

Optimal annual COVID-19 vaccine boosting dates following previous booster vaccination or breakthrough infection

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Key points

- Optimal COVID-19 booster vaccination dates are in early autumn in the Northern Hemisphere.
- Boosting on the optimal date provides up to 3–4 times more protection.
- Infection late in the interval between boosts substantially alters the optimal boosting date.

Keywords. SARS-CoV-2, vaccine, booster, COVID-19, seasonality, evolution

Running title: COVID-19 Booster Vaccination Timing

Summary: Optimal timing for COVID-19 boosters improves their efficacy. There is an optimal delay of boosters after breakthrough infection. Our analysis enables beneficial personalization of booster schedules on the basis of infection history. This personalization improves public health.

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Abstract

Background: COVID-19 booster vaccinations mitigate transmission and reduce the morbidity and mortality associated with infection. However, the optimal date for booster administration remains uncertain. Geographic variation in infection rates throughout the year make it challenging to intuit the best yearly booster administration date to effectively prevent infection, and also challenging to provide best guidance in how to alter booster administration in response to a breakthrough infection.

Methods: We leverage longitudinal antibody and reinfection probabilities with spatiotemporal projections of COVID-19 incidence to develop a geographically-informed approach to optimizing the timing of booster vaccination. We assess the delay in booster vaccination that is warranted following breakthrough infections whenever they occur during the year, enabling a personalized assessment of optimal timing that acknowledges and respects diversity of COVID-19 immune status, addressing a substantial barrier to uptake.

Results: Yearly booster vaccination on any date is beneficial to prevention of infection. However, each location exhibits as much as a 3–4-fold range in degree of protection by date of uptake. Optimal COVID-19 booster vaccination dates are location-specific, typically in early autumn in the Northern Hemisphere. Infection late in the interval between boosts substantially alters the optimal boosting date.

Conclusions: Considerable benefit accrues from aptly timing COVID-19 booster vaccination campaigns, which can be tailored to specific locations. Individuals can acquire the greatest benefit from booster vaccination by timing it optimally, including delaying in cases of infection late in the interval between boosts. These results provide location-specific guidance for public health policy, healthcare provider recommendations, and individual decision-making.

INTRODUCTION

COVID-19 vaccines confer protection against infection [1] and severe disease [2]. In New York City alone, vaccination prevented nearly 300,000 cases, 50,000 hospitalizations, and 8,500 deaths in seven key months [3]. For long-term protection, booster vaccination is necessary to address the waning of SARS-CoV-2 antibody levels [4]. However, the date when it is optimal to administer yearly booster vaccinations is not clear. It is complicated by the substantial spatiotemporal variation in incidence exhibited by SARS-CoV-2[5]. Aligning booster timing to provide peak protection during peak incidence could be crucial to maximizing benefits.

Ascertainment of optimal dates for yearly booster vaccination is important not only for those who haven't recently been infected, but also for those who experience breakthrough infections. The production of antibodies for recent breakthrough infection would offset benefits of an immediate booster vaccination [6,7]. Current guidance suggests delay of reinforcement of immunity to later in the year, with the U.S. CDC currently suggesting a delay of up to three months [8]. However, this guidance has not been rigorously evaluated, creating a significant barrier to vaccine uptake. Therefore, it is vital to establish policies assessing optimal timing of boosters acknowledging the impact of breakthrough infections.

The question of when to boost has been extensively researched for influenza which exhibits seasonal infection surges associated with climate [9] and for which analyses of extensive endemic seasonal incidence data have been collected and analyzed [10]. Consequently, the US CDC recommends influenza boosters between September and October in the United States [11]. In countries that span temperate and tropical latitudes such as China, the optimal timing of yearly influenza boosters varies within the nation by as much as several months [12]. These findings regarding influenza suggest performing similar seasonality analyses of 2019–2024 COVID-19

infection data. However, there are far fewer years of COVID-19 seasonal infection prevalence data on which to base predictions. Moreover, COVID-19 infections during recent years do not reflect endemic seasonality, and instead have been characterized by pandemic surges driven by historical contingencies [13], early saltations of viral evolution [14], and wholly naive versus differentially exposed immunological states of populations [15]. Therefore, an alternate approach to evaluating optimal timing is necessary until there is sufficient accumulation of long-term empirical data on seasonality.

Such an alternate approach has been enabled by recent research based on ample coronavirus incidence data that documented substantial spatiotemporal heterogeneity in peak incidence across the northern hemisphere [16]. These results largely match typical respiratory virus incidence patterns, featuring peaks of “flu and cold season” with some specificity in each locality. However, in isolation these results give no direct guidance regarding when to administer booster vaccinations. The optimal timing of booster vaccinations depends jointly on the risk of infection due to seasonality and on the long-term waning of protection subsequent to booster vaccination [17]. Rigorous estimates of long-term protection subsequent to booster vaccination have been obtained by leveraging longitudinal antibody and reinfection data from the close evolutionary relatives of SARS-CoV-2 as well as infection and antibody data on SARS-CoV-2 to estimate the durability of immunity following natural infection [18], primary vaccination [19], and boosting [20,21]. These analyses—subsequently validated by comparison to empirical data [22–24]—indicate that statistical approaches derived from evolutionary medicine can illuminate reinfection risks with high accuracy and precision. Yet the impact on yearly infection of administering yearly booster vaccinations at specific times in specific locations remains

unknown—as does the impact of breakthrough infections at specific times of the year on the optimal timing of booster vaccination.

Here we integrate the waxing probabilities of infection subsequent to antigen exposure with projections of the expected seasonal variation in frequency of infection for endemic SARS-CoV-2 [16], to perform a high-resolution investigation of prospective timings of booster vaccinations that maximally curtail infection. We evaluate the optimal boosting date over the year for individuals who have not been infected over the previous year. Then we analyze similar optimal timings for individuals who have been infected during that year to determine any advantage to delaying the booster, depending on the date of infection. Such knowledge of optimal booster vaccination timing will be helpful for physician and individual decision-making in the context of ongoing endemic disease, and is crucial for effective vaccination policy that suppresses morbidity and mortality as a consequence of COVID-19.

METHODS

We quantified relative monthly probabilities of infection based on seasonal incidence predictions for endemic COVID-19 [16]. These incidences were inferred using a phylogenetic ancestral and descendant state approach leveraging long-term data on the incidence of circulating human coronaviruses in 12 locations within the Northern Hemisphere: Rochester, MN USA; New York City, NY USA; Edinburgh, UK; Stockholm, Sweden; Trøndelag, Norway; Gothenburg, Sweden; Amsterdam, Netherlands; South Korea (nationwide); Yamagata, Japan; Guangzhou, China; Sarlahi, Nepal; and Beersheba, Israel [16]. These projections were robust to the choice of the model of trait evolution as well as the choice of molecular trees, relative phylogenetic chronograms, and non-recombinant alignments.

These seasonal incidence predictions are derived from long-term endemic coronavirus

prevalences that were not impacted by vaccinations or other interventions. However, an individual recently vaccinated against SARS-CoV-2 will experience lower risk of infection than an unvaccinated individual in an endemic scenario with no interventions. Therefore, for each date of booster vaccination, over the first month following the date of booster vaccination, we reduced the seasonality-based probability of infection by the daily proportional protection demonstrated in Pfizer-BioNtech booster (BNT162b2) vaccination clinical trials against the delta variant (B.1.617.2) of SARS-CoV-2 following two primary vaccinations [25]. This vaccine-based daily probability of infection was calculated via linear interpolation between the probability of no breakthrough infection at clinical trial sampling times post booster vaccination (one week and two weeks), at peak vaccination at one month, and at one year post-vaccination. For the 2nd–12th months following the booster date, reductions of the seasonal probability of infection due to booster vaccination were quantified by analysis of antibody waning and corresponding infection probability [21]. Antibody waning data was associated with Pfizer-Biontech COVID-19 vaccination and SARS-CoV-2 infection. Infection probabilities were associated with antibody levels based on an ancestral and descendent states analysis of long-term antibody data on healthy individuals who experienced other human-infecting coronaviruses [18,26]. This analysis incorporated construction of a maximum-likelihood molecular phylogeny of human-infecting coronaviruses. This phylogeny enabled comparative analyses of peak-normalized optical density levels of blood-based IgG antibodies to nucleocapsid protein, spike protein, and whole-virus lysate, that were coupled with reinfection data on endemic human-infecting coronaviruses. Then, expected declines in antibody levels over time as well as the probabilities of reinfection based on antibody level were estimated from empirical data supplemented by ancestral and descendent states analyses. The resulting probabilities of

reinfection provided probabilistic times to reinfection after recovery under conditions of endemic transmission for SARS-CoV-2. The antibody waning profiles and infection probabilities from this approach have proven consistent with multiple time points reported in subsequent but shorter-term wholly empirical studies [22–24].

For each day of the year, we calculated the cumulative yearly probability of infection, wherein the probability of infection each day was equal to the probability of not being infected each previous day times the probability of being infected on the day of interest. For each day of the year, we then plotted these cumulative yearly probabilities of infection. The booster vaccination date on which the cumulative yearly probability of infection is at its lowest represents the optimal yearly booster vaccination date.

To visualize how shifts in seasonal incidence influence the optimal timing of booster vaccination, we plotted probability mass functions of infection by month. Incidence bars were colored to indicate the monthly probabilities of infection for an individual who (1) is booster vaccinated over a period of three years on the optimal yearly booster vaccination days, and (2) is booster vaccinated once, then foregoes booster vaccination on the subsequent two optimal yearly booster vaccination days.

To examine optimal delays of boosting in the case of a breakthrough SARS-CoV-2 infection, we modified our approach above to address breakthrough infections occurring on each date by renewing protection at the point of breakthrough infection. From peak antibody response to breakthrough infection at one month following the onset of infection, antibody level followed the waning function of Townsend et al. [21]. During the first month after breakthrough infection, reductions of the probabilities of breakthrough infection were set to be consistent with observations for the BNT162b2 booster clinical trial versus the B.1.617.2 variant. Optimality of

the delayed date of booster administration was then evaluated as the cumulative probability of infection spanning from the yearly optimal booster vaccination date following the infection through to the following yearly optimal booster vaccination date.

RESULTS

Studies that have not incorporated the date of boosting into their analyses have found that annual boosters reduce the probability of infection by about 67% [19]. However, our analysis reveals that seasonality as well as the date of booster vaccination contribute substantially to the variance in efficacy (**Figure 1**). In general, each location exhibits an optimal date on which boosting offers a 3–4-fold increase in protection from infection over other times of the year, and a range of nearby dates that feature similar benefits. The timing of these periods varies substantially between locations (**Figure 1**, with phenomenological equations reported in **Supplementary Table S1**). In New York, USA (**Figure 1A**), yearly booster vaccination on September 15th provides the lowest yearly probability of infection. This benefit diminishes slightly with delay as the yearly probability of infection increases to a 3.6-fold higher booster vaccination administration on the least effective date, January 24th. Yearly booster vaccination dates later in the year than this least effective date yield increasing benefits up to the optimal date.

A similar pattern to that of New York is predicted for South Korea (**Figure 1B; Supplementary Table S2**), where the date with the lowest yearly probability of infection is on September 19th. Boosting in September in South Korea is predicted to confer a nearly five-fold increase in protection relative to delaying boosting to January or February. For Yamagata Japan (**Figure 1C**), the yearly booster vaccination date with the lowest probability of infection was

slightly later, on October 18th. Yearly probabilities of infection in Stockholm, Sweden (**Figure 1D**) were similar across the year to those for Yamagata, supporting booster vaccination in October. In Stockholm, infection risks remain similar for yearly booster vaccination in November, then rapidly rise to a nearly five-fold differential compared to a much less effective yearly booster vaccination administered in the spring.

For other locations in the Northern Hemisphere, probabilities of infection throughout the year were often similar, reflecting a strong relationship that supports booster vaccine administration on a date that minimizes infection risk by preceding anticipated surges in SARS-CoV-2 incidence (**Figure 2**). On average across locales, the optimal yearly date of booster vaccine administration preceded the highest anticipated prevalence by 2.7 months (95% CI: 1.9–3.4; **Supplementary Figure 1**).

The optimal timing of booster vaccination can be substantially altered by a breakthrough infection that occurs during the interval between yearly optimal booster vaccination dates (**Figure 3**, with phenomenological equations reported in **Supplementary Table S3**). As might be expected, an infection occurring just before the yearly optimal booster vaccination date leads to an alternate date that would be optimal for that individual for that year. For instance, in New York, a breakthrough infection occurring on any date between September through the beginning of February has practical equivalence of benefit to booster vaccination on the optimal yearly date of September 15th (**Figure 3A; Supplementary Table S4**). This equivalence includes rare individuals who are exposed to a sufficient viral dose shortly after boosting: these individuals are not expected to be in a substantially different situation than someone who was only vaccinated with a booster, and likely should receive booster vaccination on or near its next availability, i.e. on the optimal yearly date of September 15th. Breakthrough infection occurring in the middle of

March provides immunity such that the benefit booster vaccination is roughly equivalent anywhere along the span through to the following January (**Figure 3A; Supplementary Table S4**). For an individual infected in August—just before what would typically be the yearly optimal booster vaccination on September 15th—the next booster vaccination should be delayed and occur some time between December and the following June (**Figure 3A; Supplementary Table S4**).

Optimal booster timing was similarly delayed by breakthrough infection in other geographic locations (**Figure 3B–D; Supplementary Figure S2**), and similarly varied depending on infection date (**Supplementary Tables S5–S13**). Generally, individuals experiencing infection just subsequent to the optimal yearly booster vaccination date would benefit most by continuing to vaccinate on the yearly optimal date for each location. In contrast, those infected six months after the optimal yearly booster vaccination date will benefit most in terms of probability of infection over a yearlong span by delaying receipt of the next annual booster by several months. For individuals who were infected just prior to the next optimal yearly booster vaccination date, the optimal delays of booster vaccination exceeded nine months for nearly all locations. Analyses of additional geographic areas revealed that in some geographies in which anticipated seasonal infection trends are more muted, there was less pronounced benefit to optimizing booster vaccination timing (**Supplementary Figure S2**).

DISCUSSION

Here we have shown that the optimal timing of yearly booster vaccination in many locations within the temperate Northern Hemisphere is typically in the autumn to early winter, with moderate variance in timing across locations. Accounting for annual syncopations of

incidence represents an opportunity to increase the utility of booster vaccinations. Our analyses suggest that individuals who experience breakthrough infections with access to only one booster vaccination per year can beneficially delay their upcoming autumn booster later than the yearly optimal booster vaccination date. The amount of delay that provides the greatest benefit of booster vaccination is contingent on when the breakthrough infection occurs. Minimal delay in the next booster vaccination is warranted if an infection occurs shortly after a booster vaccination on the yearly optimal date. A breakthrough infection that occurs six to twelve months after booster vaccination warrants a delay of the booster vaccination by a comparable number of months. Identification and communication of appropriate booster timing to public health authorities, vaccine providers, and recipients along with guidance as to how to adapt that timing in response to infection enables more effective booster vaccinations that are cognizant of yearly incidence and infection history and therefore more universally inclusive in nature.

Our analysis is rigorously data-driven, but is based on a number of population- and location-specific datasets that enable us to quantify a broader generality. For instance, our yearly optimal booster vaccination dates are based on endemic seasonality of COVID-19 infection. However, infection trends for the near-term may not adhere to endemic seasonality and may be subject to greater variability of surge timing and intensity. Moreover, our analysis assumes that the typical endemic seasonality is applicable each year. Seasons of endemic respiratory viruses are known to vary in severity as well as to surge early or late in some years [28–30]. Indeed, in years where the seasonal surge starts early, booster vaccination will likely serve to prevent infection best if performed earlier than the optimal date indicated in this study.

Across locations, the intervals between the optimal yearly booster vaccination dates and the peaks of monthly incidence were fairly consistent from location to location. This geographical

consistency implies that a surge occurring earlier than usual at a location should be addressed by advancing the dates of booster administration in that location proportionately. Similarly, in years where the seasonal surge starts late, booster vaccination will likely serve to prevent infection best if performed later than the optimal date indicated in this study. Early and late surges are likely associated with factors such as temperature [31,32], humidity [31], as well as environmentally driven shifts in human behavior [33]. Direct research on environmental correlates of surging infection for COVID-19 has been challenging due to pandemic dynamics of SARS-CoV-2, which have been strongly influenced by dramatic spatiotemporal shifts of immune status and of interventions [34,35]. Therefore, accumulation of data regarding environmental correlates of endemic COVID-19 infection would empower the development of predictive seasonal incidence models that could in turn inform dynamic yearly recommendations regarding the timing of booster vaccination.

Our analyses regarding yearly optimal booster date and optimal delay in response to infection are based on a typical healthy adult immune response to vaccination and infection and consequent waning of immunity. However, in modern human populations, immune status is highly heterogeneous [36,37]. Factors such as immune-suppressive therapies, HIV infection, nutrition, pregnancy, as well as aging can all modulate the immune response. For individuals with compromised immune systems, it may be possible and beneficial to obtain additional booster vaccinations that can stimulate sufficient protection [20,38,39]. If restricted to a single booster vaccination per year, those with immune-compromising conditions would likely minimize their yearly probability of infection by timing their booster vaccination slightly later than the yearly optimal booster vaccination date determined for a typical healthy adult, ensuring that their lesser, shorter, peak protection spans the time at which peak seasonal infection occurs.

Booster vaccination has tremendous public health potential [20,40]. However, uptake of COVID-19 booster vaccination by low proportions of residents has diminished its public health impact [27]. Our results show that appropriate timing of updated booster vaccination can provide a three- to five-fold improvement in the yearly protection provided. Moreover, we address a major gap in knowledge and source of hesitation regarding uptake: we provide previously absent guidance for optimal timing of booster vaccination for individuals who have recently been infected. Perceptions of decreased susceptibility for infection, often stemming from known recent infections, are associated with decreased uptake of boosters [41]. For instance, healthcare workers who have been infected recently are unlikely to uptake, and can serve as unintentional drivers of vaccine hesitancy as they are viewed as models for public health responses by much of the general public [42]. Explicit guidance on how to adjust booster vaccination timing in response to infection—including in chronically exposed health-care workers—acknowledges individual exposure history for a substantial portion of the population, and provides informed advice regarding their health.

Our analyses are based on Pfizer-BioNTech BNT1262b2 boosters under endemic conditions. However, changes in the efficacy between serially produced booster vaccines or between booster vaccines produced by different manufacturers may alter the relative level of protection provided at peak antibody level and during subsequent waning. Serial or alternate booster vaccines that provoke a lesser antibody response will lead to yearly optimal booster dates and optimal delays following booster infection that are closer to months in which incidence is high. Serial or alternate booster vaccines that provoke a greater antibody response will lead to yearly optimal booster dates and optimal delays following booster infection that precede the months in which incidence is high by a wider margin. Current booster vaccines with high levels

of uptake such as those manufactured by Moderna induce antibody responses and protection from infection that is similar to booster vaccines from Pfizer-BioNTech [43]. Yearly optimal booster dates and optimal booster vaccination delays following breakthrough infection that are indicated by our analysis should be generally applicable.

