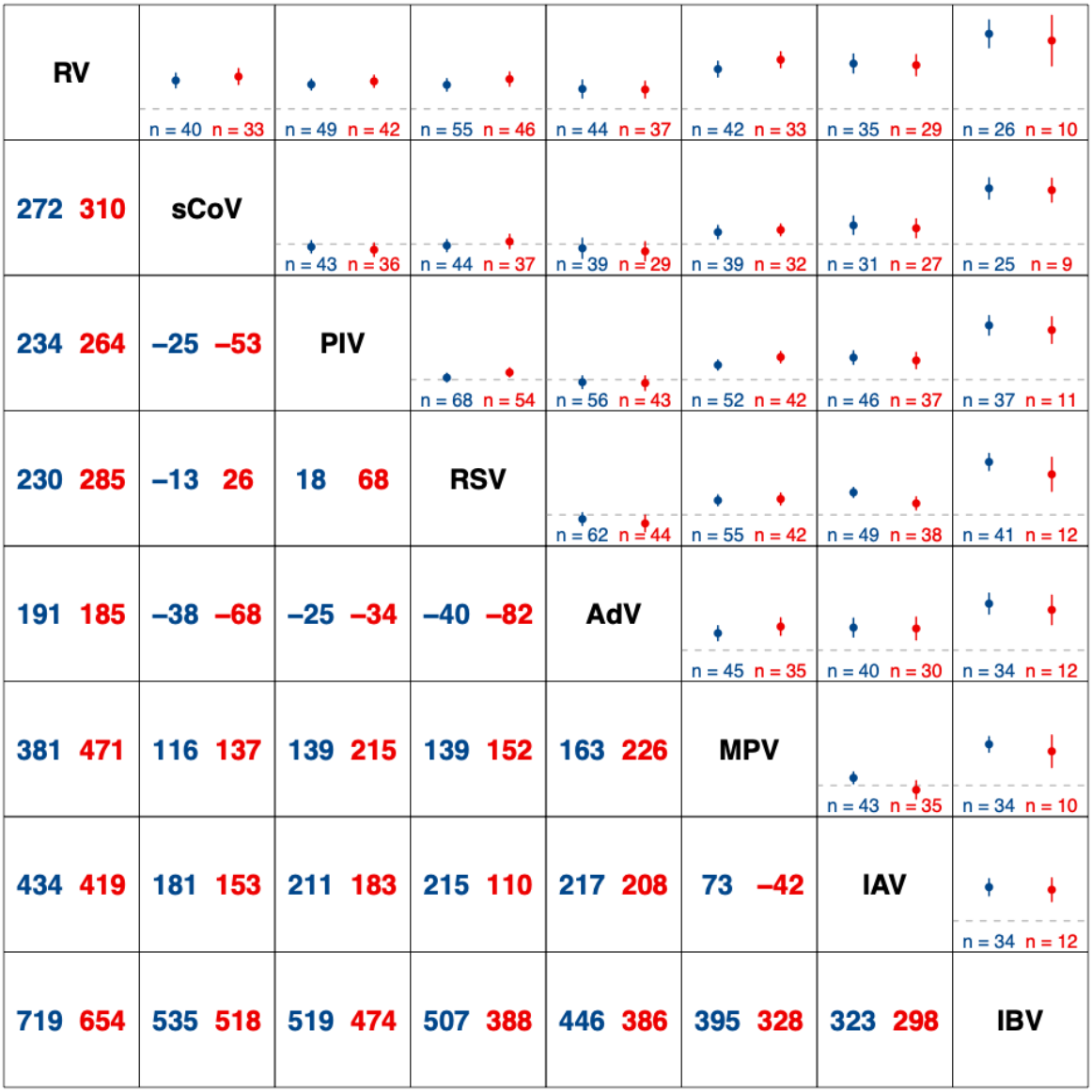
Supplementary Figure 37. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset in study sites excluding Chinese data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