In the case of a breakthrough infection, the U.S. Centers for Disease Control currently suggest that individuals may delay their booster uptake by up to three months [8]. This three-month delay is appropriate for some mid-year infections. However, this consistency is rather like a stopped clock that is correct at only certain times of the day: if a breakthrough infection occurred shortly after booster vaccination on the yearly optimal booster vaccination date, it is not optimal to delay the next booster at all beyond the next yearly optimal booster vaccination date. If a breakthrough infection occurred much later in the year following booster vaccination on the yearly optimal booster vaccination date—a more likely scenario—then it is optimal to delay the booster from the yearly optimal booster vaccination date to a much later date. Additionally, just as the yearly optimal booster vaccination date is moderately affected by the seasonal incidence patterns inherent to the geographic location, the optimal delay is moderately affected by geographic variation in incidence as well.

These results for COVID-19 provide the first continuous assessment of risk of infection with respect to annual booster vaccination for both people whose most recent exposure was a scheduled booster, and for people whose most recent exposure was a breakthrough infection. For respiratory viruses with available vaccines, immunity wanes following vaccination increasing the risk of breakthrough infection [44]. Robust analyses of optimal vaccine timing incorporating immuno-epidemiological inference [45] regarding numerous diseases including influenza and RSV are warranted, empowered by requisite collection of long-term longitudinal immunological

cohort data from relevant individuals and long-term seasonal incidence data from diverse geographic locales. Together, immuno-epidemiological inference based on long-term infection data can play a substantial role in increasing the efficacy of booster vaccination, curtailing morbidity and mortality due to respiratory infectious disease.

Supplementary Data

Supplementary Figures and Tables are available for this paper. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

Notes

Author contributions. JPT, HBH, and AD conceived the project and designed the study; HBH performed formal analyses with guidance from JPT and AD; JPT, HBH, and AD designed data visualizations; HBH implemented data visualizations; AD and JPT wrote the manuscript; and all authors reviewed the manuscript before submission. JPT and AD were responsible for the decision to submit the manuscript. All authors had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Data availability. All data, Mathematica notebooks, imputed monthly proportions, and code underlying this study are publicly available on Zenodo: DOI:[10.5281/zenodo.11209811](https://doi.org/10.5281/zenodo.11209811).

Potential conflicts of interest. The authors declare no conflicts of interest.

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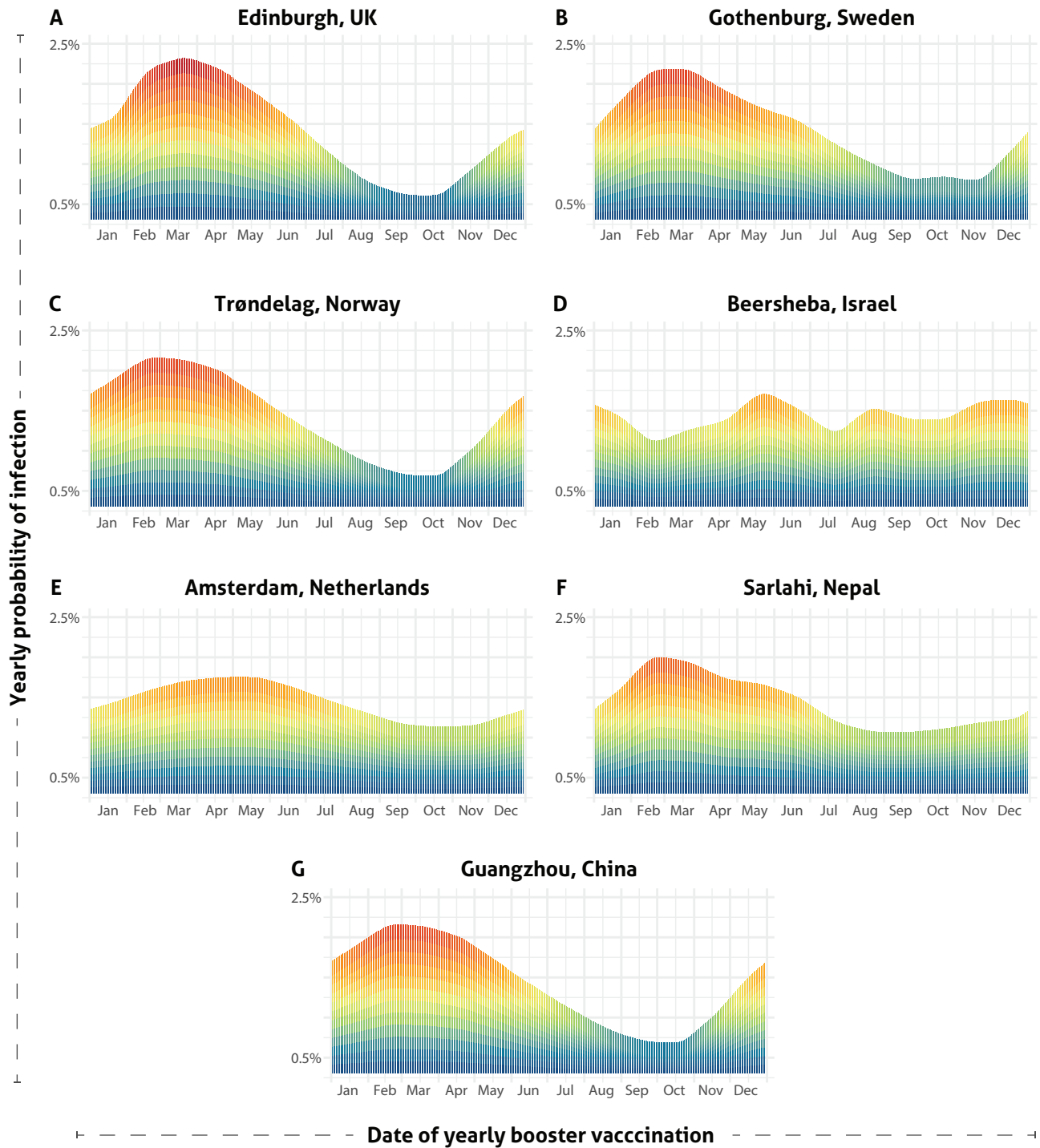
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Figure Legends

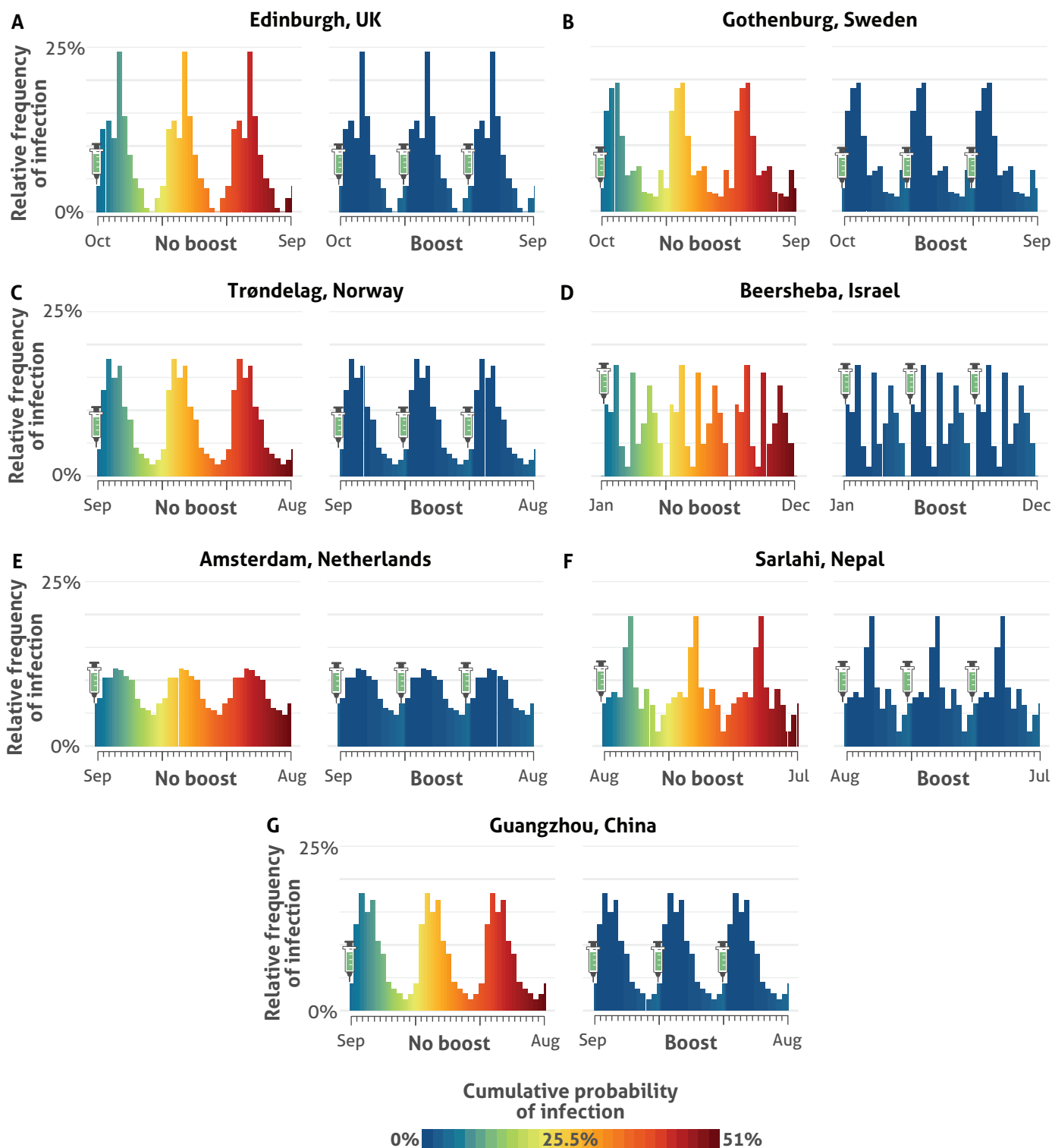
Figure 1. Yearly probability of infection (red: high to blue: low) based on yearly date of booster vaccination in (A) New York, (B) Stockholm (C) Yamagata, and (D) South Korea.

Figure 2. Cumulative probabilities of infection—indicated lower to higher by the blue / green / yellow / orange / red color gradient—in the year after booster vaccination on the optimal date and in the two following years without the yearly booster vaccination, in (A) New York, (B) Stockholm, (C) Yamagata, and (D) South Korea. The heights of the bars reflect projections of seasonal population-level incidence patterns under endemic conditions without incorporating a population-wide effect of booster vaccination, i.e. assuming that low yearly global uptake [27] remains unchanged.

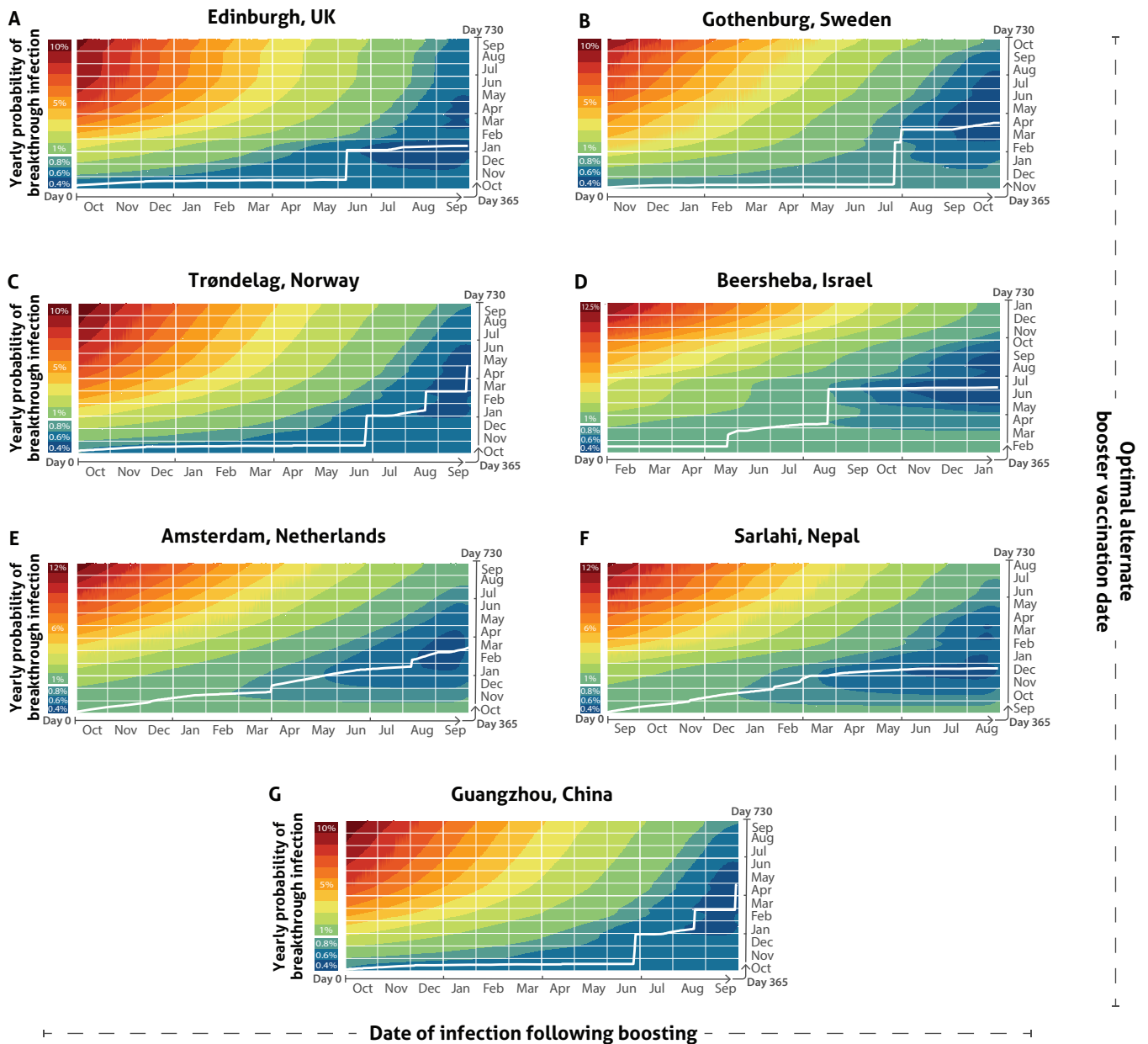
Figure 3. Probability of infection (lower to higher by the blue / green / yellow / orange / red color gradient)—upon delaying booster vaccination to each date of the year, in response to a breakthrough infection occurring in the interval between optimal booster vaccination dates in (A) New York, (B) Stockholm (C) Yamagata, and (D) South Korea. Day 0 and 365 are analyzed as the estimated optimal yearly booster vaccination date. Infection will delay the optimal booster vaccination date (white line) beyond day 365 to a greater and greater degree as the interval between the yearly optimal booster date (origin, cf. **Figure 1**) and the date of infection (x axis) increases.



Supplementary Figure S1. Yearly probability of infection (red: high to blue: low) based on yearly date of booster vaccination in (A) Edinburgh, UK, (B) Gothenburg, Sweden, (C) Trøndelag, Norway, (D) Beersheba, Israel, (E) Amsterdam, Netherlands, (F) Sarlahi, Nepal, (G) Guangzhou, China.



Supplementary Figure S2. Cumulative probabilities of infection (lower to higher: blue / green / yellow / orange / red color gradient) in the year after booster vaccination occurring on the optimal date, in (A) Edinburgh, (B) Gothenburg, (C) Trøndelag, (D) Beersheba, (E) Amsterdam, (F) Sarlahi, (G) Guangzhou, when (left) booster vaccinated once, forgoing booster vaccination in the subsequent two years, and (right) booster vaccinated over a period of three years. Heights of the bars reflect projections of seasonal population-level incidence patterns under endemic conditions without incorporating a population-wide effect of booster vaccination, i.e. assuming that low yearly global uptake [27] remains unchanged.



Supplementary Figure S3. Probability of infection (lower to higher by the blue / green / yellow / orange / red color gradient)—upon delaying booster vaccination to each date of the year, in response to a breakthrough infection occurring in the interval between optimal booster vaccination dates in (A) Edinburgh, (B) Gothenburg, (C) Trøndelag, (D) Beersheba, (E) Amsterdam, (F) Sarlahi, (G) Guangzhou. Day 0 and 365 are analyzed as the estimated optimal yearly booster vaccination date. Infection will delay the optimal booster vaccination date (white line) beyond day 365 to a greater and greater degree as the interval between the yearly optimal booster date (origin, cf. Figure S1) and the date of infection (x axis) increases.