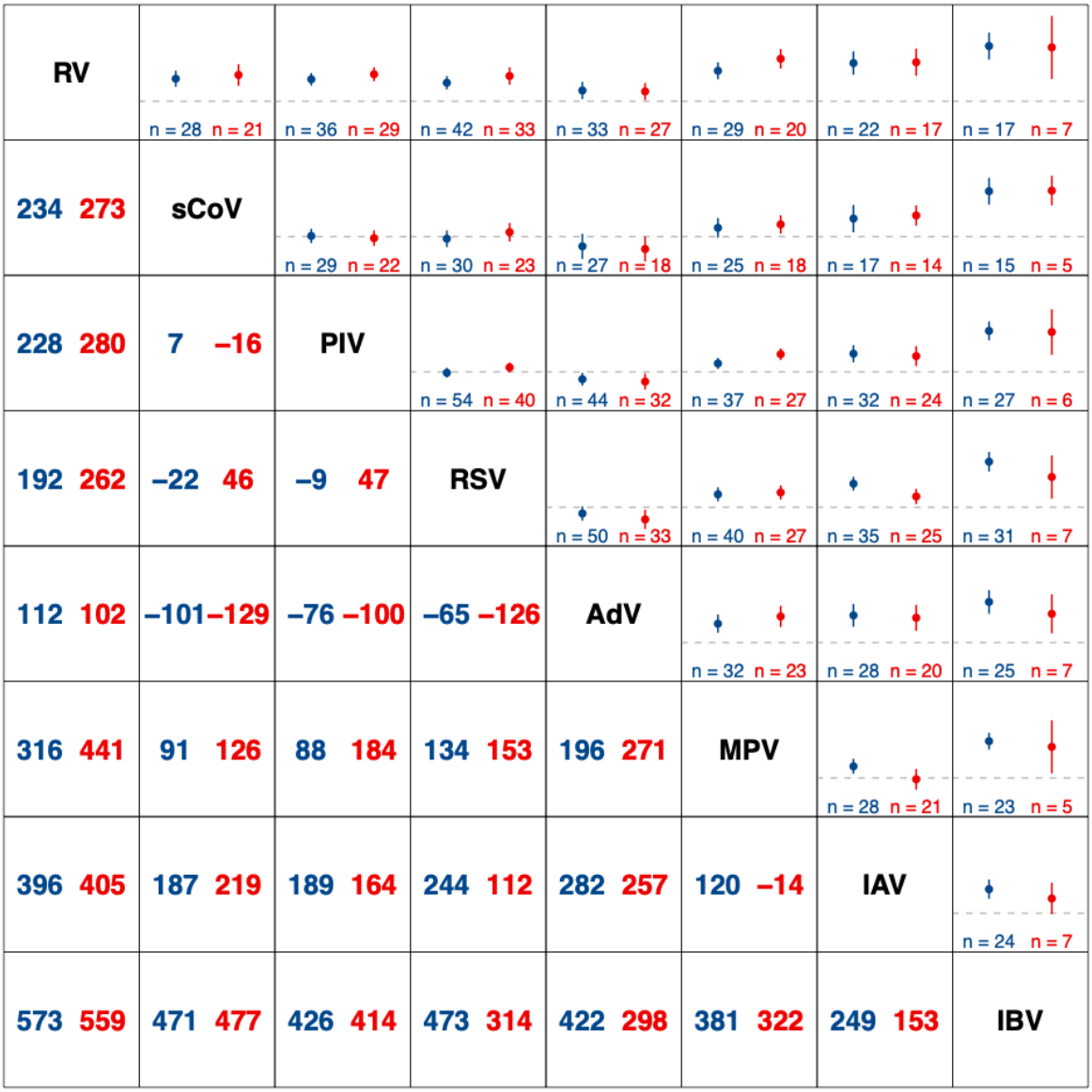
Supplementary Figure 38. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset in study sites excluding Finnish data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



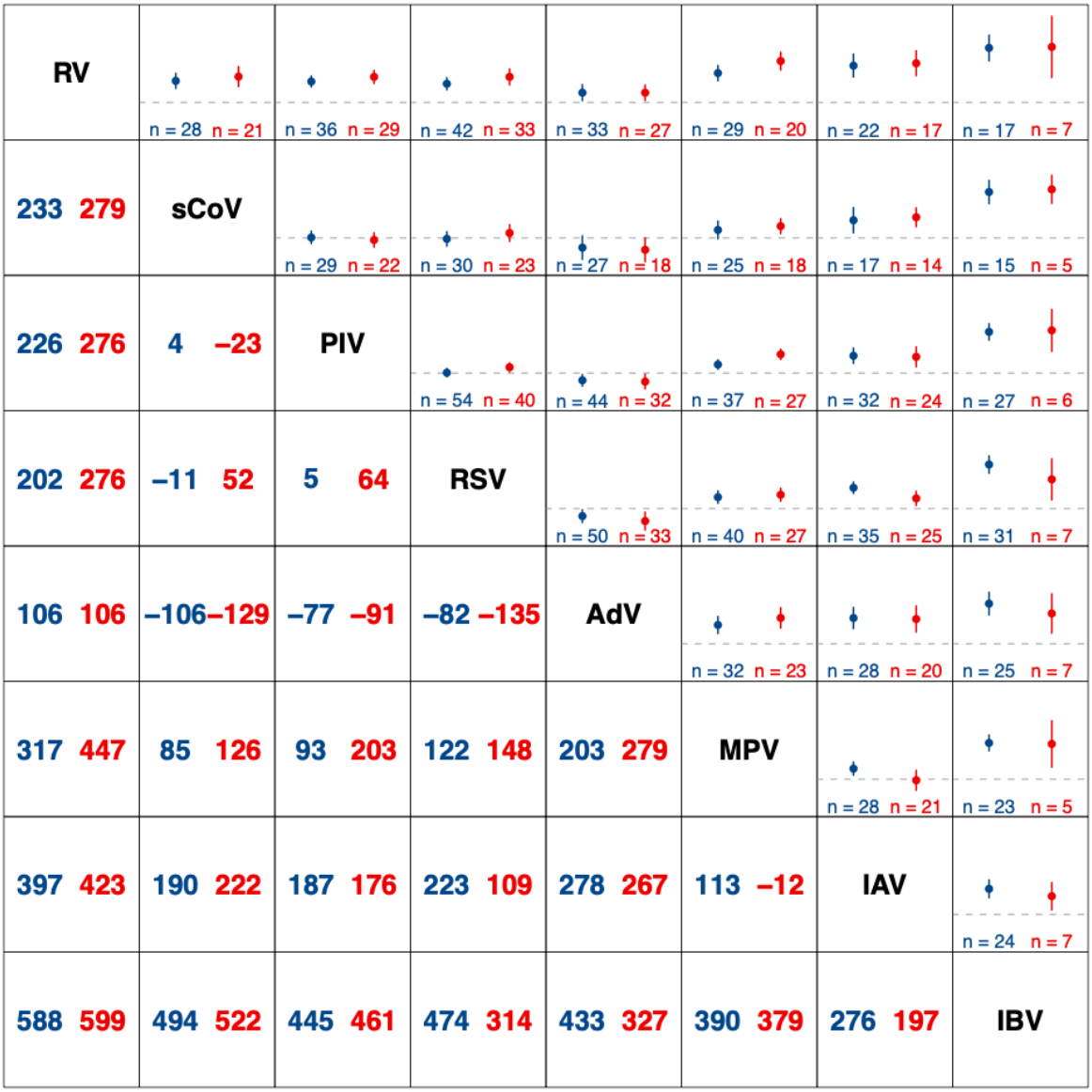
Supplementary Figure 39. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset in study sites excluding Finnish data.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