Table S1. Phenomenological equations for Figure 1

Location	Equation for yearly probability of infection based on yearly date of booster vaccination
New York	$0.02 + 1.77 \times 10^{-4}x - 4.04 \times 10^{-7}x^2 - 4.31 \times 10^{-9}x^3 + 2.90 \times 10^{-11}x^4 - 3.98 \times 10^{-14}x^5$
Stockholm	$0.01 + 2.21 \times 10^{-6}x - 1.44 \times 10^{-6}x^2 + 2.52 \times 10^{-10}x^3 + 7.77 \times 10^{-12}x^4 - 5.97 \times 10^{-15}x^5$
South Korea	$0.02 - 2.86 \times 10^{-6}x - 5.75 \times 10^{-7}x^2 + 6.73 \times 10^{-10}x^3 + 1.81 \times 10^{-12}x^4 + 2.26 \times 10^{-15}x^5$
Edinburgh	$0.01 + 2.20 \times 10^{-4}x - 7.55 \times 10^{-7}x^2 - 8.44 \times 10^{-9}x^3 + 4.30 \times 10^{-11}x^4 - 5.10 \times 10^{-14}x^5$
Yamagata	$0.01 + 3.53 \times 10^{-4}x - 2.66 \times 10^{-6}x^2 + 3.82 \times 10^{-9}x^3 + 9.83 \times 10^{-12}x^4 - 2.07 \times 10^{-14}x^5$
Nepal	$0.01 + 2.21 \times 10^{-4}x - 2.20 \times 10^{-6}x^2 + 6.58 \times 10^{-9}x^3 - 5.05 \times 10^{-12}x^4 - 2.74 \times 10^{-15}x^5$
Guangzhou	$0.02 + 1.63 \times 10^{-4}x - 1.41 \times 10^{-6}x^2 + 1.33 \times 10^{-9}x^3 + 6.53 \times 10^{-12}x^4 - 7.75 \times 10^{-15}x^5$
Netherlands	$0.01 + 2.09 \times 10^{-5}x + 8.16 \times 10^{-7}x^2 - 8.85 \times 10^{-9}x^3 + 2.71 \times 10^{-11}x^4 - 2.58 \times 10^{-14}x^5$
Göteborg	$0.01 + 3.15 \times 10^{-4}x - 3.91 \times 10^{-6}x^2 + 1.90 \times 10^{-8}x^3 - 4.68 \times 10^{-11}x^4 + 4.81 \times 10^{-14}x^5$
Norway	$0.02 + 1.63 \times 10^{-4}x - 1.41 \times 10^{-6}x^2 + 1.33 \times 10^{-9}x^3 + 6.53 \times 10^{-12}x^4 - 7.75 \times 10^{-15}x^5$
Israel	$0.02 + 1.24 \times 10^{-4}x - 4.28 \times 10^{-5}x^2 + 4.32 \times 10^{-6}x^3 - 2.33 \times 10^{-7}x^4 + 7.36 \times 10^{-9}x^5 - 1.48 \times 10^{-10}x^6$ $+ 2.00 \times 10^{-12}x^7 - 1.90 \times 10^{-14}x^8 + 1.30 \times 10^{-16}x^9 - 6.41 \times 10^{-19}x^{10} + 2.31 \times 10^{-21}x^{11}$ $- 5.99 \times 10^{-24}x^{12} + 1.09 \times 10^{-26}x^{13} - 1.32 \times 10^{-29}x^{14} + 9.55 \times 10^{-33}x^{15} - 3.13 \times 10^{-36}x^{16}$

Supplementary Table S2

South Korea

Infection date Following year optimal booster date

19-Sep	19-Sep
20-Sep	19-Sep
21-Sep	19-Sep
22-Sep	19-Sep
23-Sep	19-Sep
24-Sep	19-Sep
25-Sep	20-Sep
26-Sep	20-Sep
27-Sep	20-Sep
28-Sep	20-Sep
29-Sep	20-Sep
30-Sep	20-Sep
1-Oct	20-Sep
2-Oct	20-Sep
3-Oct	20-Sep
4-Oct	20-Sep
5-Oct	20-Sep
6-Oct	20-Sep
7-Oct	20-Sep
8-Oct	20-Sep
9-Oct	20-Sep
10-Oct	20-Sep
11-Oct	20-Sep
12-Oct	20-Sep
13-Oct	20-Sep
14-Oct	20-Sep
15-Oct	20-Sep
16-Oct	20-Sep
17-Oct	20-Sep
18-Oct	20-Sep
19-Oct	20-Sep
20-Oct	20-Sep
21-Oct	20-Sep
22-Oct	20-Sep
23-Oct	20-Sep
24-Oct	21-Sep
25-Oct	21-Sep
26-Oct	21-Sep
27-Oct	21-Sep
28-Oct	21-Sep
29-Oct	21-Sep

30-Oct	21-Sep
31-Oct	21-Sep
1-Nov	21-Sep
2-Nov	21-Sep
3-Nov	21-Sep
4-Nov	21-Sep
5-Nov	21-Sep
6-Nov	21-Sep
7-Nov	21-Sep
8-Nov	21-Sep
9-Nov	21-Sep
10-Nov	21-Sep
11-Nov	21-Sep
12-Nov	21-Sep
13-Nov	21-Sep
14-Nov	21-Sep
15-Nov	21-Sep
16-Nov	21-Sep
17-Nov	21-Sep
18-Nov	21-Sep
19-Nov	21-Sep
20-Nov	21-Sep
21-Nov	21-Sep
22-Nov	21-Sep
23-Nov	21-Sep
24-Nov	21-Sep
25-Nov	21-Sep
26-Nov	22-Sep
27-Nov	22-Sep
28-Nov	22-Sep
29-Nov	22-Sep
30-Nov	22-Sep
1-Dec	22-Sep
2-Dec	22-Sep
3-Dec	22-Sep
4-Dec	22-Sep
5-Dec	22-Sep
6-Dec	22-Sep
7-Dec	22-Sep
8-Dec	22-Sep
9-Dec	22-Sep
10-Dec	22-Sep
11-Dec	22-Sep

12-Dec	22-Sep
13-Dec	22-Sep
14-Dec	22-Sep
15-Dec	22-Sep
16-Dec	22-Sep
17-Dec	22-Sep
18-Dec	22-Sep
19-Dec	22-Sep
20-Dec	22-Sep
21-Dec	22-Sep
22-Dec	22-Sep
23-Dec	22-Sep
24-Dec	22-Sep
25-Dec	22-Sep
26-Dec	22-Sep
27-Dec	22-Sep
28-Dec	22-Sep
29-Dec	22-Sep
30-Dec	22-Sep
31-Dec	22-Sep
1-Jan	22-Sep
2-Jan	22-Sep
3-Jan	22-Sep
4-Jan	22-Sep
5-Jan	22-Sep
6-Jan	23-Sep
7-Jan	23-Sep
8-Jan	23-Sep
9-Jan	23-Sep
10-Jan	23-Sep
11-Jan	23-Sep
12-Jan	23-Sep
13-Jan	23-Sep
14-Jan	23-Sep
15-Jan	23-Sep
16-Jan	23-Sep
17-Jan	23-Sep
18-Jan	23-Sep
19-Jan	23-Sep
20-Jan	10-Oct
21-Jan	10-Oct
22-Jan	10-Oct
23-Jan	10-Oct

24-Jan	10-Oct
25-Jan	10-Oct
26-Jan	10-Oct
27-Jan	10-Oct
28-Jan	11-Oct
29-Jan	11-Oct
30-Jan	11-Oct
31-Jan	11-Oct
1-Feb	11-Oct
2-Feb	11-Oct
3-Feb	11-Oct
4-Feb	11-Oct
5-Feb	12-Oct
6-Feb	12-Oct
7-Feb	12-Oct
8-Feb	12-Oct
9-Feb	12-Oct
10-Feb	12-Oct
11-Feb	12-Oct
12-Feb	12-Oct
13-Feb	13-Oct
14-Feb	13-Oct
15-Feb	13-Oct
16-Feb	13-Oct
17-Feb	13-Oct
18-Feb	13-Oct
19-Feb	13-Oct
20-Feb	13-Oct
21-Feb	13-Oct
22-Feb	14-Oct
23-Feb	14-Oct
24-Feb	14-Oct
25-Feb	14-Oct
26-Feb	14-Oct
27-Feb	14-Oct
28-Feb	14-Oct
1-Mar	14-Oct
2-Mar	14-Oct
3-Mar	14-Oct
4-Mar	15-Oct
5-Mar	15-Oct
6-Mar	15-Oct
7-Mar	15-Oct

8-Mar	15-Oct
9-Mar	15-Oct
10-Mar	15-Oct
11-Mar	15-Oct
12-Mar	15-Oct
13-Mar	15-Oct
14-Mar	16-Oct
15-Mar	16-Oct
16-Mar	16-Oct
17-Mar	16-Oct
18-Mar	16-Oct
19-Mar	16-Oct
20-Mar	16-Oct
21-Mar	16-Oct
22-Mar	16-Oct
23-Mar	16-Oct
24-Mar	17-Oct
25-Mar	17-Oct
26-Mar	17-Oct
27-Mar	17-Oct
28-Mar	17-Oct
29-Mar	17-Oct
30-Mar	17-Oct
31-Mar	17-Oct
1-Apr	17-Oct
2-Apr	17-Oct
3-Apr	17-Oct
4-Apr	17-Oct
5-Apr	17-Oct
6-Apr	17-Oct
7-Apr	17-Oct
8-Apr	17-Oct
9-Apr	17-Oct
10-Apr	17-Oct
11-Apr	17-Oct
12-Apr	17-Oct
13-Apr	17-Oct
14-Apr	17-Oct
15-Apr	17-Oct
16-Apr	17-Oct
17-Apr	17-Oct
18-Apr	17-Oct
19-Apr	17-Oct

20-Apr	17-Oct
21-Apr	17-Oct
22-Apr	17-Oct
23-Apr	17-Oct
24-Apr	17-Oct
25-Apr	17-Oct
26-Apr	17-Oct
27-Apr	17-Oct
28-Apr	17-Oct
29-Apr	17-Oct
30-Apr	17-Oct
1-May	17-Oct
2-May	17-Oct
3-May	17-Oct
4-May	17-Oct
5-May	17-Oct
6-May	17-Oct
7-May	17-Oct
8-May	17-Oct
9-May	17-Oct
10-May	17-Oct
11-May	17-Oct
12-May	17-Oct
13-May	17-Oct
14-May	17-Oct
15-May	17-Oct
16-May	17-Oct
17-May	17-Oct
18-May	17-Oct
19-May	17-Oct
20-May	17-Oct
21-May	17-Oct
22-May	17-Oct
23-May	17-Oct
24-May	17-Oct
25-May	17-Oct
26-May	17-Oct
27-May	17-Oct
28-May	17-Oct
29-May	17-Oct
30-May	17-Oct
31-May	17-Oct
1-Jun	17-Oct

2-Jun	17-Oct
3-Jun	17-Oct
4-Jun	18-Oct
5-Jun	18-Oct
6-Jun	18-Oct
7-Jun	18-Oct
8-Jun	18-Oct
9-Jun	18-Oct
10-Jun	18-Oct
11-Jun	18-Oct
12-Jun	18-Oct
13-Jun	18-Oct
14-Jun	18-Oct
15-Jun	18-Oct
16-Jun	18-Oct
17-Jun	18-Oct
18-Jun	18-Oct
19-Jun	18-Oct
20-Jun	18-Oct
21-Jun	18-Oct
22-Jun	18-Oct
23-Jun	18-Oct
24-Jun	18-Oct
25-Jun	18-Oct
26-Jun	18-Oct
27-Jun	18-Oct
28-Jun	18-Oct
29-Jun	18-Oct
30-Jun	18-Oct
1-Jul	18-Oct
2-Jul	18-Oct
3-Jul	18-Oct
4-Jul	18-Oct
5-Jul	18-Oct
6-Jul	18-Oct
7-Jul	18-Oct
8-Jul	18-Oct
9-Jul	18-Oct
10-Jul	18-Oct
11-Jul	18-Oct
12-Jul	18-Oct
13-Jul	18-Oct
14-Jul	18-Oct

15-Jul	18-Oct
16-Jul	18-Oct
17-Jul	18-Oct
18-Jul	18-Oct
19-Jul	18-Oct
20-Jul	31-Jan
21-Jul	28-Feb
22-Jul	28-Feb
23-Jul	28-Feb
24-Jul	28-Feb
25-Jul	28-Feb
26-Jul	28-Feb
27-Jul	28-Feb
28-Jul	28-Feb
29-Jul	28-Feb
30-Jul	28-Feb
31-Jul	28-Feb
1-Aug	28-Feb
2-Aug	28-Feb
3-Aug	28-Feb
4-Aug	28-Feb
5-Aug	28-Feb
6-Aug	28-Feb
7-Aug	28-Feb
8-Aug	28-Feb
9-Aug	28-Feb
10-Aug	28-Feb
11-Aug	28-Feb
12-Aug	28-Feb
13-Aug	28-Feb
14-Aug	28-Feb
15-Aug	28-Feb
16-Aug	28-Feb
17-Aug	28-Feb
18-Aug	28-Feb
19-Aug	28-Feb
20-Aug	28-Feb
21-Aug	28-Feb
22-Aug	28-Feb
23-Aug	28-Feb
24-Aug	28-Feb
25-Aug	28-Feb
26-Aug	28-Feb

27-Aug	28-Feb
28-Aug	28-Feb
29-Aug	28-Feb
30-Aug	28-Feb
31-Aug	28-Feb
1-Sep	28-Feb
2-Sep	28-Feb
3-Sep	28-Feb
4-Sep	28-Feb
5-Sep	28-Feb
6-Sep	28-Feb
7-Sep	28-Feb
8-Sep	28-Feb
9-Sep	28-Feb
10-Sep	28-Feb
11-Sep	28-Feb
12-Sep	28-Feb
13-Sep	28-Feb
14-Sep	28-Feb
15-Sep	28-Feb
16-Sep	28-Feb
17-Sep	28-Feb
18-Sep	28-Feb

Table S3. Phenomenological equations for Figure 3

Location	Equation for yearly optimal booster vaccination date
New York	$25.80 - 8.08x + 1.31x^2 - 0.09x^3 + 3.73 \times 10^{-3}x^4 - 9.15 \times 10^{-5}x^5 + 1.49 \times 10^{-6}x^6 - 1.67 \times 10^{-8}x^7$ $+ 1.33 \times 10^{-10}x^8 - 7.59 \times 10^{-13}x^9 + 3.13 \times 10^{-15}x^{10} - 9.21 \times 10^{-18}x^{11} + 1.89 \times 10^{-20}x^{12}$ $- 2.56 \times 10^{-23}x^{13} + 2.06 \times 10^{-26}x^{14} - 7.43 \times 10^{-30}x^{15}$
Stockholm	$3.79 + 2.57x - 0.10x^2 + 1.62 \times 10^{-3}x^3 - 1.28 \times 10^{-5}x^4 + 5.31 \times 10^{-8}x^5 - 1.11 \times 10^{-10}x^6 + 9.20 \times 10^{-14}x^7$
South Korea	$33.17 - 2.60x + 0.11x^2 - 1.91 \times 10^{-3}x^3 + 1.60 \times 10^{-5}x^4 - 6.82 \times 10^{-8}x^5 + 1.43 \times 10^{-10}x^6 - 1.17 \times 10^{-13}x^7$
Edinburgh	$-2.56 + 1.66x - 0.06x^2 + 1.13 \times 10^{-3}x^3 - 9.62 \times 10^{-6}x^4 + 4.19 \times 10^{-8}x^5 - 8.88 \times 10^{-11}x^6 + 7.28 \times 10^{-14}x^7$
Yamagata	$1.49 + 1.83x - 0.06x^2 + 9.16 \times 10^{-3}x^3 - 6.20 \times 10^{-6}x^4 + 2.16 \times 10^{-8}x^5 - 3.79 \times 10^{-11}x^6 + 2.64 \times 10^{-14}x^7$
Nepal	$3.64 + 0.14x + 0.01x^2 - 2.15 \times 10^{-3}x^3 + 1.94 \times 10^{-6}x^4 - 8.50 \times 10^{-9}x^5 + 1.78 \times 10^{-11}x^6 - 1.42 \times 10^{-14}x^7$
Guangzhou	$13.82 - 3.91x + 0.62x^2 - 0.04x^3 + 1.58 \times 10^{-3}x^4 - 3.61 \times 10^{-5}x^5 + 5.38 \times 10^{-7}x^6 - 5.46 \times 10^{-9}x^7$ $+ 3.88 \times 10^{-11}x^8 - 1.93 \times 10^{-13}x^9 + 6.73 \times 10^{-16}x^{10} - 1.60 \times 10^{-18}x^{11}$ $+ 2.48 \times 10^{-21}x^{12} - 2.22 \times 10^{-24}x^{13} + 8.27 \times 10^{-28}x^{14} + 6.11 \times 10^{-32}x^{15}$
Netherlands	$15.30 - 1.02x + 0.05x^2 - 8.64 \times 10^{-3}x^3 + 6.56 \times 10^{-6}x^4 - 2.56 \times 10^{-8}x^5 + 4.98 \times 10^{-11}x^6 - 3.81 \times 10^{-14}x^7$
Gothenburg	$-11.61 + 3.87x - 0.15x^2 + 2.46 \times 10^{-5}x^3 - 1.95 \times 10^{-5}x^4 + 7.97 \times 10^{-8}x^5 - 1.60 \times 10^{-10}x^6 + 1.25 \times 10^{-13}x^7$
Norway	$13.82 - 3.91x + 0.62x^2 - 0.04x^3 + 1.58 \times 10^{-3}x^4 - 3.61 \times 10^{-5}x^5 + 5.38 \times 10^{-7}x^6 - 5.46 \times 10^{-9}x^7$ $+ 3.88 \times 10^{-11}x^8 - 1.93 \times 10^{-13}x^9 + 6.73 \times 10^{-16}x^{10} - 1.60 \times 10^{-18}x^{11} + 2.48 \times 10^{-21}x^{12}$ $- 2.22 \times 10^{-24}x^{13} + 8.27 \times 10^{-28}x^{14} + 6.11 \times 10^{-32}x^{15}$
Israel	$28.41 - 1.03x + 0.04x^2 - 5.18 \times 10^{-3}x^3 + 3.94 \times 10^{-6}x^4 - 1.48 \times 10^{-8}x^5 + 2.62 \times 10^{-11}x^6 - 1.75 \times 10^{-14}x^7$

Supplementary Table S4

New York

Infection date Following year optimal booster date

15-Sep	15-Sep
16-Sep	15-Sep
17-Sep	15-Sep
18-Sep	15-Sep
19-Sep	15-Sep
20-Sep	15-Sep
21-Sep	15-Sep
22-Sep	15-Sep
23-Sep	15-Sep
24-Sep	15-Sep
25-Sep	15-Sep
26-Sep	15-Sep
27-Sep	15-Sep
28-Sep	15-Sep
29-Sep	15-Sep
30-Sep	15-Sep
1-Oct	15-Sep
2-Oct	15-Sep
3-Oct	15-Sep
4-Oct	15-Sep
5-Oct	15-Sep
6-Oct	15-Sep
7-Oct	15-Sep
8-Oct	15-Sep
9-Oct	15-Sep
10-Oct	15-Sep
11-Oct	15-Sep
12-Oct	15-Sep
13-Oct	15-Sep
14-Oct	15-Sep
15-Oct	15-Sep
16-Oct	15-Sep
17-Oct	15-Sep
18-Oct	15-Sep
19-Oct	15-Sep
20-Oct	15-Sep
21-Oct	15-Sep
22-Oct	15-Sep
23-Oct	15-Sep
24-Oct	15-Sep
25-Oct	15-Sep

26-Oct	15-Sep
27-Oct	15-Sep
28-Oct	15-Sep
29-Oct	15-Sep
30-Oct	15-Sep
31-Oct	15-Sep
1-Nov	15-Sep
2-Nov	15-Sep
3-Nov	15-Sep
4-Nov	15-Sep
5-Nov	15-Sep
6-Nov	15-Sep
7-Nov	15-Sep
8-Nov	15-Sep
9-Nov	15-Sep
10-Nov	15-Sep
11-Nov	15-Sep
12-Nov	15-Sep
13-Nov	15-Sep
14-Nov	15-Sep
15-Nov	15-Sep
16-Nov	15-Sep
17-Nov	15-Sep
18-Nov	15-Sep
19-Nov	15-Sep
20-Nov	15-Sep
21-Nov	15-Sep
22-Nov	15-Sep
23-Nov	15-Sep
24-Nov	15-Sep
25-Nov	15-Sep
26-Nov	15-Sep
27-Nov	15-Sep
28-Nov	15-Sep
29-Nov	15-Sep
30-Nov	15-Sep
1-Dec	15-Sep
2-Dec	15-Sep
3-Dec	15-Sep
4-Dec	15-Sep
5-Dec	15-Sep
6-Dec	15-Sep
7-Dec	15-Sep

8-Dec	15-Sep
9-Dec	15-Sep
10-Dec	15-Sep
11-Dec	15-Sep
12-Dec	15-Sep
13-Dec	15-Sep
14-Dec	15-Sep
15-Dec	15-Sep
16-Dec	15-Sep
17-Dec	15-Sep
18-Dec	15-Sep
19-Dec	15-Sep
20-Dec	15-Sep
21-Dec	15-Sep
22-Dec	15-Sep
23-Dec	15-Sep
24-Dec	15-Sep
25-Dec	15-Sep
26-Dec	15-Sep
27-Dec	15-Sep
28-Dec	15-Sep
29-Dec	15-Sep
30-Dec	16-Sep
31-Dec	16-Sep
1-Jan	16-Sep
2-Jan	16-Sep
3-Jan	16-Sep
4-Jan	16-Sep
5-Jan	16-Sep
6-Jan	16-Sep
7-Jan	16-Sep
8-Jan	16-Sep
9-Jan	16-Sep
10-Jan	16-Sep
11-Jan	16-Sep
12-Jan	16-Sep
13-Jan	16-Sep
14-Jan	16-Sep
15-Jan	16-Sep
16-Jan	16-Sep
17-Jan	16-Sep
18-Jan	16-Sep
19-Jan	16-Sep