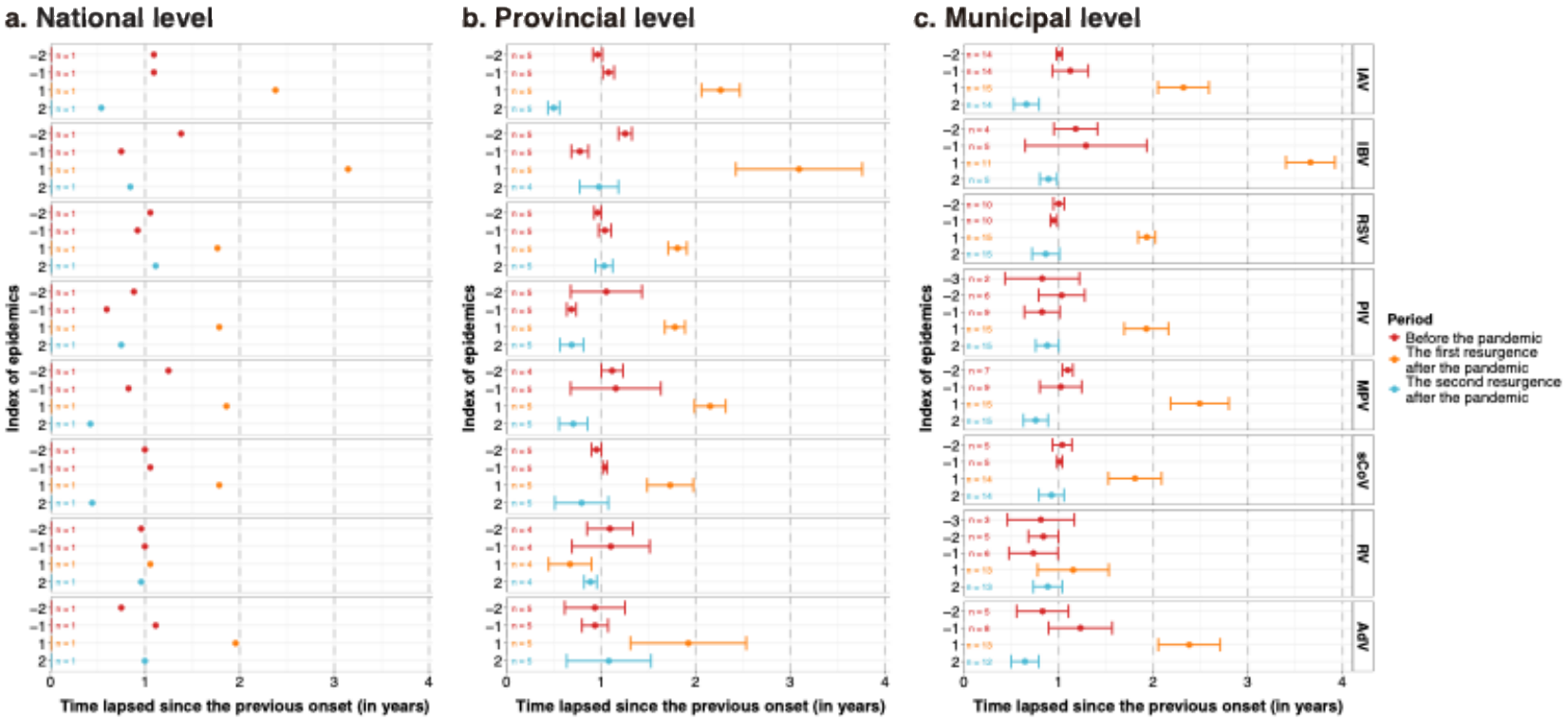
Supplementary Figure 40. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, using nationally aggregated data from Canada and Finland.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