20-Jan	16-Sep
21-Jan	16-Sep
22-Jan	16-Sep
23-Jan	16-Sep
24-Jan	16-Sep
25-Jan	16-Sep
26-Jan	16-Sep
27-Jan	16-Sep
28-Jan	16-Sep
29-Jan	16-Sep
30-Jan	16-Sep
31-Jan	16-Sep
1-Feb	16-Sep
2-Feb	16-Sep
3-Feb	16-Sep
4-Feb	16-Sep
5-Feb	16-Sep
6-Feb	16-Sep
7-Feb	16-Sep
8-Feb	16-Sep
9-Feb	16-Sep
10-Feb	16-Sep
11-Feb	16-Sep
12-Feb	16-Sep
13-Feb	16-Sep
14-Feb	16-Sep
15-Feb	16-Sep
16-Feb	16-Sep
17-Feb	16-Sep
18-Feb	16-Sep
19-Feb	16-Sep
20-Feb	16-Sep
21-Feb	16-Sep
22-Feb	16-Sep
23-Feb	16-Sep
24-Feb	16-Sep
25-Feb	16-Sep
26-Feb	16-Sep
27-Feb	16-Sep
28-Feb	16-Sep
1-Mar	16-Sep
2-Mar	16-Sep
3-Mar	16-Sep

4-Mar	16-Sep
5-Mar	16-Sep
6-Mar	16-Sep
7-Mar	16-Sep
8-Mar	16-Sep
9-Mar	16-Sep
10-Mar	16-Sep
11-Mar	16-Sep
12-Mar	16-Sep
13-Mar	16-Sep
14-Mar	16-Sep
15-Mar	16-Sep
16-Mar	16-Sep
17-Mar	16-Sep
18-Mar	16-Sep
19-Mar	16-Sep
20-Mar	16-Sep
21-Mar	16-Sep
22-Mar	16-Sep
23-Mar	16-Sep
24-Mar	16-Sep
25-Mar	16-Sep
26-Mar	16-Sep
27-Mar	16-Sep
28-Mar	16-Sep
29-Mar	16-Sep
30-Mar	16-Sep
31-Mar	16-Sep
1-Apr	16-Sep
2-Apr	16-Sep
3-Apr	16-Sep
4-Apr	16-Sep
5-Apr	16-Sep
6-Apr	16-Sep
7-Apr	16-Sep
8-Apr	16-Sep
9-Apr	16-Sep
10-Apr	16-Sep
11-Apr	16-Sep
12-Apr	16-Sep
13-Apr	16-Sep
14-Apr	16-Sep
15-Apr	16-Sep

16-Apr	16-Sep
17-Apr	17-Sep
18-Apr	17-Sep
19-Apr	17-Sep
20-Apr	17-Sep
21-Apr	17-Sep
22-Apr	17-Sep
23-Apr	17-Sep
24-Apr	17-Sep
25-Apr	17-Sep
26-Apr	17-Sep
27-Apr	17-Sep
28-Apr	17-Sep
29-Apr	17-Sep
30-Apr	17-Sep
1-May	17-Sep
2-May	17-Sep
3-May	17-Sep
4-May	17-Sep
5-May	17-Sep
6-May	17-Sep
7-May	17-Sep
8-May	17-Sep
9-May	17-Sep
10-May	28-Nov
11-May	28-Nov
12-May	28-Nov
13-May	28-Nov
14-May	28-Nov
15-May	28-Nov
16-May	28-Nov
17-May	28-Nov
18-May	28-Nov
19-May	28-Nov
20-May	28-Nov
21-May	28-Nov
22-May	28-Nov
23-May	28-Nov
24-May	28-Nov
25-May	28-Nov
26-May	28-Nov
27-May	28-Nov
28-May	28-Nov

29-May	28-Nov
30-May	28-Nov
31-May	28-Nov
1-Jun	28-Nov
2-Jun	28-Nov
3-Jun	29-Nov
4-Jun	29-Nov
5-Jun	30-Nov
6-Jun	1-Dec
7-Jun	1-Dec
8-Jun	2-Dec
9-Jun	2-Dec
10-Jun	3-Dec
11-Jun	3-Dec
12-Jun	4-Dec
13-Jun	5-Dec
14-Jun	5-Dec
15-Jun	5-Dec
16-Jun	5-Dec
17-Jun	6-Dec
18-Jun	6-Dec
19-Jun	6-Dec
20-Jun	6-Dec
21-Jun	7-Dec
22-Jun	7-Dec
23-Jun	7-Dec
24-Jun	7-Dec
25-Jun	8-Dec
26-Jun	8-Dec
27-Jun	8-Dec
28-Jun	8-Dec
29-Jun	9-Dec
30-Jun	9-Dec
1-Jul	9-Dec
2-Jul	9-Dec
3-Jul	10-Dec
4-Jul	10-Dec
5-Jul	10-Dec
6-Jul	10-Dec
7-Jul	11-Dec
8-Jul	11-Dec
9-Jul	11-Dec
10-Jul	11-Dec

11-Jul	29-Jan
12-Jul	29-Jan
13-Jul	29-Jan
14-Jul	29-Jan
15-Jul	29-Jan
16-Jul	29-Jan
17-Jul	29-Jan
18-Jul	29-Jan
19-Jul	29-Jan
20-Jul	29-Jan
21-Jul	29-Jan
22-Jul	29-Jan
23-Jul	29-Jan
24-Jul	29-Jan
25-Jul	29-Jan
26-Jul	29-Jan
27-Jul	29-Jan
28-Jul	29-Jan
29-Jul	29-Jan
30-Jul	29-Jan
31-Jul	29-Jan
1-Aug	29-Jan
2-Aug	29-Jan
3-Aug	29-Jan
4-Aug	29-Jan
5-Aug	26-Feb
6-Aug	26-Feb
7-Aug	26-Feb
8-Aug	26-Feb
9-Aug	26-Feb
10-Aug	26-Feb
11-Aug	26-Feb
12-Aug	26-Feb
13-Aug	26-Feb
14-Aug	26-Feb
15-Aug	26-Feb
16-Aug	26-Feb
17-Aug	26-Feb
18-Aug	26-Feb
19-Aug	26-Feb
20-Aug	26-Feb
21-Aug	26-Feb
22-Aug	26-Feb

23-Aug	26-Feb
24-Aug	26-Feb
25-Aug	26-Feb
26-Aug	26-Feb
27-Aug	26-Feb
28-Aug	26-Feb
29-Aug	26-Feb
30-Aug	29-Mar
31-Aug	29-Mar
1-Sep	29-Mar
2-Sep	29-Mar
3-Sep	29-Mar
4-Sep	29-Mar
5-Sep	29-Mar
6-Sep	29-Mar
7-Sep	29-Mar
8-Sep	29-Mar
9-Sep	29-Mar
10-Sep	29-Mar
11-Sep	29-Mar
12-Sep	29-Mar
13-Sep	29-Mar
14-Sep	29-Mar

Supplementary Table S5

Yamagata

Infection date Following year optimal booster date

18-Oct	18-Oct
19-Oct	18-Oct
20-Oct	18-Oct
21-Oct	18-Oct
22-Oct	18-Oct
23-Oct	18-Oct
24-Oct	18-Oct
25-Oct	18-Oct
26-Oct	18-Oct
27-Oct	19-Oct
28-Oct	19-Oct
29-Oct	19-Oct
30-Oct	19-Oct
31-Oct	19-Oct
1-Nov	19-Oct
2-Nov	19-Oct
3-Nov	19-Oct
4-Nov	19-Oct
5-Nov	19-Oct
6-Nov	20-Oct
7-Nov	20-Oct
8-Nov	20-Oct
9-Nov	20-Oct
10-Nov	20-Oct
11-Nov	20-Oct
12-Nov	20-Oct
13-Nov	20-Oct
14-Nov	20-Oct
15-Nov	20-Oct
16-Nov	21-Oct
17-Nov	21-Oct
18-Nov	21-Oct
19-Nov	21-Oct
20-Nov	21-Oct
21-Nov	21-Oct
22-Nov	21-Oct
23-Nov	21-Oct
24-Nov	21-Oct
25-Nov	21-Oct
26-Nov	21-Oct
27-Nov	22-Oct

28-Nov	22-Oct
29-Nov	22-Oct
30-Nov	22-Oct
1-Dec	22-Oct
2-Dec	22-Oct
3-Dec	22-Oct
4-Dec	22-Oct
5-Dec	22-Oct
6-Dec	22-Oct
7-Dec	22-Oct
8-Dec	23-Oct
9-Dec	23-Oct
10-Dec	23-Oct
11-Dec	23-Oct
12-Dec	23-Oct
13-Dec	23-Oct
14-Dec	23-Oct
15-Dec	23-Oct
16-Dec	23-Oct
17-Dec	23-Oct
18-Dec	23-Oct
19-Dec	23-Oct
20-Dec	24-Oct
21-Dec	24-Oct
22-Dec	24-Oct
23-Dec	24-Oct
24-Dec	24-Oct
25-Dec	24-Oct
26-Dec	24-Oct
27-Dec	24-Oct
28-Dec	24-Oct
29-Dec	25-Oct
30-Dec	25-Oct
31-Dec	25-Oct
1-Jan	25-Oct
2-Jan	25-Oct
3-Jan	25-Oct
4-Jan	25-Oct
5-Jan	25-Oct
6-Jan	25-Oct
7-Jan	25-Oct
8-Jan	26-Oct
9-Jan	26-Oct

10-Jan	26-Oct
11-Jan	26-Oct
12-Jan	26-Oct
13-Jan	26-Oct
14-Jan	26-Oct
15-Jan	26-Oct
16-Jan	26-Oct
17-Jan	27-Oct
18-Jan	8-Nov
19-Jan	9-Nov
20-Jan	9-Nov
21-Jan	10-Nov
22-Jan	11-Nov
23-Jan	11-Nov
24-Jan	30-Nov
25-Jan	30-Nov
26-Jan	30-Nov
27-Jan	30-Nov
28-Jan	30-Nov
29-Jan	30-Nov
30-Jan	30-Nov
31-Jan	30-Nov
1-Feb	30-Nov
2-Feb	30-Nov
3-Feb	30-Nov
4-Feb	30-Nov
5-Feb	30-Nov
6-Feb	30-Nov
7-Feb	30-Nov
8-Feb	30-Nov
9-Feb	30-Nov
10-Feb	30-Nov
11-Feb	1-Dec
12-Feb	1-Dec
13-Feb	1-Dec
14-Feb	2-Dec
15-Feb	2-Dec
16-Feb	3-Dec
17-Feb	3-Dec
18-Feb	4-Dec
19-Feb	4-Dec
20-Feb	4-Dec
21-Feb	5-Dec

22-Feb	5-Dec
23-Feb	6-Dec
24-Feb	6-Dec
25-Feb	7-Dec
26-Feb	7-Dec
27-Feb	7-Dec
28-Feb	7-Dec
1-Mar	7-Dec
2-Mar	7-Dec
3-Mar	7-Dec
4-Mar	7-Dec
5-Mar	8-Dec
6-Mar	8-Dec
7-Mar	8-Dec
8-Mar	8-Dec
9-Mar	8-Dec
10-Mar	8-Dec
11-Mar	8-Dec
12-Mar	9-Dec
13-Mar	9-Dec
14-Mar	9-Dec
15-Mar	9-Dec
16-Mar	9-Dec
17-Mar	9-Dec
18-Mar	9-Dec
19-Mar	9-Dec
20-Mar	10-Dec
21-Mar	10-Dec
22-Mar	10-Dec
23-Mar	10-Dec
24-Mar	10-Dec
25-Mar	10-Dec
26-Mar	10-Dec
27-Mar	10-Dec
28-Mar	11-Dec
29-Mar	11-Dec
30-Mar	11-Dec
31-Mar	11-Dec
1-Apr	11-Dec
2-Apr	11-Dec
3-Apr	11-Dec
4-Apr	11-Dec
5-Apr	11-Dec

6-Apr	12-Dec
7-Apr	12-Dec
8-Apr	12-Dec
9-Apr	12-Dec
10-Apr	12-Dec
11-Apr	12-Dec
12-Apr	12-Dec
13-Apr	12-Dec
14-Apr	12-Dec
15-Apr	13-Dec
16-Apr	13-Dec
17-Apr	13-Dec
18-Apr	13-Dec
19-Apr	13-Dec
20-Apr	13-Dec
21-Apr	13-Dec
22-Apr	13-Dec
23-Apr	13-Dec
24-Apr	14-Dec
25-Apr	14-Dec
26-Apr	14-Dec
27-Apr	14-Dec
28-Apr	14-Dec
29-Apr	14-Dec
30-Apr	14-Dec
1-May	14-Dec
2-May	14-Dec
3-May	14-Dec
4-May	15-Dec
5-May	15-Dec
6-May	15-Dec
7-May	15-Dec
8-May	15-Dec
9-May	15-Dec
10-May	15-Dec
11-May	15-Dec
12-May	15-Dec
13-May	15-Dec
14-May	15-Dec
15-May	16-Dec
16-May	16-Dec
17-May	16-Dec
18-May	16-Dec

19-May	16-Dec
20-May	16-Dec
21-May	16-Dec
22-May	16-Dec
23-May	16-Dec
24-May	16-Dec
25-May	16-Dec
26-May	17-Dec
27-May	17-Dec
28-May	17-Dec
29-May	17-Dec
30-May	17-Dec
31-May	17-Dec
1-Jun	17-Dec
2-Jun	17-Dec
3-Jun	17-Dec
4-Jun	17-Dec
5-Jun	17-Dec
6-Jun	17-Dec
7-Jun	17-Dec
8-Jun	17-Dec
9-Jun	17-Dec
10-Jun	17-Dec
11-Jun	17-Dec
12-Jun	17-Dec
13-Jun	17-Dec
14-Jun	17-Dec
15-Jun	17-Dec
16-Jun	17-Dec
17-Jun	17-Dec
18-Jun	17-Dec
19-Jun	17-Dec
20-Jun	17-Dec
21-Jun	17-Dec
22-Jun	17-Dec
23-Jun	17-Dec
24-Jun	17-Dec
25-Jun	17-Dec
26-Jun	17-Dec
27-Jun	17-Dec
28-Jun	17-Dec
29-Jun	17-Dec
30-Jun	17-Dec

1-Jul	17-Dec
2-Jul	17-Dec
3-Jul	17-Dec
4-Jul	17-Dec
5-Jul	17-Dec
6-Jul	17-Dec
7-Jul	17-Dec
8-Jul	17-Dec
9-Jul	17-Dec
10-Jul	17-Dec
11-Jul	17-Dec
12-Jul	17-Dec
13-Jul	17-Dec
14-Jul	17-Dec
15-Jul	17-Dec
16-Jul	17-Dec
17-Jul	17-Dec
18-Jul	17-Dec
19-Jul	17-Dec
20-Jul	17-Dec
21-Jul	17-Dec
22-Jul	17-Dec
23-Jul	17-Dec
24-Jul	17-Dec
25-Jul	17-Dec
26-Jul	17-Dec
27-Jul	17-Dec
28-Jul	17-Dec
29-Jul	17-Dec
30-Jul	17-Dec
31-Jul	17-Dec
1-Aug	17-Dec
2-Aug	17-Dec
3-Aug	17-Dec
4-Aug	17-Dec
5-Aug	17-Dec
6-Aug	17-Dec
7-Aug	17-Dec
8-Aug	17-Dec
9-Aug	17-Dec
10-Aug	17-Dec
11-Aug	17-Dec
12-Aug	17-Dec

13-Aug	17-Dec
14-Aug	17-Dec
15-Aug	17-Dec
16-Aug	17-Dec
17-Aug	17-Dec
18-Aug	18-Dec
19-Aug	18-Dec
20-Aug	18-Dec
21-Aug	18-Dec
22-Aug	18-Dec
23-Aug	18-Dec
24-Aug	18-Dec
25-Aug	18-Dec
26-Aug	18-Dec
27-Aug	18-Dec
28-Aug	18-Dec
29-Aug	18-Dec
30-Aug	18-Dec
31-Aug	18-Dec
1-Sep	18-Dec
2-Sep	18-Dec
3-Sep	18-Dec
4-Sep	18-Dec
5-Sep	18-Dec
6-Sep	18-Dec
7-Sep	18-Dec
8-Sep	18-Dec
9-Sep	18-Dec
10-Sep	18-Dec
11-Sep	18-Dec
12-Sep	18-Dec
13-Sep	18-Dec
14-Sep	18-Dec
15-Sep	18-Dec
16-Sep	18-Dec
17-Sep	18-Dec
18-Sep	18-Dec
19-Sep	18-Dec
20-Sep	18-Dec
21-Sep	18-Dec
22-Sep	18-Dec
23-Sep	18-Dec
24-Sep	18-Dec

25-Sep	18-Dec
26-Sep	18-Dec
27-Sep	31-Mar
28-Sep	31-Mar
29-Sep	31-Mar
30-Sep	31-Mar
1-Oct	31-Mar
2-Oct	31-Mar
3-Oct	31-Mar
4-Oct	31-Mar
5-Oct	31-Mar
6-Oct	31-May
7-Oct	31-May
8-Oct	31-May
9-Oct	31-May
10-Oct	31-May
11-Oct	31-May
12-Oct	31-May
13-Oct	31-May
14-Oct	31-May
15-Oct	31-May
16-Oct	31-May
17-Oct	31-May

Supplementary Table S6

Nepal

Infection date Following year optimal booster date

11-Sep	11-Sep
12-Sep	11-Sep
13-Sep	11-Sep
14-Sep	12-Sep
15-Sep	12-Sep
16-Sep	13-Sep
17-Sep	13-Sep
18-Sep	14-Sep
19-Sep	14-Sep
20-Sep	14-Sep
21-Sep	15-Sep
22-Sep	15-Sep
23-Sep	16-Sep
24-Sep	16-Sep
25-Sep	16-Sep
26-Sep	16-Sep
27-Sep	17-Sep
28-Sep	17-Sep
29-Sep	17-Sep
30-Sep	17-Sep
1-Oct	18-Sep
2-Oct	18-Sep
3-Oct	18-Sep
4-Oct	19-Sep
5-Oct	19-Sep
6-Oct	19-Sep
7-Oct	19-Sep
8-Oct	20-Sep
9-Oct	20-Sep
10-Oct	20-Sep
11-Oct	21-Sep
12-Oct	21-Sep
13-Oct	21-Sep
14-Oct	21-Sep
15-Oct	22-Sep
16-Oct	22-Sep
17-Oct	22-Sep
18-Oct	22-Sep
19-Oct	23-Sep
20-Oct	23-Sep
21-Oct	23-Sep

22-Oct	24-Sep
23-Oct	24-Sep
24-Oct	24-Sep
25-Oct	25-Sep
26-Oct	25-Sep
27-Oct	25-Sep
28-Oct	26-Sep
29-Oct	26-Sep
30-Oct	26-Sep
31-Oct	26-Sep
1-Nov	27-Sep
2-Nov	27-Sep
3-Nov	27-Sep
4-Nov	28-Sep
5-Nov	28-Sep
6-Nov	28-Sep
7-Nov	29-Sep
8-Nov	29-Sep
9-Nov	2-Oct
10-Nov	2-Oct
11-Nov	2-Oct
12-Nov	3-Oct
13-Nov	3-Oct
14-Nov	4-Oct
15-Nov	4-Oct
16-Nov	5-Oct
17-Nov	5-Oct
18-Nov	6-Oct
19-Nov	6-Oct
20-Nov	7-Oct
21-Nov	7-Oct
22-Nov	8-Oct
23-Nov	8-Oct
24-Nov	8-Oct
25-Nov	9-Oct
26-Nov	9-Oct
27-Nov	10-Oct
28-Nov	10-Oct
29-Nov	11-Oct
30-Nov	11-Oct
1-Dec	11-Oct
2-Dec	12-Oct
3-Dec	12-Oct

4-Dec	13-Oct
5-Dec	13-Oct
6-Dec	14-Oct
7-Dec	14-Oct
8-Dec	14-Oct
9-Dec	15-Oct
10-Dec	15-Oct
11-Dec	16-Oct
12-Dec	16-Oct
13-Dec	17-Oct
14-Dec	17-Oct
15-Dec	17-Oct
16-Dec	17-Oct
17-Dec	18-Oct
18-Dec	18-Oct
19-Dec	18-Oct
20-Dec	19-Oct
21-Dec	19-Oct
22-Dec	19-Oct
23-Dec	19-Oct
24-Dec	20-Oct
25-Dec	20-Oct
26-Dec	20-Oct
27-Dec	20-Oct
28-Dec	21-Oct
29-Dec	21-Oct
30-Dec	21-Oct
31-Dec	22-Oct
1-Jan	22-Oct
2-Jan	22-Oct
3-Jan	22-Oct
4-Jan	23-Oct
5-Jan	23-Oct
6-Jan	23-Oct
7-Jan	24-Oct
8-Jan	24-Oct
9-Jan	24-Oct
10-Jan	24-Oct
11-Jan	25-Oct
12-Jan	25-Oct
13-Jan	25-Oct
14-Jan	26-Oct
15-Jan	26-Oct

16-Jan	26-Oct
17-Jan	27-Oct
18-Jan	27-Oct
19-Jan	27-Oct
20-Jan	28-Oct
21-Jan	28-Oct
22-Jan	28-Oct
23-Jan	29-Oct
24-Jan	29-Oct
25-Jan	2-Nov
26-Jan	3-Nov
27-Jan	3-Nov
28-Jan	4-Nov
29-Jan	4-Nov
30-Jan	5-Nov
31-Jan	5-Nov
1-Feb	6-Nov
2-Feb	6-Nov
3-Feb	7-Nov
4-Feb	7-Nov
5-Feb	8-Nov
6-Feb	9-Nov
7-Feb	9-Nov
8-Feb	10-Nov
9-Feb	10-Nov
10-Feb	11-Nov
11-Feb	11-Nov
12-Feb	12-Nov
13-Feb	12-Nov
14-Feb	13-Nov
15-Feb	14-Nov
16-Feb	14-Nov
17-Feb	15-Nov
18-Feb	15-Nov
19-Feb	17-Nov
20-Feb	19-Nov
21-Feb	21-Nov
22-Feb	23-Nov
23-Feb	24-Nov
24-Feb	25-Nov
25-Feb	26-Nov
26-Feb	27-Nov
27-Feb	28-Nov

28-Feb	29-Nov
1-Mar	30-Nov
2-Mar	30-Nov
3-Mar	30-Nov
4-Mar	30-Nov
5-Mar	30-Nov
6-Mar	30-Nov
7-Mar	30-Nov
8-Mar	30-Nov
9-Mar	30-Nov
10-Mar	30-Nov
11-Mar	30-Nov
12-Mar	30-Nov
13-Mar	30-Nov
14-Mar	30-Nov
15-Mar	30-Nov
16-Mar	1-Dec
17-Mar	1-Dec
18-Mar	1-Dec
19-Mar	2-Dec
20-Mar	2-Dec
21-Mar	3-Dec
22-Mar	3-Dec
23-Mar	4-Dec
24-Mar	4-Dec
25-Mar	5-Dec
26-Mar	5-Dec
27-Mar	6-Dec
28-Mar	6-Dec
29-Mar	7-Dec
30-Mar	7-Dec
31-Mar	7-Dec
1-Apr	7-Dec
2-Apr	7-Dec
3-Apr	7-Dec
4-Apr	8-Dec
5-Apr	8-Dec
6-Apr	8-Dec
7-Apr	8-Dec
8-Apr	8-Dec
9-Apr	8-Dec
10-Apr	9-Dec
11-Apr	9-Dec

12-Apr	9-Dec
13-Apr	9-Dec
14-Apr	9-Dec
15-Apr	10-Dec
16-Apr	10-Dec
17-Apr	10-Dec
18-Apr	10-Dec
19-Apr	10-Dec
20-Apr	10-Dec
21-Apr	11-Dec
22-Apr	11-Dec
23-Apr	11-Dec
24-Apr	11-Dec
25-Apr	11-Dec
26-Apr	11-Dec
27-Apr	11-Dec
28-Apr	12-Dec
29-Apr	12-Dec
30-Apr	12-Dec
1-May	12-Dec
2-May	12-Dec
3-May	12-Dec
4-May	13-Dec
5-May	13-Dec
6-May	13-Dec
7-May	13-Dec
8-May	13-Dec
9-May	13-Dec
10-May	13-Dec
11-May	14-Dec
12-May	14-Dec
13-May	14-Dec
14-May	14-Dec
15-May	14-Dec
16-May	14-Dec
17-May	14-Dec
18-May	15-Dec
19-May	15-Dec
20-May	15-Dec
21-May	15-Dec
22-May	15-Dec
23-May	15-Dec
24-May	15-Dec

25-May	16-Dec
26-May	16-Dec
27-May	16-Dec
28-May	16-Dec
29-May	16-Dec
30-May	16-Dec
31-May	16-Dec
1-Jun	17-Dec
2-Jun	17-Dec
3-Jun	17-Dec
4-Jun	17-Dec
5-Jun	17-Dec
6-Jun	17-Dec
7-Jun	17-Dec
8-Jun	17-Dec
9-Jun	17-Dec
10-Jun	17-Dec
11-Jun	17-Dec
12-Jun	17-Dec
13-Jun	17-Dec
14-Jun	17-Dec
15-Jun	17-Dec
16-Jun	17-Dec
17-Jun	17-Dec
18-Jun	17-Dec
19-Jun	17-Dec
20-Jun	17-Dec
21-Jun	17-Dec
22-Jun	17-Dec
23-Jun	17-Dec
24-Jun	17-Dec
25-Jun	17-Dec
26-Jun	17-Dec
27-Jun	17-Dec
28-Jun	17-Dec
29-Jun	17-Dec
30-Jun	17-Dec
1-Jul	17-Dec
2-Jul	17-Dec
3-Jul	17-Dec
4-Jul	17-Dec
5-Jul	17-Dec
6-Jul	17-Dec

7-Jul	17-Dec
8-Jul	17-Dec
9-Jul	17-Dec
10-Jul	17-Dec
11-Jul	18-Dec
12-Jul	18-Dec
13-Jul	18-Dec
14-Jul	18-Dec
15-Jul	18-Dec
16-Jul	18-Dec
17-Jul	18-Dec
18-Jul	18-Dec
19-Jul	18-Dec
20-Jul	18-Dec
21-Jul	18-Dec
22-Jul	18-Dec
23-Jul	18-Dec
24-Jul	18-Dec
25-Jul	18-Dec
26-Jul	18-Dec
27-Jul	18-Dec
28-Jul	18-Dec
29-Jul	18-Dec
30-Jul	18-Dec
31-Jul	18-Dec
1-Aug	18-Dec
2-Aug	18-Dec
3-Aug	18-Dec
4-Aug	18-Dec
5-Aug	18-Dec
6-Aug	18-Dec
7-Aug	18-Dec
8-Aug	18-Dec
9-Aug	18-Dec
10-Aug	18-Dec
11-Aug	18-Dec
12-Aug	18-Dec
13-Aug	18-Dec
14-Aug	18-Dec
15-Aug	18-Dec
16-Aug	18-Dec
17-Aug	18-Dec
18-Aug	18-Dec

19-Aug	18-Dec
20-Aug	18-Dec
21-Aug	18-Dec
22-Aug	18-Dec
23-Aug	18-Dec
24-Aug	18-Dec
25-Aug	18-Dec
26-Aug	18-Dec
27-Aug	31-Mar
28-Aug	31-Mar
29-Aug	31-Mar
30-Aug	31-Mar
31-Aug	31-Mar
1-Sep	31-Mar
2-Sep	31-Mar
3-Sep	31-Mar
4-Sep	31-Mar
5-Sep	31-Mar
6-Sep	31-Mar
7-Sep	31-Mar
8-Sep	31-Mar
9-Sep	31-Mar
10-Sep	31-Mar

Supplementary Table S7

Guangzhou

Infection date Following year optimal booster date

10-Oct	10-Oct
11-Oct	10-Oct
12-Oct	10-Oct
13-Oct	10-Oct
14-Oct	10-Oct
15-Oct	10-Oct
16-Oct	11-Oct
17-Oct	11-Oct
18-Oct	11-Oct
19-Oct	11-Oct
20-Oct	11-Oct
21-Oct	11-Oct
22-Oct	11-Oct
23-Oct	12-Oct
24-Oct	12-Oct
25-Oct	12-Oct
26-Oct	12-Oct
27-Oct	12-Oct
28-Oct	12-Oct
29-Oct	13-Oct
30-Oct	13-Oct
31-Oct	13-Oct
1-Nov	13-Oct
2-Nov	13-Oct
3-Nov	13-Oct
4-Nov	13-Oct
5-Nov	14-Oct
6-Nov	14-Oct
7-Nov	14-Oct
8-Nov	14-Oct
9-Nov	14-Oct
10-Nov	14-Oct
11-Nov	14-Oct
12-Nov	15-Oct
13-Nov	15-Oct
14-Nov	15-Oct
15-Nov	15-Oct
16-Nov	15-Oct
17-Nov	15-Oct
18-Nov	15-Oct
19-Nov	16-Oct

20-Nov	16-Oct
21-Nov	16-Oct
22-Nov	16-Oct
23-Nov	16-Oct
24-Nov	16-Oct
25-Nov	16-Oct
26-Nov	17-Oct
27-Nov	17-Oct
28-Nov	17-Oct
29-Nov	17-Oct
30-Nov	17-Oct
1-Dec	17-Oct
2-Dec	17-Oct
3-Dec	17-Oct
4-Dec	17-Oct
5-Dec	17-Oct
6-Dec	17-Oct
7-Dec	17-Oct
8-Dec	17-Oct
9-Dec	17-Oct
10-Dec	17-Oct
11-Dec	17-Oct
12-Dec	17-Oct
13-Dec	17-Oct
14-Dec	17-Oct
15-Dec	17-Oct
16-Dec	17-Oct
17-Dec	17-Oct
18-Dec	17-Oct
19-Dec	17-Oct
20-Dec	17-Oct
21-Dec	17-Oct
22-Dec	17-Oct
23-Dec	17-Oct
24-Dec	17-Oct
25-Dec	17-Oct
26-Dec	17-Oct
27-Dec	18-Oct
28-Dec	18-Oct
29-Dec	18-Oct
30-Dec	18-Oct
31-Dec	18-Oct
1-Jan	18-Oct

2-Jan	18-Oct
3-Jan	18-Oct
4-Jan	18-Oct
5-Jan	18-Oct
6-Jan	18-Oct
7-Jan	18-Oct
8-Jan	18-Oct
9-Jan	18-Oct
10-Jan	18-Oct
11-Jan	18-Oct
12-Jan	18-Oct
13-Jan	18-Oct
14-Jan	18-Oct
15-Jan	18-Oct
16-Jan	18-Oct
17-Jan	18-Oct
18-Jan	18-Oct
19-Jan	18-Oct
20-Jan	18-Oct
21-Jan	18-Oct
22-Jan	18-Oct
23-Jan	18-Oct
24-Jan	18-Oct
25-Jan	18-Oct
26-Jan	18-Oct
27-Jan	18-Oct
28-Jan	18-Oct
29-Jan	18-Oct
30-Jan	18-Oct
31-Jan	18-Oct
1-Feb	18-Oct
2-Feb	18-Oct
3-Feb	19-Oct
4-Feb	19-Oct
5-Feb	19-Oct
6-Feb	19-Oct
7-Feb	19-Oct
8-Feb	19-Oct
9-Feb	19-Oct
10-Feb	19-Oct
11-Feb	19-Oct
12-Feb	19-Oct
13-Feb	19-Oct

14-Feb	19-Oct
15-Feb	19-Oct
16-Feb	19-Oct
17-Feb	19-Oct
18-Feb	19-Oct
19-Feb	19-Oct
20-Feb	19-Oct
21-Feb	19-Oct
22-Feb	19-Oct
23-Feb	19-Oct
24-Feb	19-Oct
25-Feb	19-Oct
26-Feb	19-Oct
27-Feb	19-Oct
28-Feb	19-Oct
1-Mar	19-Oct
2-Mar	19-Oct
3-Mar	19-Oct
4-Mar	19-Oct
5-Mar	19-Oct
6-Mar	19-Oct
7-Mar	19-Oct
8-Mar	19-Oct
9-Mar	19-Oct
10-Mar	19-Oct
11-Mar	19-Oct
12-Mar	19-Oct
13-Mar	19-Oct
14-Mar	19-Oct
15-Mar	19-Oct
16-Mar	19-Oct
17-Mar	19-Oct
18-Mar	19-Oct
19-Mar	19-Oct
20-Mar	19-Oct
21-Mar	19-Oct
22-Mar	19-Oct
23-Mar	19-Oct
24-Mar	19-Oct
25-Mar	20-Oct
26-Mar	20-Oct
27-Mar	20-Oct
28-Mar	20-Oct

29-Mar	20-Oct
30-Mar	20-Oct
31-Mar	20-Oct
1-Apr	20-Oct
2-Apr	20-Oct
3-Apr	20-Oct
4-Apr	20-Oct
5-Apr	20-Oct
6-Apr	20-Oct
7-Apr	20-Oct
8-Apr	20-Oct
9-Apr	20-Oct
10-Apr	20-Oct
11-Apr	20-Oct
12-Apr	20-Oct
13-Apr	20-Oct
14-Apr	20-Oct
15-Apr	20-Oct
16-Apr	20-Oct
17-Apr	20-Oct
18-Apr	20-Oct
19-Apr	20-Oct
20-Apr	20-Oct
21-Apr	20-Oct
22-Apr	20-Oct
23-Apr	20-Oct
24-Apr	20-Oct
25-Apr	20-Oct
26-Apr	20-Oct
27-Apr	20-Oct
28-Apr	20-Oct
29-Apr	20-Oct
30-Apr	20-Oct
1-May	20-Oct
2-May	20-Oct
3-May	20-Oct
4-May	20-Oct
5-May	20-Oct
6-May	20-Oct
7-May	20-Oct
8-May	20-Oct
9-May	20-Oct
10-May	20-Oct

11-May	20-Oct
12-May	20-Oct
13-May	20-Oct
14-May	20-Oct
15-May	20-Oct
16-May	20-Oct
17-May	20-Oct
18-May	20-Oct
19-May	20-Oct
20-May	20-Oct
21-May	20-Oct
22-May	20-Oct
23-May	20-Oct
24-May	20-Oct
25-May	20-Oct
26-May	20-Oct
27-May	20-Oct
28-May	20-Oct
29-May	20-Oct
30-May	20-Oct
31-May	20-Oct
1-Jun	20-Oct
2-Jun	20-Oct
3-Jun	20-Oct
4-Jun	20-Oct
5-Jun	20-Oct
6-Jun	20-Oct
7-Jun	20-Oct
8-Jun	18-Nov
9-Jun	18-Nov
10-Jun	18-Nov
11-Jun	18-Nov
12-Jun	19-Nov
13-Jun	19-Nov
14-Jun	19-Nov
15-Jun	19-Nov
16-Jun	19-Nov
17-Jun	19-Nov
18-Jun	19-Nov
19-Jun	19-Nov
20-Jun	19-Nov
21-Jun	31-Dec
22-Jun	31-Dec

23-Jun	31-Dec
24-Jun	31-Dec
25-Jun	31-Dec
26-Jun	31-Dec
27-Jun	31-Dec
28-Jun	31-Dec
29-Jun	31-Dec
30-Jun	31-Dec
1-Jul	31-Dec
2-Jul	31-Dec
3-Jul	31-Dec
4-Jul	31-Dec
5-Jul	31-Dec
6-Jul	31-Dec
7-Jul	31-Dec
8-Jul	31-Dec
9-Jul	31-Dec
10-Jul	31-Dec
11-Jul	31-Dec
12-Jul	31-Dec
13-Jul	31-Dec
14-Jul	31-Dec
15-Jul	31-Dec
16-Jul	1-Jan
17-Jul	1-Jan
18-Jul	2-Jan
19-Jul	2-Jan
20-Jul	3-Jan
21-Jul	3-Jan
22-Jul	4-Jan
23-Jul	4-Jan
24-Jul	5-Jan
25-Jul	6-Jan
26-Jul	6-Jan
27-Jul	7-Jan
28-Jul	7-Jan
29-Jul	7-Jan
30-Jul	8-Jan
31-Jul	8-Jan
1-Aug	8-Jan
2-Aug	9-Jan
3-Aug	9-Jan
4-Aug	10-Jan

5-Aug	10-Jan
6-Aug	10-Jan
7-Aug	11-Jan
8-Aug	11-Jan
9-Aug	11-Jan
10-Aug	12-Jan
11-Aug	12-Jan
12-Aug	12-Jan
13-Aug	13-Jan
14-Aug	13-Jan
15-Aug	13-Jan
16-Aug	14-Jan
17-Aug	14-Jan
18-Aug	28-Feb
19-Aug	28-Feb
20-Aug	28-Feb
21-Aug	28-Feb
22-Aug	28-Feb
23-Aug	28-Feb
24-Aug	28-Feb
25-Aug	28-Feb
26-Aug	28-Feb
27-Aug	28-Feb
28-Aug	28-Feb
29-Aug	28-Feb
30-Aug	28-Feb
31-Aug	28-Feb
1-Sep	28-Feb
2-Sep	28-Feb
3-Sep	28-Feb
4-Sep	28-Feb
5-Sep	28-Feb
6-Sep	28-Feb
7-Sep	28-Feb
8-Sep	28-Feb
9-Sep	28-Feb
10-Sep	28-Feb
11-Sep	28-Feb
12-Sep	28-Feb
13-Sep	28-Feb
14-Sep	28-Feb
15-Sep	28-Feb
16-Sep	28-Feb