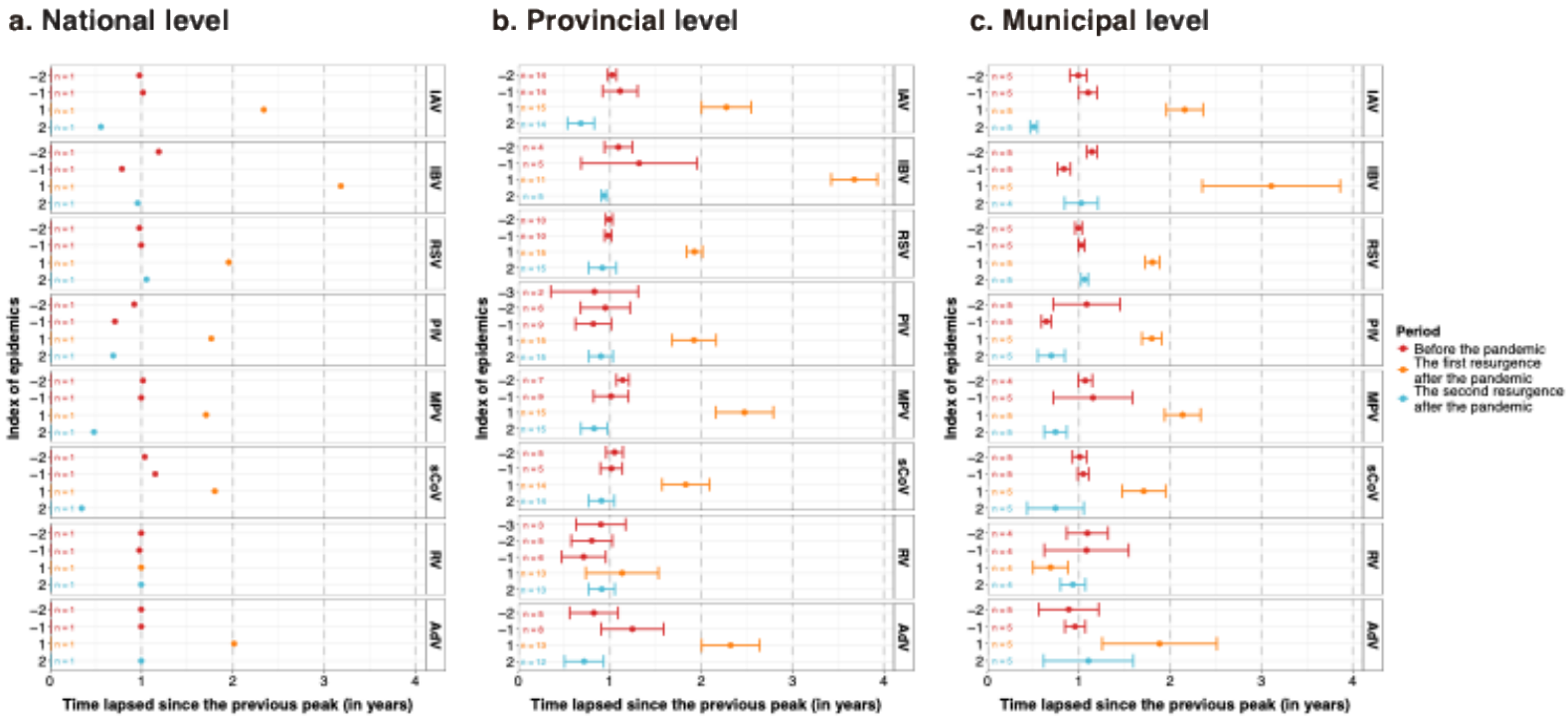
Supplementary Figure 41. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset, using nationally aggregated data from Canada and Finland.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



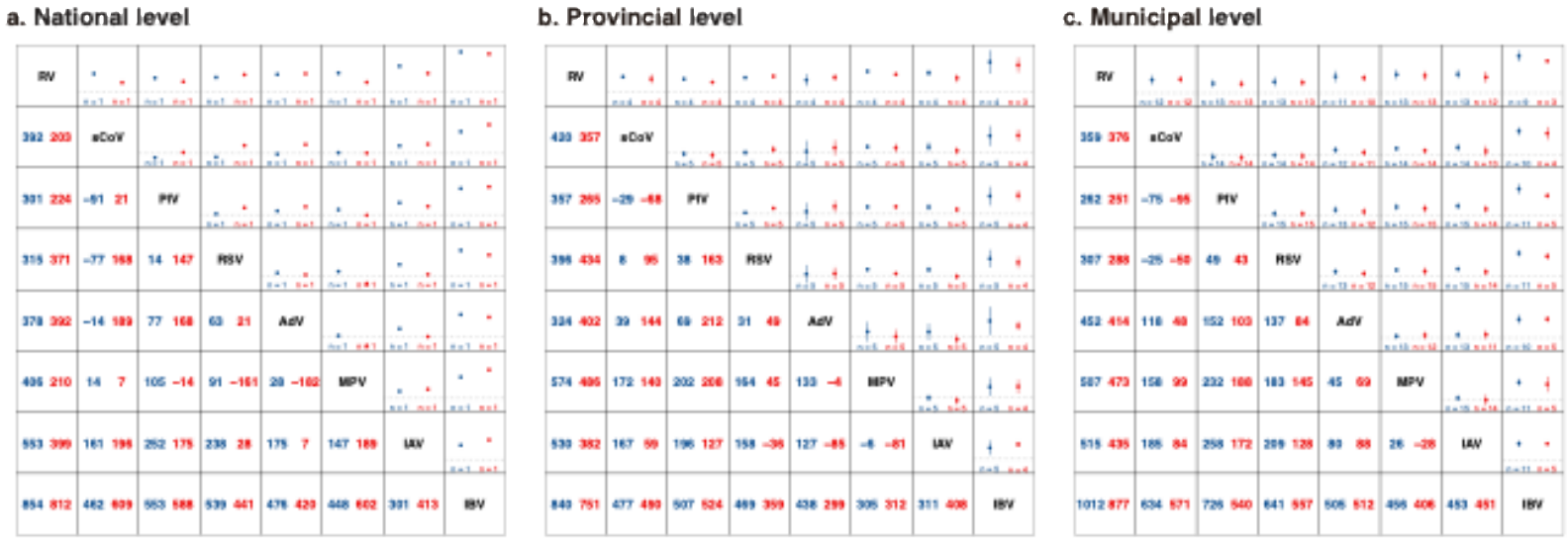
Supplementary Figure 42. The virus-specific time interval (with 95% CI) between the onsets in two subsequent years across national (A), provincial (B), and municipal (C) levels in Canada.