17-Sep	28-Feb
18-Sep	28-Feb
19-Sep	28-Feb
20-Sep	28-Feb
21-Sep	28-Feb
22-Sep	28-Feb
23-Sep	28-Feb
24-Sep	28-Feb
25-Sep	30-Apr
26-Sep	30-Apr
27-Sep	30-Apr
28-Sep	30-Apr
29-Sep	30-Apr
30-Sep	30-Apr
1-Oct	30-Apr
2-Oct	30-Apr
3-Oct	30-Apr
4-Oct	30-Apr
5-Oct	30-Apr
6-Oct	30-Apr
7-Oct	30-Apr
8-Oct	30-Apr
9-Oct	30-Apr

Supplementary Table S8

Norway

Infection date Following year optimal booster date

10-Oct	10-Oct
11-Oct	10-Oct
12-Oct	10-Oct
13-Oct	10-Oct
14-Oct	10-Oct
15-Oct	10-Oct
16-Oct	11-Oct
17-Oct	11-Oct
18-Oct	11-Oct
19-Oct	11-Oct
20-Oct	11-Oct
21-Oct	11-Oct
22-Oct	11-Oct
23-Oct	12-Oct
24-Oct	12-Oct
25-Oct	12-Oct
26-Oct	12-Oct
27-Oct	12-Oct
28-Oct	12-Oct
29-Oct	13-Oct
30-Oct	13-Oct
31-Oct	13-Oct
1-Nov	13-Oct
2-Nov	13-Oct
3-Nov	13-Oct
4-Nov	13-Oct
5-Nov	14-Oct
6-Nov	14-Oct
7-Nov	14-Oct
8-Nov	14-Oct
9-Nov	14-Oct
10-Nov	14-Oct
11-Nov	14-Oct
12-Nov	15-Oct
13-Nov	15-Oct
14-Nov	15-Oct
15-Nov	15-Oct
16-Nov	15-Oct
17-Nov	15-Oct
18-Nov	15-Oct
19-Nov	16-Oct

20-Nov	16-Oct
21-Nov	16-Oct
22-Nov	16-Oct
23-Nov	16-Oct
24-Nov	16-Oct
25-Nov	16-Oct
26-Nov	17-Oct
27-Nov	17-Oct
28-Nov	17-Oct
29-Nov	17-Oct
30-Nov	17-Oct
1-Dec	17-Oct
2-Dec	17-Oct
3-Dec	17-Oct
4-Dec	17-Oct
5-Dec	17-Oct
6-Dec	17-Oct
7-Dec	17-Oct
8-Dec	17-Oct
9-Dec	17-Oct
10-Dec	17-Oct
11-Dec	17-Oct
12-Dec	17-Oct
13-Dec	17-Oct
14-Dec	17-Oct
15-Dec	17-Oct
16-Dec	17-Oct
17-Dec	17-Oct
18-Dec	17-Oct
19-Dec	17-Oct
20-Dec	17-Oct
21-Dec	17-Oct
22-Dec	17-Oct
23-Dec	17-Oct
24-Dec	17-Oct
25-Dec	17-Oct
26-Dec	17-Oct
27-Dec	18-Oct
28-Dec	18-Oct
29-Dec	18-Oct
30-Dec	18-Oct
31-Dec	18-Oct
1-Jan	18-Oct

2-Jan	18-Oct
3-Jan	18-Oct
4-Jan	18-Oct
5-Jan	18-Oct
6-Jan	18-Oct
7-Jan	18-Oct
8-Jan	18-Oct
9-Jan	18-Oct
10-Jan	18-Oct
11-Jan	18-Oct
12-Jan	18-Oct
13-Jan	18-Oct
14-Jan	18-Oct
15-Jan	18-Oct
16-Jan	18-Oct
17-Jan	18-Oct
18-Jan	18-Oct
19-Jan	18-Oct
20-Jan	18-Oct
21-Jan	18-Oct
22-Jan	18-Oct
23-Jan	18-Oct
24-Jan	18-Oct
25-Jan	18-Oct
26-Jan	18-Oct
27-Jan	18-Oct
28-Jan	18-Oct
29-Jan	18-Oct
30-Jan	18-Oct
31-Jan	18-Oct
1-Feb	18-Oct
2-Feb	18-Oct
3-Feb	19-Oct
4-Feb	19-Oct
5-Feb	19-Oct
6-Feb	19-Oct
7-Feb	19-Oct
8-Feb	19-Oct
9-Feb	19-Oct
10-Feb	19-Oct
11-Feb	19-Oct
12-Feb	19-Oct
13-Feb	19-Oct

14-Feb	19-Oct
15-Feb	19-Oct
16-Feb	19-Oct
17-Feb	19-Oct
18-Feb	19-Oct
19-Feb	19-Oct
20-Feb	19-Oct
21-Feb	19-Oct
22-Feb	19-Oct
23-Feb	19-Oct
24-Feb	19-Oct
25-Feb	19-Oct
26-Feb	19-Oct
27-Feb	19-Oct
28-Feb	19-Oct
1-Mar	19-Oct
2-Mar	19-Oct
3-Mar	19-Oct
4-Mar	19-Oct
5-Mar	19-Oct
6-Mar	19-Oct
7-Mar	19-Oct
8-Mar	19-Oct
9-Mar	19-Oct
10-Mar	19-Oct
11-Mar	19-Oct
12-Mar	19-Oct
13-Mar	19-Oct
14-Mar	19-Oct
15-Mar	19-Oct
16-Mar	19-Oct
17-Mar	19-Oct
18-Mar	19-Oct
19-Mar	19-Oct
20-Mar	19-Oct
21-Mar	19-Oct
22-Mar	19-Oct
23-Mar	19-Oct
24-Mar	19-Oct
25-Mar	20-Oct
26-Mar	20-Oct
27-Mar	20-Oct
28-Mar	20-Oct

29-Mar	20-Oct
30-Mar	20-Oct
31-Mar	20-Oct
1-Apr	20-Oct
2-Apr	20-Oct
3-Apr	20-Oct
4-Apr	20-Oct
5-Apr	20-Oct
6-Apr	20-Oct
7-Apr	20-Oct
8-Apr	20-Oct
9-Apr	20-Oct
10-Apr	20-Oct
11-Apr	20-Oct
12-Apr	20-Oct
13-Apr	20-Oct
14-Apr	20-Oct
15-Apr	20-Oct
16-Apr	20-Oct
17-Apr	20-Oct
18-Apr	20-Oct
19-Apr	20-Oct
20-Apr	20-Oct
21-Apr	20-Oct
22-Apr	20-Oct
23-Apr	20-Oct
24-Apr	20-Oct
25-Apr	20-Oct
26-Apr	20-Oct
27-Apr	20-Oct
28-Apr	20-Oct
29-Apr	20-Oct
30-Apr	20-Oct
1-May	20-Oct
2-May	20-Oct
3-May	20-Oct
4-May	20-Oct
5-May	20-Oct
6-May	20-Oct
7-May	20-Oct
8-May	20-Oct
9-May	20-Oct
10-May	20-Oct

11-May	20-Oct
12-May	20-Oct
13-May	20-Oct
14-May	20-Oct
15-May	20-Oct
16-May	20-Oct
17-May	20-Oct
18-May	20-Oct
19-May	20-Oct
20-May	20-Oct
21-May	20-Oct
22-May	20-Oct
23-May	20-Oct
24-May	20-Oct
25-May	20-Oct
26-May	20-Oct
27-May	20-Oct
28-May	20-Oct
29-May	20-Oct
30-May	20-Oct
31-May	20-Oct
1-Jun	20-Oct
2-Jun	20-Oct
3-Jun	20-Oct
4-Jun	20-Oct
5-Jun	20-Oct
6-Jun	20-Oct
7-Jun	20-Oct
8-Jun	18-Nov
9-Jun	18-Nov
10-Jun	18-Nov
11-Jun	18-Nov
12-Jun	19-Nov
13-Jun	19-Nov
14-Jun	19-Nov
15-Jun	19-Nov
16-Jun	19-Nov
17-Jun	19-Nov
18-Jun	19-Nov
19-Jun	19-Nov
20-Jun	19-Nov
21-Jun	31-Dec
22-Jun	31-Dec

23-Jun	31-Dec
24-Jun	31-Dec
25-Jun	31-Dec
26-Jun	31-Dec
27-Jun	31-Dec
28-Jun	31-Dec
29-Jun	31-Dec
30-Jun	31-Dec
1-Jul	31-Dec
2-Jul	31-Dec
3-Jul	31-Dec
4-Jul	31-Dec
5-Jul	31-Dec
6-Jul	31-Dec
7-Jul	31-Dec
8-Jul	31-Dec
9-Jul	31-Dec
10-Jul	31-Dec
11-Jul	31-Dec
12-Jul	31-Dec
13-Jul	31-Dec
14-Jul	31-Dec
15-Jul	31-Dec
16-Jul	1-Jan
17-Jul	1-Jan
18-Jul	2-Jan
19-Jul	2-Jan
20-Jul	3-Jan
21-Jul	3-Jan
22-Jul	4-Jan
23-Jul	4-Jan
24-Jul	5-Jan
25-Jul	6-Jan
26-Jul	6-Jan
27-Jul	7-Jan
28-Jul	7-Jan
29-Jul	7-Jan
30-Jul	8-Jan
31-Jul	8-Jan
1-Aug	8-Jan
2-Aug	9-Jan
3-Aug	9-Jan
4-Aug	10-Jan

5-Aug	10-Jan
6-Aug	10-Jan
7-Aug	11-Jan
8-Aug	11-Jan
9-Aug	11-Jan
10-Aug	12-Jan
11-Aug	12-Jan
12-Aug	12-Jan
13-Aug	13-Jan
14-Aug	13-Jan
15-Aug	13-Jan
16-Aug	14-Jan
17-Aug	14-Jan
18-Aug	28-Feb
19-Aug	28-Feb
20-Aug	28-Feb
21-Aug	28-Feb
22-Aug	28-Feb
23-Aug	28-Feb
24-Aug	28-Feb
25-Aug	28-Feb
26-Aug	28-Feb
27-Aug	28-Feb
28-Aug	28-Feb
29-Aug	28-Feb
30-Aug	28-Feb
31-Aug	28-Feb
1-Sep	28-Feb
2-Sep	28-Feb
3-Sep	28-Feb
4-Sep	28-Feb
5-Sep	28-Feb
6-Sep	28-Feb
7-Sep	28-Feb
8-Sep	28-Feb
9-Sep	28-Feb
10-Sep	28-Feb
11-Sep	28-Feb
12-Sep	28-Feb
13-Sep	28-Feb
14-Sep	28-Feb
15-Sep	28-Feb
16-Sep	28-Feb

17-Sep	28-Feb
18-Sep	28-Feb
19-Sep	28-Feb
20-Sep	28-Feb
21-Sep	28-Feb
22-Sep	28-Feb
23-Sep	28-Feb
24-Sep	28-Feb
25-Sep	30-Apr
26-Sep	30-Apr
27-Sep	30-Apr
28-Sep	30-Apr
29-Sep	30-Apr
30-Sep	30-Apr
1-Oct	30-Apr
2-Oct	30-Apr
3-Oct	30-Apr
4-Oct	30-Apr
5-Oct	30-Apr
6-Oct	30-Apr
7-Oct	30-Apr
8-Oct	30-Apr
9-Oct	30-Apr

Supplementary Table S9

Netherlands

Infection date Following year optimal booster date

22-Oct	22-Oct
23-Oct	22-Oct
24-Oct	22-Oct
25-Oct	23-Oct
26-Oct	23-Oct
27-Oct	23-Oct
28-Oct	24-Oct
29-Oct	24-Oct
30-Oct	24-Oct
31-Oct	25-Oct
1-Nov	25-Oct
2-Nov	25-Oct
3-Nov	26-Oct
4-Nov	26-Oct
5-Nov	26-Oct
6-Nov	27-Oct
7-Nov	27-Oct
8-Nov	27-Oct
9-Nov	28-Oct
10-Nov	28-Oct
11-Nov	28-Oct
12-Nov	29-Oct
13-Nov	29-Oct
14-Nov	29-Oct
15-Nov	30-Oct
16-Nov	30-Oct
17-Nov	30-Oct
18-Nov	31-Oct
19-Nov	1-Nov
20-Nov	1-Nov
21-Nov	2-Nov
22-Nov	2-Nov
23-Nov	3-Nov
24-Nov	3-Nov
25-Nov	4-Nov
26-Nov	4-Nov
27-Nov	5-Nov
28-Nov	5-Nov
29-Nov	6-Nov
30-Nov	6-Nov
1-Dec	6-Nov

2-Dec	7-Nov
3-Dec	7-Nov
4-Dec	7-Nov
5-Dec	8-Nov
6-Dec	8-Nov
7-Dec	8-Nov
8-Dec	9-Nov
9-Dec	9-Nov
10-Dec	9-Nov
11-Dec	10-Nov
12-Dec	10-Nov
13-Dec	10-Nov
14-Dec	11-Nov
15-Dec	11-Nov
16-Dec	11-Nov
17-Dec	12-Nov
18-Dec	12-Nov
19-Dec	12-Nov
20-Dec	13-Nov
21-Dec	13-Nov
22-Dec	13-Nov
23-Dec	14-Nov
24-Dec	14-Nov
25-Dec	14-Nov
26-Dec	15-Nov
27-Dec	15-Nov
28-Dec	15-Nov
29-Dec	16-Nov
30-Dec	16-Nov
31-Dec	16-Nov
1-Jan	16-Nov
2-Jan	16-Nov
3-Jan	16-Nov
4-Jan	16-Nov
5-Jan	17-Nov
6-Jan	17-Nov
7-Jan	17-Nov
8-Jan	17-Nov
9-Jan	17-Nov
10-Jan	17-Nov
11-Jan	17-Nov
12-Jan	18-Nov
13-Jan	18-Nov

14-Jan	18-Nov
15-Jan	18-Nov
16-Jan	18-Nov
17-Jan	18-Nov
18-Jan	18-Nov
19-Jan	18-Nov
20-Jan	19-Nov
21-Jan	19-Nov
22-Jan	19-Nov
23-Jan	19-Nov
24-Jan	19-Nov
25-Jan	19-Nov
26-Jan	19-Nov
27-Jan	19-Nov
28-Jan	20-Nov
29-Jan	20-Nov
30-Jan	20-Nov
31-Jan	20-Nov
1-Feb	20-Nov
2-Feb	20-Nov
3-Feb	20-Nov
4-Feb	21-Nov
5-Feb	21-Nov
6-Feb	21-Nov
7-Feb	21-Nov
8-Feb	21-Nov
9-Feb	21-Nov
10-Feb	21-Nov
11-Feb	21-Nov
12-Feb	22-Nov
13-Feb	22-Nov
14-Feb	22-Nov
15-Feb	22-Nov
16-Feb	22-Nov
17-Feb	22-Nov
18-Feb	22-Nov
19-Feb	22-Nov
20-Feb	22-Nov
21-Feb	23-Nov
22-Feb	23-Nov
23-Feb	23-Nov
24-Feb	23-Nov
25-Feb	23-Nov

26-Feb	23-Nov
27-Feb	24-Nov
28-Feb	24-Nov
1-Mar	24-Nov
2-Mar	24-Nov
3-Mar	24-Nov
4-Mar	24-Nov
5-Mar	24-Nov
6-Mar	25-Nov
7-Mar	25-Nov
8-Mar	25-Nov
9-Mar	25-Nov
10-Mar	8-Dec
11-Mar	8-Dec
12-Mar	9-Dec
13-Mar	9-Dec
14-Mar	10-Dec
15-Mar	10-Dec
16-Mar	11-Dec
17-Mar	11-Dec
18-Mar	12-Dec
19-Mar	12-Dec
20-Mar	13-Dec
21-Mar	13-Dec
22-Mar	14-Dec
23-Mar	14-Dec
24-Mar	15-Dec
25-Mar	15-Dec
26-Mar	16-Dec
27-Mar	16-Dec
28-Mar	17-Dec
29-Mar	17-Dec
30-Mar	18-Dec
31-Mar	18-Dec
1-Apr	19-Dec
2-Apr	19-Dec
3-Apr	20-Dec
4-Apr	20-Dec
5-Apr	21-Dec
6-Apr	21-Dec
7-Apr	21-Dec
8-Apr	22-Dec
9-Apr	22-Dec

10-Apr	23-Dec
11-Apr	23-Dec
12-Apr	24-Dec
13-Apr	24-Dec
14-Apr	25-Dec
15-Apr	25-Dec
16-Apr	26-Dec
17-Apr	26-Dec
18-Apr	27-Dec
19-Apr	27-Dec
20-Apr	28-Dec
21-Apr	28-Dec
22-Apr	29-Dec
23-Apr	29-Dec
24-Apr	30-Dec
25-Apr	30-Dec
26-Apr	31-Dec
27-Apr	1-Jan
28-Apr	1-Jan
29-Apr	2-Jan
30-Apr	2-Jan
1-May	3-Jan
2-May	3-Jan
3-May	4-Jan
4-May	4-Jan
5-May	5-Jan
6-May	5-Jan
7-May	6-Jan
8-May	7-Jan
9-May	7-Jan
10-May	7-Jan
11-May	8-Jan
12-May	8-Jan
13-May	9-Jan
14-May	9-Jan
15-May	9-Jan
16-May	10-Jan
17-May	10-Jan
18-May	11-Jan
19-May	11-Jan
20-May	11-Jan
21-May	12-Jan
22-May	12-Jan

23-May	13-Jan
24-May	13-Jan
25-May	14-Jan
26-May	14-Jan
27-May	14-Jan
28-May	15-Jan
29-May	15-Jan
30-May	16-Jan
31-May	16-Jan
1-Jun	16-Jan
2-Jun	17-Jan
3-Jun	17-Jan
4-Jun	17-Jan
5-Jun	17-Jan
6-Jun	17-Jan
7-Jun	18-Jan
8-Jun	18-Jan
9-Jun	18-Jan
10-Jun	18-Jan
11-Jun	18-Jan
12-Jun	19-Jan
13-Jun	19-Jan
14-Jun	19-Jan
15-Jun	19-Jan
16-Jun	19-Jan
17-Jun	20-Jan
18-Jun	20-Jan
19-Jun	20-Jan
20-Jun	20-Jan
21-Jun	20-Jan
22-Jun	21-Jan
23-Jun	21-Jan
24-Jun	21-Jan
25-Jun	21-Jan
26-Jun	21-Jan
27-Jun	21-Jan
28-Jun	22-Jan
29-Jun	22-Jan
30-Jun	22-Jan
1-Jul	22-Jan
2-Jul	22-Jan
3-Jul	23-Jan
4-Jul	23-Jan

5-Jul	23-Jan
6-Jul	23-Jan
7-Jul	23-Jan
8-Jul	23-Jan
9-Jul	24-Jan
10-Jul	24-Jan
11-Jul	24-Jan
12-Jul	24-Jan
13-Jul	25-Jan
14-Jul	25-Jan
15-Jul	25-Jan
16-Jul	25-Jan
17-Jul	25-Jan
18-Jul	8-Feb
19-Jul	9-Feb
20-Jul	9-Feb
21-Jul	10-Feb
22-Jul	10-Feb
23-Jul	11-Feb
24-Jul	11-Feb
25-Jul	12-Feb
26-Jul	12-Feb
27-Jul	13-Feb
28-Jul	14-Feb
29-Jul	15-Feb
30-Jul	15-Feb
31-Jul	16-Feb
1-Aug	17-Feb
2-Aug	18-Feb
3-Aug	19-Feb
4-Aug	19-Feb
5-Aug	20-Feb
6-Aug	21-Feb
7-Aug	22-Feb
8-Aug	22-Feb
9-Aug	23-Feb
10-Aug	24-Feb
11-Aug	25-Feb
12-Aug	25-Feb
13-Aug	26-Feb
14-Aug	27-Feb
15-Aug	27-Feb
16-Aug	28-Feb

17-Aug	28-Feb
18-Aug	28-Feb
19-Aug	28-Feb
20-Aug	28-Feb
21-Aug	28-Feb
22-Aug	28-Feb
23-Aug	28-Feb
24-Aug	28-Feb
25-Aug	1-Mar
26-Aug	1-Mar
27-Aug	2-Mar
28-Aug	2-Mar
29-Aug	3-Mar
30-Aug	3-Mar
31-Aug	4-Mar
1-Sep	4-Mar
2-Sep	5-Mar
3-Sep	5-Mar
4-Sep	6-Mar
5-Sep	6-Mar
6-Sep	7-Mar
7-Sep	8-Mar
8-Sep	9-Mar
9-Sep	9-Mar
10-Sep	10-Mar
11-Sep	11-Mar
12-Sep	11-Mar
13-Sep	12-Mar
14-Sep	13-Mar
15-Sep	14-Mar
16-Sep	31-Mar
17-Sep	31-Mar
18-Sep	31-Mar
19-Sep	31-Mar
20-Sep	31-Mar
21-Sep	31-Mar
22-Sep	31-Mar
23-Sep	31-Mar
24-Sep	31-Mar
25-Sep	31-Mar
26-Sep	31-Mar
27-Sep	31-Mar
28-Sep	31-Mar

29-Sep	31-Mar
30-Sep	31-Mar
1-Oct	31-Mar
2-Oct	31-Mar
3-Oct	31-Mar
4-Oct	31-Mar
5-Oct	31-Mar
6-Oct	31-Mar
7-Oct	31-Mar
8-Oct	31-Mar
9-Oct	31-Mar
10-Oct	31-Mar
11-Oct	31-Mar
12-Oct	31-Mar
13-Oct	31-Mar
14-Oct	31-Mar
15-Oct	31-Mar
16-Oct	31-Mar
17-Oct	31-Mar
18-Oct	1-Apr
19-Oct	1-Apr
20-Oct	2-Apr
21-Oct	3-Apr

Supplementary Table S10

Sweden

Infection date Following year optimal booster date

14-Nov	14-Nov
15-Nov	14-Nov
16-Nov	14-Nov
17-Nov	14-Nov
18-Nov	14-Nov
19-Nov	15-Nov
20-Nov	15-Nov
21-Nov	15-Nov
22-Nov	15-Nov
23-Nov	15-Nov
24-Nov	15-Nov
25-Nov	15-Nov
26-Nov	15-Nov
27-Nov	15-Nov
28-Nov	16-Nov
29-Nov	16-Nov
30-Nov	16-Nov
1-Dec	16-Nov
2-Dec	16-Nov
3-Dec	16-Nov
4-Dec	16-Nov
5-Dec	16-Nov
6-Dec	16-Nov
7-Dec	16-Nov
8-Dec	16-Nov
9-Dec	16-Nov
10-Dec	16-Nov
11-Dec	16-Nov
12-Dec	16-Nov
13-Dec	16-Nov
14-Dec	16-Nov
15-Dec	16-Nov
16-Dec	16-Nov
17-Dec	16-Nov
18-Dec	16-Nov
19-Dec	16-Nov
20-Dec	16-Nov
21-Dec	16-Nov
22-Dec	16-Nov
23-Dec	16-Nov
24-Dec	16-Nov

25-Dec	16-Nov
26-Dec	16-Nov
27-Dec	16-Nov
28-Dec	16-Nov
29-Dec	16-Nov
30-Dec	16-Nov
31-Dec	16-Nov
1-Jan	16-Nov
2-Jan	16-Nov
3-Jan	16-Nov
4-Jan	16-Nov
5-Jan	16-Nov
6-Jan	16-Nov
7-Jan	16-Nov
8-Jan	17-Nov
9-Jan	17-Nov
10-Jan	17-Nov
11-Jan	17-Nov
12-Jan	17-Nov
13-Jan	17-Nov
14-Jan	17-Nov
15-Jan	17-Nov
16-Jan	17-Nov
17-Jan	17-Nov
18-Jan	17-Nov
19-Jan	17-Nov
20-Jan	17-Nov
21-Jan	17-Nov
22-Jan	17-Nov
23-Jan	17-Nov
24-Jan	17-Nov
25-Jan	17-Nov
26-Jan	17-Nov
27-Jan	17-Nov
28-Jan	17-Nov
29-Jan	17-Nov
30-Jan	17-Nov
31-Jan	17-Nov
1-Feb	17-Nov
2-Feb	17-Nov
3-Feb	17-Nov
4-Feb	17-Nov
5-Feb	17-Nov

6-Feb	17-Nov
7-Feb	17-Nov
8-Feb	17-Nov
9-Feb	17-Nov
10-Feb	17-Nov
11-Feb	17-Nov
12-Feb	17-Nov
13-Feb	17-Nov
14-Feb	17-Nov
15-Feb	17-Nov
16-Feb	17-Nov
17-Feb	17-Nov
18-Feb	17-Nov
19-Feb	17-Nov
20-Feb	17-Nov
21-Feb	17-Nov
22-Feb	17-Nov
23-Feb	17-Nov
24-Feb	17-Nov
25-Feb	17-Nov
26-Feb	17-Nov
27-Feb	17-Nov
28-Feb	17-Nov
1-Mar	18-Nov
2-Mar	18-Nov
3-Mar	18-Nov
4-Mar	18-Nov
5-Mar	18-Nov
6-Mar	18-Nov
7-Mar	18-Nov
8-Mar	18-Nov
9-Mar	18-Nov
10-Mar	18-Nov
11-Mar	18-Nov
12-Mar	18-Nov
13-Mar	18-Nov
14-Mar	18-Nov
15-Mar	18-Nov
16-Mar	18-Nov
17-Mar	18-Nov
18-Mar	18-Nov
19-Mar	18-Nov
20-Mar	18-Nov

21-Mar	18-Nov
22-Mar	18-Nov
23-Mar	18-Nov
24-Mar	18-Nov
25-Mar	18-Nov
26-Mar	18-Nov
27-Mar	18-Nov
28-Mar	18-Nov
29-Mar	18-Nov
30-Mar	18-Nov
31-Mar	18-Nov
1-Apr	18-Nov
2-Apr	18-Nov
3-Apr	18-Nov
4-Apr	18-Nov
5-Apr	18-Nov
6-Apr	18-Nov
7-Apr	18-Nov
8-Apr	18-Nov
9-Apr	18-Nov
10-Apr	18-Nov
11-Apr	18-Nov
12-Apr	18-Nov
13-Apr	18-Nov
14-Apr	18-Nov
15-Apr	18-Nov
16-Apr	18-Nov
17-Apr	18-Nov
18-Apr	18-Nov
19-Apr	18-Nov
20-Apr	18-Nov
21-Apr	18-Nov
22-Apr	18-Nov
23-Apr	18-Nov
24-Apr	18-Nov
25-Apr	18-Nov
26-Apr	18-Nov
27-Apr	18-Nov
28-Apr	18-Nov
29-Apr	18-Nov
30-Apr	18-Nov
1-May	18-Nov
2-May	18-Nov

3-May	18-Nov
4-May	18-Nov
5-May	18-Nov
6-May	18-Nov
7-May	18-Nov
8-May	18-Nov
9-May	18-Nov
10-May	18-Nov
11-May	18-Nov
12-May	18-Nov
13-May	18-Nov
14-May	18-Nov
15-May	18-Nov
16-May	18-Nov
17-May	18-Nov
18-May	18-Nov
19-May	18-Nov
20-May	18-Nov
21-May	18-Nov
22-May	19-Nov
23-May	19-Nov
24-May	19-Nov
25-May	19-Nov
26-May	19-Nov
27-May	19-Nov
28-May	19-Nov
29-May	19-Nov
30-May	19-Nov
31-May	19-Nov
1-Jun	19-Nov
2-Jun	19-Nov
3-Jun	19-Nov
4-Jun	19-Nov
5-Jun	19-Nov
6-Jun	19-Nov
7-Jun	19-Nov
8-Jun	19-Nov
9-Jun	19-Nov
10-Jun	19-Nov
11-Jun	19-Nov
12-Jun	19-Nov
13-Jun	19-Nov
14-Jun	19-Nov

15-Jun	19-Nov
16-Jun	19-Nov
17-Jun	19-Nov
18-Jun	19-Nov
19-Jun	19-Nov
20-Jun	19-Nov
21-Jun	19-Nov
22-Jun	19-Nov
23-Jun	19-Nov
24-Jun	19-Nov
25-Jun	19-Nov
26-Jun	19-Nov
27-Jun	19-Nov
28-Jun	19-Nov
29-Jun	19-Nov
30-Jun	19-Nov
1-Jul	19-Nov
2-Jul	19-Nov
3-Jul	19-Nov
4-Jul	19-Nov
5-Jul	19-Nov
6-Jul	19-Nov
7-Jul	19-Nov
8-Jul	19-Nov
9-Jul	19-Nov
10-Jul	19-Nov
11-Jul	19-Nov
12-Jul	22-Dec
13-Jul	22-Dec
14-Jul	22-Dec
15-Jul	23-Dec
16-Jul	23-Dec
17-Jul	14-Jan
18-Jul	15-Jan
19-Jul	15-Jan
20-Jul	28-Feb
21-Jul	28-Feb
22-Jul	28-Feb
23-Jul	28-Feb
24-Jul	28-Feb
25-Jul	28-Feb
26-Jul	28-Feb
27-Jul	28-Feb

28-Jul	31-Mar
29-Jul	31-Mar
30-Jul	31-Mar
31-Jul	31-Mar
1-Aug	31-Mar
2-Aug	31-Mar
3-Aug	31-Mar
4-Aug	31-Mar
5-Aug	31-Mar
6-Aug	31-Mar
7-Aug	31-Mar
8-Aug	31-Mar
9-Aug	31-Mar
10-Aug	31-Mar
11-Aug	31-Mar
12-Aug	31-Mar
13-Aug	31-Mar
14-Aug	31-Mar
15-Aug	31-Mar
16-Aug	31-Mar
17-Aug	31-Mar
18-Aug	31-Mar
19-Aug	31-Mar
20-Aug	31-Mar
21-Aug	31-Mar
22-Aug	31-Mar
23-Aug	31-Mar
24-Aug	31-Mar
25-Aug	31-Mar
26-Aug	31-Mar
27-Aug	31-Mar
28-Aug	31-Mar
29-Aug	31-Mar
30-Aug	31-Mar
31-Aug	31-Mar
1-Sep	31-Mar
2-Sep	31-Mar
3-Sep	31-Mar
4-Sep	31-Mar
5-Sep	31-Mar
6-Sep	31-Mar
7-Sep	31-Mar
8-Sep	31-Mar

9-Sep	1-Apr
10-Sep	1-Apr
11-Sep	2-Apr
12-Sep	2-Apr
13-Sep	3-Apr
14-Sep	3-Apr
15-Sep	4-Apr
16-Sep	4-Apr
17-Sep	5-Apr
18-Sep	5-Apr
19-Sep	6-Apr
20-Sep	6-Apr
21-Sep	7-Apr
22-Sep	7-Apr
23-Sep	7-Apr
24-Sep	8-Apr
25-Sep	8-Apr
26-Sep	9-Apr
27-Sep	9-Apr
28-Sep	9-Apr
29-Sep	10-Apr
30-Sep	10-Apr
1-Oct	11-Apr
2-Oct	11-Apr
3-Oct	11-Apr
4-Oct	12-Apr
5-Oct	12-Apr
6-Oct	12-Apr
7-Oct	13-Apr
8-Oct	13-Apr
9-Oct	14-Apr
10-Oct	14-Apr
11-Oct	14-Apr
12-Oct	15-Apr
13-Oct	15-Apr
14-Oct	16-Apr
15-Oct	16-Apr
16-Oct	16-Apr
17-Oct	16-Apr
18-Oct	16-Apr
19-Oct	16-Apr
20-Oct	17-Apr
21-Oct	17-Apr

22-Oct	17-Apr
23-Oct	17-Apr
24-Oct	17-Apr
25-Oct	17-Apr
26-Oct	18-Apr
27-Oct	18-Apr
28-Oct	18-Apr
29-Oct	18-Apr
30-Oct	18-Apr
31-Oct	18-Apr
1-Nov	18-Apr
2-Nov	19-Apr
3-Nov	19-Apr
4-Nov	19-Apr
5-Nov	19-Apr
6-Nov	19-Apr
7-Nov	19-Apr
8-Nov	20-Apr
9-Nov	20-Apr
10-Nov	20-Apr
11-Nov	20-Apr
12-Nov	20-Apr
13-Nov	20-Apr

Supplementary Table S11

Israel

Infection date Following year optimal booster date

21-Feb	21-Feb
22-Feb	21-Feb
23-Feb	21-Feb
24-Feb	21-Feb
25-Feb	21-Feb
26-Feb	21-Feb
27-Feb	21-Feb
28-Feb	21-Feb
1-Mar	21-Feb
2-Mar	21-Feb
3-Mar	21-Feb
4-Mar	21-Feb
5-Mar	21-Feb
6-Mar	21-Feb
7-Mar	21-Feb
8-Mar	21-Feb
9-Mar	21-Feb
10-Mar	21-Feb
11-Mar	21-Feb
12-Mar	21-Feb
13-Mar	21-Feb
14-Mar	21-Feb
15-Mar	21-Feb
16-Mar	21-Feb
17-Mar	21-Feb
18-Mar	21-Feb
19-Mar	21-Feb
20-Mar	21-Feb
21-Mar	21-Feb
22-Mar	21-Feb
23-Mar	21-Feb
24-Mar	21-Feb
25-Mar	21-Feb
26-Mar	21-Feb
27-Mar	21-Feb
28-Mar	21-Feb
29-Mar	21-Feb
30-Mar	21-Feb
31-Mar	21-Feb
1-Apr	21-Feb
2-Apr	21-Feb

3-Apr	21-Feb
4-Apr	21-Feb
5-Apr	21-Feb
6-Apr	21-Feb
7-Apr	21-Feb
8-Apr	21-Feb
9-Apr	21-Feb
10-Apr	21-Feb
11-Apr	21-Feb
12-Apr	21-Feb
13-Apr	21-Feb
14-Apr	21-Feb
15-Apr	21-Feb
16-Apr	21-Feb
17-Apr	21-Feb
18-Apr	21-Feb
19-Apr	21-Feb
20-Apr	21-Feb
21-Apr	21-Feb
22-Apr	21-Feb
23-Apr	21-Feb
24-Apr	21-Feb
25-Apr	21-Feb
26-Apr	21-Feb
27-Apr	21-Feb
28-Apr	21-Feb
29-Apr	21-Feb
30-Apr	21-Feb
1-May	21-Feb
2-May	21-Feb
3-May	21-Feb
4-May	21-Feb
5-May	21-Feb
6-May	21-Feb
7-May	21-Feb
8-May	21-Feb
9-May	21-Feb
10-May	21-Feb
11-May	21-Feb
12-May	21-Feb
13-May	21-Feb
14-May	21-Feb
15-May	21-Feb

16-May	21-Feb
17-May	21-Feb
18-May	21-Feb
19-May	21-Feb
20-May	21-Feb
21-May	21-Feb
22-May	21-Feb
23-May	21-Feb
24-May	21-Feb
25-May	21-Feb
26-May	21-Mar
27-May	23-Mar
28-May	24-Mar
29-May	25-Mar
30-May	26-Mar
31-May	27-Mar
1-Jun	28-Mar
2-Jun	29-Mar
3-Jun	30-Mar
4-Jun	31-Mar
5-Jun	31-Mar
6-Jun	31-Mar
7-Jun	31-Mar
8-Jun	31-Mar
9-Jun	31-Mar
10-Jun	31-Mar
11-Jun	31-Mar
12-Jun	31-Mar
13-Jun	31-Mar
14-Jun	1-Apr
15-Jun	1-Apr
16-Jun	2-Apr
17-Jun	2-Apr
18-Jun	3-Apr
19-Jun	3-Apr
20-Jun	4-Apr
21-Jun	4-Apr
22-Jun	5-Apr
23-Jun	5-Apr
24-Jun	6-Apr
25-Jun	6-Apr
26-Jun	6-Apr
27-Jun	6-Apr

28-Jun	7-Apr
29-Jun	7-Apr
30-Jun	7-Apr
1-Jul	7-Apr
2-Jul	8-Apr
3-Jul	8-Apr
4-Jul	8-Apr
5-Jul	8-Apr
6-Jul	9-Apr
7-Jul	9-Apr
8-Jul	9-Apr
9-Jul	9-Apr
10-Jul	10-Apr
11-Jul	10-Apr
12-Jul	10-Apr
13-Jul	10-Apr
14-Jul	11-Apr
15-Jul	11-Apr
16-Jul	11-Apr
17-Jul	11-Apr
18-Jul	12-Apr
19-Jul	12-Apr
20-Jul	12-Apr
21-Jul	12-Apr
22-Jul	13-Apr
23-Jul	13-Apr
24-Jul	13-Apr
25-Jul	13-Apr
26-Jul	14-Apr
27-Jul	14-Apr
28-Jul	14-Apr
29-Jul	14-Apr
30-Jul	14-Apr
31-Jul	15-Apr
1-Aug	15-Apr
2-Aug	15-Apr
3-Aug	15-Apr
4-Aug	16-Apr
5-Aug	16-Apr
6-Aug	16-Apr
7-Aug	16-Apr
8-Aug	16-Apr
9-Aug	16-Apr

10-Aug	16-Apr
11-Aug	16-Apr
12-Aug	16-Apr
13-Aug	16-Apr
14-Aug	16-Apr
15-Aug	16-Apr
16-Aug	16-Apr
17-Aug	16-Apr
18-Aug	16-Apr
19-Aug	16-Apr
20-Aug	17-Apr
21-Aug	17-Apr
22-Aug	17-Apr
23-Aug	17-Apr
24-Aug	17-Apr
25-Aug	17-Apr
26-Aug	17-Apr
27-Aug	10-Jul
28-Aug	10-Jul
29-Aug	10-Jul
30-Aug	10-Jul
31-Aug	10-Jul
1-Sep	10-Jul
2-Sep	10-Jul
3-Sep	10-Jul
4-Sep	10-Jul
5-Sep	10-Jul
6-Sep	10-Jul
7-Sep	10-Jul
8-Sep	10-Jul
9-Sep	10-Jul
10-Sep	10-Jul
11-Sep	10-Jul
12-Sep	10-Jul
13-Sep	10-Jul
14-Sep	11-Jul
15-Sep	11-Jul
16-Sep	11-Jul
17-Sep	11-Jul
18-Sep	11-Jul
19-Sep	11-Jul
20-Sep	11-Jul
21-Sep	11-Jul