The x-axis represents the time lapsed since the previous onset, measured in years. The left y-axis lists the index of epidemics relative to the onset of the COVID-19 pandemic, with negative numbers indicating epidemics occurring before the pandemic, and positive numbers indicating epidemics occurring after the onset of the pandemic. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



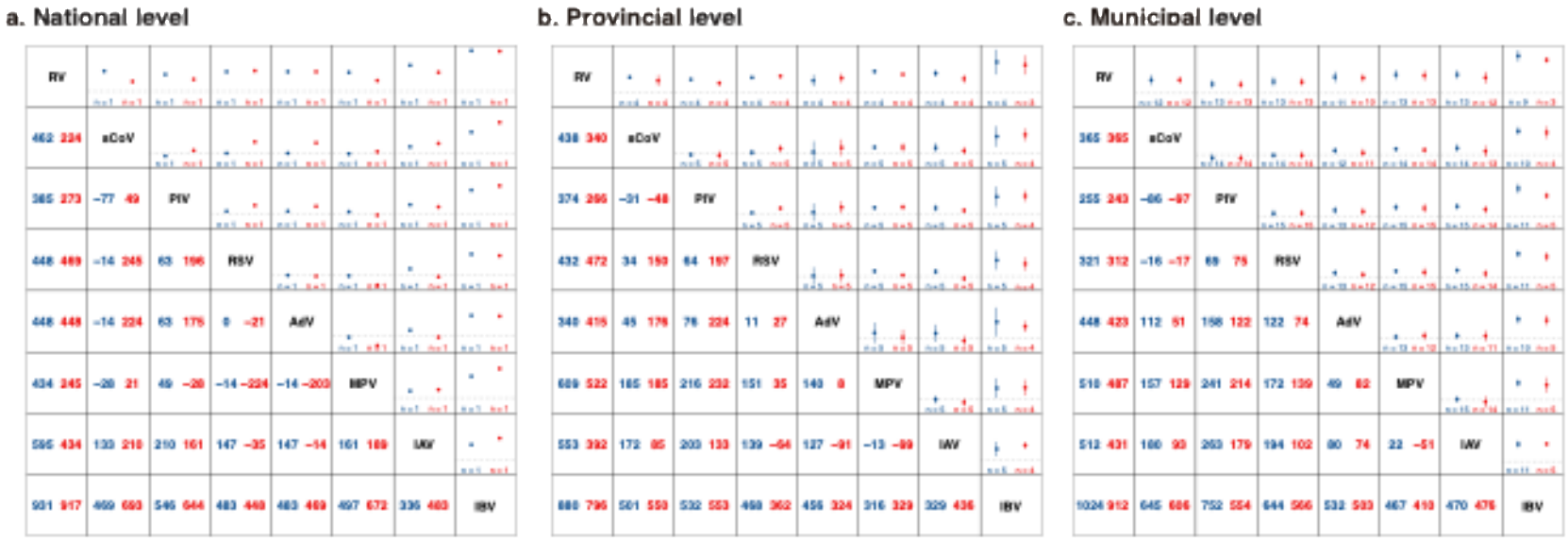
Supplementary Figure 43. The virus-specific time interval (with 95% CI) between the peaks in two subsequent years across national (A), provincial (B), and municipal (C) levels in Canada.

The x-axis represents the time lapsed since the previous onset, measured in years. The left y-axis lists the index of epidemics relative to the onset of the COVID-19 pandemic, with negative numbers indicating epidemics occurring before the pandemic, and positive numbers indicating epidemics occurring after the onset of the pandemic. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



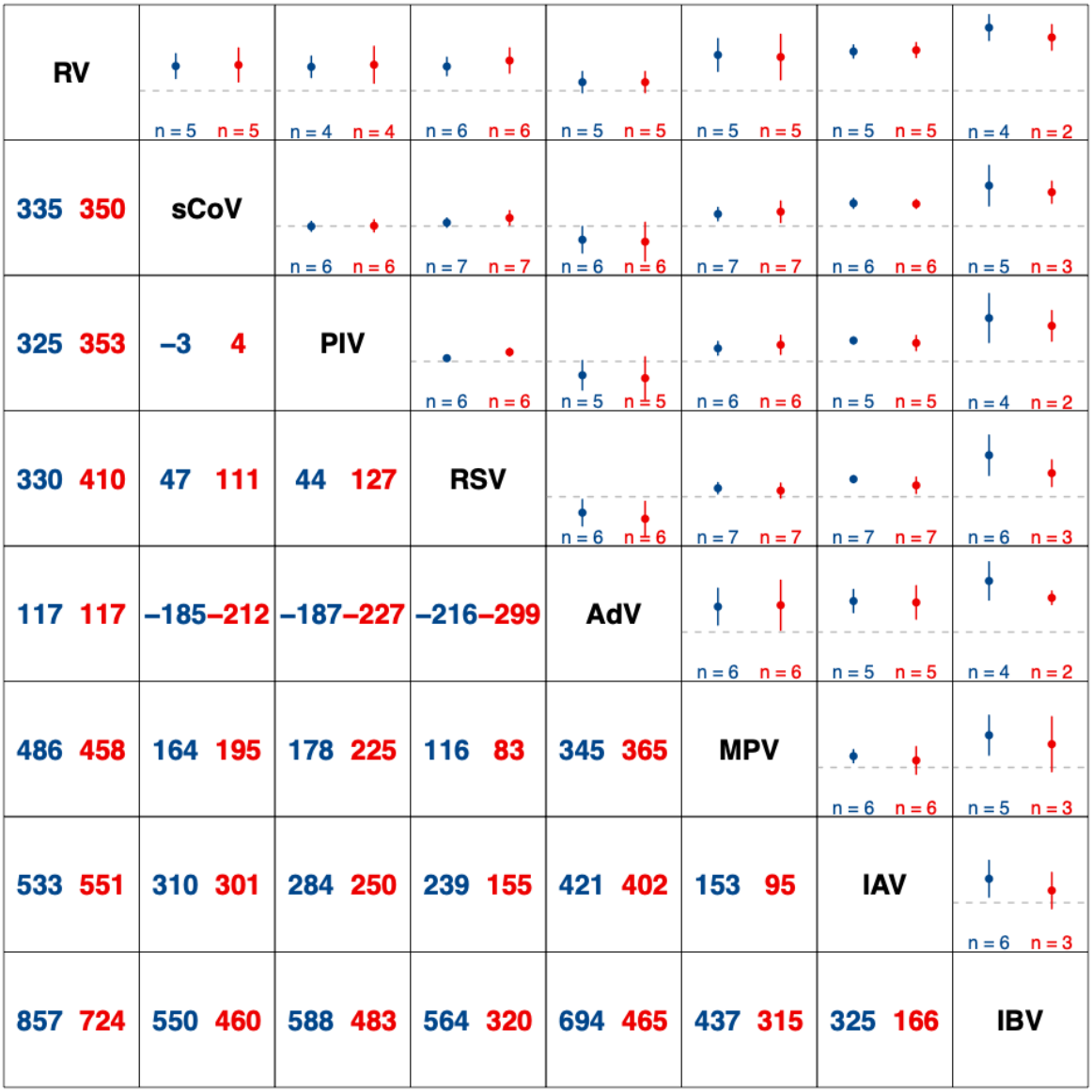
Supplementary Figure 44. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset across national (A), provincial (B), and municipal (C) levels in Canada.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



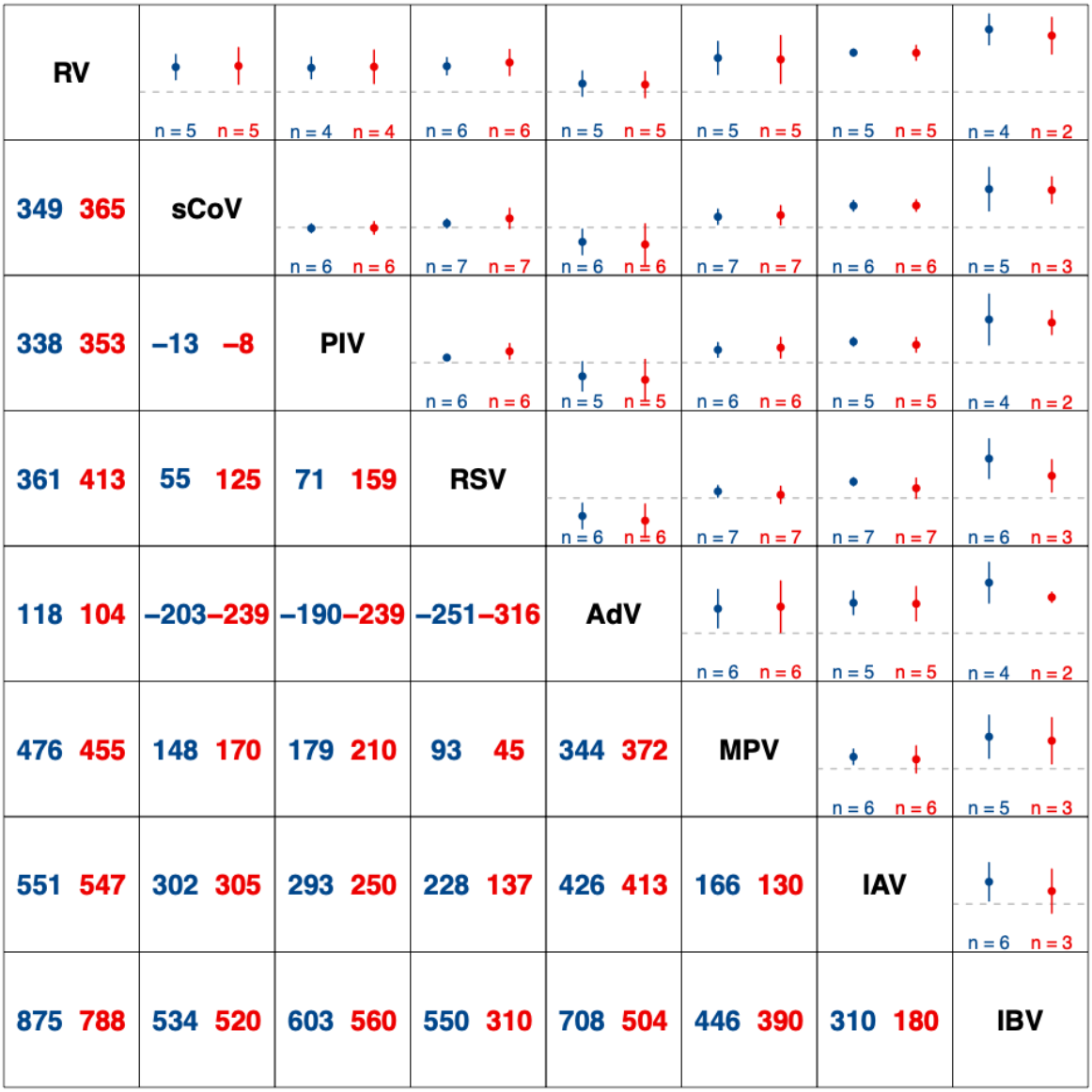
Supplementary Figure 45. The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic onset across national (A), provincial (B), and municipal (C) levels in Canada.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



Supplementary Figure 46. The time difference in days of onset between viruses during their first resurgence and second resurgence following the COVID-19 pandemic, matched by study sites that had over 1000 positive cases for each virus.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).



Supplementary Figure 47.The time difference in days of peak between viruses during their first resurgence and second resurgence following the COVID-19 pandemic, matched by study sites that had over 1000 positive cases for each virus.

The matrix presents the pairwise comparison of timing between viruses in their first (shown in blue) and second resurgence (shown in red). Positive [negative] values indicated that the virus on the top / left resurged earlier [later] than the virus on the bottom / right. Dashed line indicated no differences in the timing. Data are presented as mean values and error bars indicate their 95% confidence intervals. IAV = Influenza A virus; IBV = Influenza B virus; RSV = Respiratory Syncytial Virus; PIV = Parainfluenza Virus; MPV = Metapneumovirus; sCoV = Seasonal Coronavirus; RV = Rhinovirus; AdV = Adenovirus (AdV).

Supplementary methods

Supplementary Methods 1. Search Strategy.

Web of science:

1. TS=(respiratory viru* OR respiratory viral* OR respiratory NEAR/3 infectio* OR respiratory NEAR/1 disease* OR respiratory NEAR/1 illness*)
2. TS=(influenza* OR flu OR RSV OR Respiratory Syncytial Virus* OR parainfluenza* OR adenovirus* OR metapneumovirus* OR bocavirus* OR rhinovirus* OR enterovirus* OR IFV OR HPIV OR HAdV OR HMPV OR HCoV OR HBoV OR HRV)
3. TS=(nonpharmaceutical* OR ("non pharmaceutical*") OR NPI OR pandemic* OR COVID*)
4. TS=((epidemic* NEAR/1 characteristic*) OR (epidemic* NEAR/1 feature*) OR (epidemic* NEAR/1 trend) OR (epidemic* NEAR/1 change*) OR (epidemic* NEAR/1 pattern*))
5. TS=((prevalence NEAR/1 characteristic*) OR (prevalence NEAR/1 feature*) OR (prevalence NEAR/1 trend) OR (prevalence NEAR/1 change*) OR (prevalence NEAR/1 pattern*))
6. TS=((contagio* NEAR/2 characteristic*) OR (contagio* NEAR/2 feature*) OR (contagio* NEAR/2 trend) OR (contagio* NEAR/2 change*) OR (contagio* NEAR/2 pattern*))
7. TS=((circulat* NEAR/1 characteristic*) OR (circulat* NEAR/1 feature*) OR (circulat* NEAR/1 trend) OR (circulat* NEAR/1 change*) OR (circulat* NEAR/1 pattern*))
8. TS=((viru* NEAR/2 activity) OR (viru* NEAR/2 trend) OR (viral* NEAR/2 activity) OR (viral* NEAR/2 trend))
9. TS=(hospitalization* OR (surveillance NEAR/1 data))
10. (#4) OR (#5) OR (#6) OR (#7) OR (#8) OR (#9)
11. (#1) AND (#2) AND (#3) AND (#10)
12. (#11) AND PY=(2021-2023)

Medline：

1. exp Respiratory Tract Infections/ep, pc, sn, tm or (respiratory adj3 infectio*).mp. or exp Respirovirus/ or Respirovirus Infections/ep, pc, tm or Respirovirus/ or (respiratory viru*).mp. or (respiratory viral*).mp. or exp Respiratory Tract Diseases/ep, pc, tm or (respiratory adj1 disease*).mp. or (respiratory adj1 illness*).mp.
2. Pandemic/ or pandemic.mp. or COVID-19/ep, pc or nonpharmaceutical*.mp. or (non adj1 pharmaceutical*).mp.
3. Influenza, Human/ep, pc, sn, tm or influenza*.mp. or flu.mp. or IFV.mp. or Respiratory Syncytial Virus, Human/ or Respiratory Syncytial Virus* or RSV.mp. or exp Rubulavirus/ or parainfluenza* or HPIV.mp. or Metapneumovirus/ or metapneumovirus* or HMPV.mp. or Human bocavirus/ or bocavirus* or HBoV.mp. or Rhinovirus/ or rhinovirus* or HRV.mp. or exp Enterovirus/ or enterovirus* or exp Coronavirus/ or HCoV.mp. or exp Adenoviruses, Human/ or adenovirus* or HAdv.mp.
4. exp Epidemiology/
5. exp Population Surveillance/
6. exp Incidence/
7. exp Prevalence/
8. exp Hospitalization/

9. ((epidemi* or prevalence or contagious or circulat* or viru* or viral*) adj3 (characteristic* or feature* or trend or change* or pattern* or activity or hospitalization*)).mp.
10. surveillance data.mp.
11. 1 and 2 and 3
12. 4 or 5 or 6 or 7 or 8 or 9 or 10
13. 11 and 12
14. limit 13 to (humans and yr="2021 -Current")

Embase:

1. 'Respiratory Tract Infections'/exp OR 'Respirovirus'/exp OR 'Respirovirus infection'/exp OR (respiratory NEXT/1 (viru* or viral* or infectio* or disease* or illness*))
2. 'pandemic'/de OR pandemic* OR 'coronavirus disease 2019'/de OR 'nonpharmaceutical*' OR 'non NEXT/1 pharmaceutical*'
3. 'influenza'/exp OR influenza* OR IFV OR flu OR 'human respiratory syncytial virus'/exp OR 'Respiratory Syncytial Virus*' OR RSV OR 'rubulavirus'/exp OR 'Parainfluenza virus infection'/exp OR parainfluenza* OR HPIV.mp. OR 'metapneumovirus'/exp OR metapneumovirus* OR HMPV OR 'bocaparvovirus'/exp OR bocavirus* OR HBoV OR 'rhinovirus'/exp OR rhinovirus* OR HRV OR 'enterovirus'/exp OR enterovirus* OR 'coronavirinae'/exp OR HCoV OR 'Human adenovirus C'/exp OR adenovirus* OR HAdV
4. 'epidemic'/exp OR 'epidemiological surveillance'/exp OR 'incidence'/exp OR 'infection rate'/exp OR 'morbidity'/exp OR 'prevalence'/exp OR 'hospitalization'/exp OR 'seasonal variation'/exp OR ((epidemi* OR prevalence OR contagious OR circulat* OR viru* OR viral*) NEXT/1 (characteristic* OR feature* OR trend OR change* OR pattern* OR activity OR hospitalization*)) OR 'surveillance data'
5. #1 AND #2 AND #3 AND #4
6. #5 AND (2021:py OR 2022:py OR 2023:py) AND 'human'/de

WHO COVID-19 Research Database:

1. ((respiratory viru*) OR (respiratory viral*) OR (respiratory infectio*) OR (respiratory disease*) OR (respiratory illness*))
2. (influenza* OR flu OR RSV OR (Respiratory Syncytial Virus*) OR parainfluenza* OR adenovirus* OR metapneumovirus* OR bocavirus* OR rhinovirus* OR enterovirus* OR IFV OR HPIV OR HAdV OR HMPV OR HCoV OR HBoV OR HRV)
3. (nonpharmaceutical* OR (non pharmaceutical*) OR NPI OR pandemic* OR COVID*)
4. ((epidemic* characteristic*) OR (epidemic* feature*) OR (epidemic* trend) OR (epidemic* change*) OR (epidemic* pattern*))
5. ((prevalence characteristic*) OR (prevalence feature*) OR (prevalence trend) OR (prevalence change*) OR (prevalence pattern*))
6. ((contagio* characteristic*) OR (contagio* feature*) OR (contagio* trend) OR (contagio* change*) OR (contagio* pattern*))
7. ((circulat* characteristic*) OR (circulat* feature*) OR (circulat* trend) OR (circulat* change*) OR (circulat*

pattern*))

8. ((viru* activity) OR (viru* trend) OR (viral* activity) OR (viral* trend)) OR
9. (hospitalization* OR (surveillance data))
10. 4 OR 5 OR 6 OR 7 OR 8 OR 9
11. 1 AND 2 AND 3 AND 10
12. 11 AND AND year_cluster:("2021" OR "2022" OR "2023")
13. 12 AND db:("MEDLINE" OR "EuropePMC" OR "EMBASE" OR "ICTRP" OR "Scopus" OR "COVIDWHO" OR "LILACS" OR "Web of Science" OR "CAB Abstracts" OR "ProQuest Central" OR "Indonesian Research" OR "MDPI" OR "Academic Search Complete" OR "ScienceDirect" OR "GIM" OR "PubMed")

Supplementary Methods 2. Quality assessment form.

Category	**Question**	**Assessment** **Yes – 1 point.** **No – 0 points.** **Not clear – 0 points.**
Representativeness	Q1: Whether the study was a multicenter study?	
Representativeness	Q2: Whether the study included all age groups?	
Precision	Q3: Whether the viral activities were reported on a weekly basis?	
Precision	Q4: Whether the total number of positive cases for all viruses exceeded 1,000 since 2020?	
Reliability	Q5: For published literatures: Whether the viral activity data were not extracted from figures? For other sources: Whether data were missing for ≤ 3 months?	
Reliability	Q6: Whether the testing method of different viruses were consistent?	
Representativeness	Q7: Whether viral activity data were available for at least five types of viruses?	
Reliability	Q8: Whether the testing capacity was stable during the study period? *	

* We evaluated testing stability by two distinct criteria. First, whether the data source had any documented major interruptions in testing during the pandemic. Second, whether the number of specimens taken was consistently zero for more than two weeks.

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