22-Sep	11-Jul
23-Sep	11-Jul
24-Sep	11-Jul
25-Sep	11-Jul
26-Sep	11-Jul
27-Sep	11-Jul
28-Sep	11-Jul
29-Sep	11-Jul
30-Sep	11-Jul
1-Oct	11-Jul
2-Oct	11-Jul
3-Oct	11-Jul
4-Oct	11-Jul
5-Oct	11-Jul
6-Oct	11-Jul
7-Oct	11-Jul
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9-Oct	11-Jul
10-Oct	11-Jul
11-Oct	11-Jul
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13-Oct	11-Jul
14-Oct	12-Jul
15-Oct	12-Jul
16-Oct	12-Jul
17-Oct	12-Jul
18-Oct	12-Jul
19-Oct	12-Jul
20-Oct	12-Jul
21-Oct	12-Jul
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23-Oct	12-Jul
24-Oct	12-Jul
25-Oct	12-Jul
26-Oct	12-Jul
27-Oct	12-Jul
28-Oct	12-Jul
29-Oct	12-Jul
30-Oct	12-Jul
31-Oct	12-Jul
1-Nov	12-Jul
2-Nov	12-Jul
3-Nov	12-Jul

4-Nov	12-Jul
5-Nov	12-Jul
6-Nov	12-Jul
7-Nov	12-Jul
8-Nov	12-Jul
9-Nov	12-Jul
10-Nov	12-Jul
11-Nov	12-Jul
12-Nov	12-Jul
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15-Nov	12-Jul
16-Nov	12-Jul
17-Nov	12-Jul
18-Nov	12-Jul
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25-Nov	13-Jul
26-Nov	13-Jul
27-Nov	13-Jul
28-Nov	13-Jul
29-Nov	13-Jul
30-Nov	13-Jul
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2-Dec	13-Jul
3-Dec	13-Jul
4-Dec	13-Jul
5-Dec	13-Jul
6-Dec	13-Jul
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8-Dec	13-Jul
9-Dec	13-Jul
10-Dec	13-Jul
11-Dec	13-Jul
12-Dec	13-Jul
13-Dec	13-Jul
14-Dec	13-Jul
15-Dec	13-Jul
16-Dec	13-Jul

17-Dec	13-Jul
18-Dec	13-Jul
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22-Dec	13-Jul
23-Dec	13-Jul
24-Dec	13-Jul
25-Dec	13-Jul
26-Dec	13-Jul
27-Dec	13-Jul
28-Dec	13-Jul
29-Dec	13-Jul
30-Dec	13-Jul
31-Dec	13-Jul
1-Jan	13-Jul
2-Jan	13-Jul
3-Jan	13-Jul
4-Jan	13-Jul
5-Jan	13-Jul
6-Jan	13-Jul
7-Jan	13-Jul
8-Jan	13-Jul
9-Jan	13-Jul
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11-Jan	13-Jul
12-Jan	13-Jul
13-Jan	13-Jul
14-Jan	13-Jul
15-Jan	13-Jul
16-Jan	13-Jul
17-Jan	14-Jul
18-Jan	14-Jul
19-Jan	14-Jul
20-Jan	14-Jul
21-Jan	14-Jul
22-Jan	14-Jul
23-Jan	14-Jul
24-Jan	14-Jul
25-Jan	14-Jul
26-Jan	14-Jul
27-Jan	14-Jul
28-Jan	14-Jul

29-Jan	14-Jul
30-Jan	14-Jul
31-Jan	14-Jul
1-Feb	14-Jul
2-Feb	14-Jul
3-Feb	14-Jul
4-Feb	14-Jul
5-Feb	14-Jul
6-Feb	14-Jul
7-Feb	14-Jul
8-Feb	14-Jul
9-Feb	14-Jul
10-Feb	14-Jul
11-Feb	14-Jul
12-Feb	14-Jul
13-Feb	14-Jul
14-Feb	14-Jul
15-Feb	14-Jul
16-Feb	14-Jul
17-Feb	14-Jul
18-Feb	14-Jul
19-Feb	14-Jul
20-Feb	14-Jul

Supplementary Table S12

Edinburgh

Infection date Following year optimal booster date

9-Oct	9-Oct
10-Oct	9-Oct
11-Oct	9-Oct
12-Oct	9-Oct
13-Oct	9-Oct
14-Oct	9-Oct
15-Oct	10-Oct
16-Oct	10-Oct
17-Oct	10-Oct
18-Oct	10-Oct
19-Oct	10-Oct
20-Oct	10-Oct
21-Oct	10-Oct
22-Oct	11-Oct
23-Oct	11-Oct
24-Oct	11-Oct
25-Oct	11-Oct
26-Oct	11-Oct
27-Oct	11-Oct
28-Oct	12-Oct
29-Oct	12-Oct
30-Oct	12-Oct
31-Oct	12-Oct
1-Nov	12-Oct
2-Nov	12-Oct
3-Nov	12-Oct
4-Nov	13-Oct
5-Nov	13-Oct
6-Nov	13-Oct
7-Nov	13-Oct
8-Nov	13-Oct
9-Nov	13-Oct
10-Nov	13-Oct
11-Nov	14-Oct
12-Nov	14-Oct
13-Nov	14-Oct
14-Nov	14-Oct
15-Nov	14-Oct
16-Nov	14-Oct
17-Nov	14-Oct
18-Nov	15-Oct

19-Nov	15-Oct
20-Nov	15-Oct
21-Nov	15-Oct
22-Nov	15-Oct
23-Nov	15-Oct
24-Nov	15-Oct
25-Nov	16-Oct
26-Nov	16-Oct
27-Nov	16-Oct
28-Nov	16-Oct
29-Nov	16-Oct
30-Nov	16-Oct
1-Dec	16-Oct
2-Dec	16-Oct
3-Dec	17-Oct
4-Dec	17-Oct
5-Dec	17-Oct
6-Dec	17-Oct
7-Dec	17-Oct
8-Dec	17-Oct
9-Dec	17-Oct
10-Dec	17-Oct
11-Dec	17-Oct
12-Dec	17-Oct
13-Dec	17-Oct
14-Dec	17-Oct
15-Dec	17-Oct
16-Dec	17-Oct
17-Dec	17-Oct
18-Dec	17-Oct
19-Dec	17-Oct
20-Dec	17-Oct
21-Dec	17-Oct
22-Dec	17-Oct
23-Dec	17-Oct
24-Dec	17-Oct
25-Dec	17-Oct
26-Dec	17-Oct
27-Dec	17-Oct
28-Dec	17-Oct
29-Dec	17-Oct
30-Dec	17-Oct
31-Dec	17-Oct

1-Jan	17-Oct
2-Jan	17-Oct
3-Jan	17-Oct
4-Jan	17-Oct
5-Jan	18-Oct
6-Jan	18-Oct
7-Jan	18-Oct
8-Jan	18-Oct
9-Jan	18-Oct
10-Jan	18-Oct
11-Jan	18-Oct
12-Jan	18-Oct
13-Jan	18-Oct
14-Jan	18-Oct
15-Jan	18-Oct
16-Jan	18-Oct
17-Jan	18-Oct
18-Jan	18-Oct
19-Jan	18-Oct
20-Jan	18-Oct
21-Jan	18-Oct
22-Jan	18-Oct
23-Jan	18-Oct
24-Jan	18-Oct
25-Jan	18-Oct
26-Jan	18-Oct
27-Jan	18-Oct
28-Jan	18-Oct
29-Jan	18-Oct
30-Jan	18-Oct
31-Jan	18-Oct
1-Feb	18-Oct
2-Feb	18-Oct
3-Feb	18-Oct
4-Feb	18-Oct
5-Feb	18-Oct
6-Feb	18-Oct
7-Feb	18-Oct
8-Feb	18-Oct
9-Feb	18-Oct
10-Feb	18-Oct
11-Feb	18-Oct
12-Feb	18-Oct

13-Feb	18-Oct
14-Feb	19-Oct
15-Feb	19-Oct
16-Feb	19-Oct
17-Feb	19-Oct
18-Feb	19-Oct
19-Feb	19-Oct
20-Feb	19-Oct
21-Feb	19-Oct
22-Feb	19-Oct
23-Feb	19-Oct
24-Feb	19-Oct
25-Feb	19-Oct
26-Feb	19-Oct
27-Feb	19-Oct
28-Feb	19-Oct
1-Mar	19-Oct
2-Mar	19-Oct
3-Mar	19-Oct
4-Mar	19-Oct
5-Mar	19-Oct
6-Mar	19-Oct
7-Mar	19-Oct
8-Mar	19-Oct
9-Mar	19-Oct
10-Mar	19-Oct
11-Mar	19-Oct
12-Mar	19-Oct
13-Mar	19-Oct
14-Mar	19-Oct
15-Mar	19-Oct
16-Mar	19-Oct
17-Mar	19-Oct
18-Mar	19-Oct
19-Mar	19-Oct
20-Mar	19-Oct
21-Mar	19-Oct
22-Mar	19-Oct
23-Mar	19-Oct
24-Mar	19-Oct
25-Mar	19-Oct
26-Mar	19-Oct
27-Mar	19-Oct

28-Mar	19-Oct
29-Mar	19-Oct
30-Mar	19-Oct
31-Mar	19-Oct
1-Apr	19-Oct
2-Apr	19-Oct
3-Apr	19-Oct
4-Apr	19-Oct
5-Apr	19-Oct
6-Apr	19-Oct
7-Apr	19-Oct
8-Apr	19-Oct
9-Apr	19-Oct
10-Apr	19-Oct
11-Apr	19-Oct
12-Apr	20-Oct
13-Apr	20-Oct
14-Apr	20-Oct
15-Apr	20-Oct
16-Apr	20-Oct
17-Apr	20-Oct
18-Apr	20-Oct
19-Apr	20-Oct
20-Apr	20-Oct
21-Apr	20-Oct
22-Apr	20-Oct
23-Apr	20-Oct
24-Apr	20-Oct
25-Apr	20-Oct
26-Apr	20-Oct
27-Apr	20-Oct
28-Apr	20-Oct
29-Apr	20-Oct
30-Apr	20-Oct
1-May	20-Oct
2-May	20-Oct
3-May	20-Oct
4-May	20-Oct
5-May	20-Oct
6-May	20-Oct
7-May	20-Oct
8-May	20-Oct
9-May	20-Oct

10-May	20-Oct
11-May	20-Oct
12-May	20-Oct
13-May	20-Oct
14-May	20-Oct
15-May	20-Oct
16-May	20-Oct
17-May	20-Oct
18-May	20-Oct
19-May	20-Oct
20-May	20-Oct
21-May	20-Oct
22-May	20-Oct
23-May	20-Oct
24-May	20-Oct
25-May	20-Oct
26-May	20-Oct
27-May	20-Oct
28-May	20-Oct
29-May	20-Oct
30-May	20-Oct
31-May	20-Oct
1-Jun	20-Oct
2-Jun	31-Dec
3-Jun	31-Dec
4-Jun	31-Dec
5-Jun	31-Dec
6-Jun	31-Dec
7-Jun	31-Dec
8-Jun	31-Dec
9-Jun	31-Dec
10-Jun	31-Dec
11-Jun	31-Dec
12-Jun	31-Dec
13-Jun	31-Dec
14-Jun	31-Dec
15-Jun	31-Dec
16-Jun	31-Dec
17-Jun	31-Dec
18-Jun	31-Dec
19-Jun	31-Dec
20-Jun	31-Dec
21-Jun	31-Dec

22-Jun	31-Dec
23-Jun	31-Dec
24-Jun	31-Dec
25-Jun	31-Dec
26-Jun	31-Dec
27-Jun	31-Dec
28-Jun	31-Dec
29-Jun	31-Dec
30-Jun	31-Dec
1-Jul	31-Dec
2-Jul	31-Dec
3-Jul	31-Dec
4-Jul	31-Dec
5-Jul	31-Dec
6-Jul	31-Dec
7-Jul	31-Dec
8-Jul	31-Dec
9-Jul	31-Dec
10-Jul	31-Dec
11-Jul	31-Dec
12-Jul	1-Jan
13-Jul	1-Jan
14-Jul	2-Jan
15-Jul	2-Jan
16-Jul	3-Jan
17-Jul	3-Jan
18-Jul	4-Jan
19-Jul	4-Jan
20-Jul	5-Jan
21-Jul	5-Jan
22-Jul	6-Jan
23-Jul	6-Jan
24-Jul	7-Jan
25-Jul	7-Jan
26-Jul	7-Jan
27-Jul	7-Jan
28-Jul	7-Jan
29-Jul	7-Jan
30-Jul	7-Jan
31-Jul	7-Jan
1-Aug	7-Jan
2-Aug	7-Jan
3-Aug	7-Jan

4-Aug	8-Jan
5-Aug	8-Jan
6-Aug	8-Jan
7-Aug	8-Jan
8-Aug	8-Jan
9-Aug	8-Jan
10-Aug	8-Jan
11-Aug	8-Jan
12-Aug	8-Jan
13-Aug	8-Jan
14-Aug	8-Jan
15-Aug	8-Jan
16-Aug	8-Jan
17-Aug	9-Jan
18-Aug	9-Jan
19-Aug	9-Jan
20-Aug	9-Jan
21-Aug	9-Jan
22-Aug	9-Jan
23-Aug	9-Jan
24-Aug	9-Jan
25-Aug	9-Jan
26-Aug	9-Jan
27-Aug	9-Jan
28-Aug	9-Jan
29-Aug	9-Jan
30-Aug	9-Jan
31-Aug	10-Jan
1-Sep	10-Jan
2-Sep	10-Jan
3-Sep	10-Jan
4-Sep	10-Jan
5-Sep	10-Jan
6-Sep	10-Jan
7-Sep	10-Jan
8-Sep	10-Jan
9-Sep	10-Jan
10-Sep	10-Jan
11-Sep	10-Jan
12-Sep	10-Jan
13-Sep	10-Jan
14-Sep	10-Jan
15-Sep	10-Jan

16-Sep	10-Jan
17-Sep	11-Jan
18-Sep	11-Jan
19-Sep	11-Jan
20-Sep	11-Jan
21-Sep	11-Jan
22-Sep	11-Jan
23-Sep	11-Jan
24-Sep	11-Jan
25-Sep	11-Jan
26-Sep	11-Jan
27-Sep	11-Jan
28-Sep	11-Jan
29-Sep	11-Jan
30-Sep	11-Jan
1-Oct	11-Jan
2-Oct	11-Jan
3-Oct	11-Jan
4-Oct	11-Jan
5-Oct	11-Jan
6-Oct	11-Jan
7-Oct	11-Jan
8-Oct	11-Jan

Supplementary Table S13

Stockholm

Infection date Following year optimal booster date

21-Oct	21-Oct
22-Oct	21-Oct
23-Oct	21-Oct
24-Oct	21-Oct
25-Oct	21-Oct
26-Oct	21-Oct
27-Oct	21-Oct
28-Oct	21-Oct
29-Oct	21-Oct
30-Oct	22-Oct
31-Oct	22-Oct
1-Nov	22-Oct
2-Nov	22-Oct
3-Nov	22-Oct
4-Nov	22-Oct
5-Nov	22-Oct
6-Nov	22-Oct
7-Nov	22-Oct
8-Nov	22-Oct
9-Nov	22-Oct
10-Nov	22-Oct
11-Nov	22-Oct
12-Nov	22-Oct
13-Nov	22-Oct
14-Nov	22-Oct
15-Nov	22-Oct
16-Nov	22-Oct
17-Nov	22-Oct
18-Nov	22-Oct
19-Nov	22-Oct
20-Nov	22-Oct
21-Nov	23-Oct
22-Nov	23-Oct
23-Nov	23-Oct
24-Nov	23-Oct
25-Nov	23-Oct
26-Nov	23-Oct
27-Nov	23-Oct
28-Nov	23-Oct
29-Nov	23-Oct
30-Nov	23-Oct

1-Dec	23-Oct
2-Dec	23-Oct
3-Dec	23-Oct
4-Dec	23-Oct
5-Dec	23-Oct
6-Dec	23-Oct
7-Dec	23-Oct
8-Dec	23-Oct
9-Dec	23-Oct
10-Dec	23-Oct
11-Dec	23-Oct
12-Dec	23-Oct
13-Dec	23-Oct
14-Dec	23-Oct
15-Dec	24-Oct
16-Dec	24-Oct
17-Dec	24-Oct
18-Dec	24-Oct
19-Dec	24-Oct
20-Dec	24-Oct
21-Dec	24-Oct
22-Dec	24-Oct
23-Dec	24-Oct
24-Dec	24-Oct
25-Dec	24-Oct
26-Dec	24-Oct
27-Dec	24-Oct
28-Dec	24-Oct
29-Dec	24-Oct
30-Dec	24-Oct
31-Dec	24-Oct
1-Jan	24-Oct
2-Jan	24-Oct
3-Jan	24-Oct
4-Jan	25-Oct
5-Jan	25-Oct
6-Jan	25-Oct
7-Jan	25-Oct
8-Jan	25-Oct
9-Jan	25-Oct
10-Jan	25-Oct
11-Jan	25-Oct
12-Jan	25-Oct

13-Jan	25-Oct
14-Jan	25-Oct
15-Jan	25-Oct
16-Jan	25-Oct
17-Jan	25-Oct
18-Jan	25-Oct
19-Jan	25-Oct
20-Jan	25-Oct
21-Jan	25-Oct
22-Jan	25-Oct
23-Jan	25-Oct
24-Jan	25-Oct
25-Jan	7-Nov
26-Jan	7-Nov
27-Jan	7-Nov
28-Jan	8-Nov
29-Jan	8-Nov
30-Jan	8-Nov
31-Jan	8-Nov
1-Feb	8-Nov
2-Feb	8-Nov
3-Feb	8-Nov
4-Feb	9-Nov
5-Feb	9-Nov
6-Feb	9-Nov
7-Feb	9-Nov
8-Feb	9-Nov
9-Feb	9-Nov
10-Feb	9-Nov
11-Feb	9-Nov
12-Feb	10-Nov
13-Feb	10-Nov
14-Feb	10-Nov
15-Feb	10-Nov
16-Feb	10-Nov
17-Feb	10-Nov
18-Feb	10-Nov
19-Feb	10-Nov
20-Feb	11-Nov
21-Feb	11-Nov
22-Feb	11-Nov
23-Feb	11-Nov
24-Feb	11-Nov

25-Feb	11-Nov
26-Feb	11-Nov
27-Feb	11-Nov
28-Feb	12-Nov
1-Mar	12-Nov
2-Mar	12-Nov
3-Mar	12-Nov
4-Mar	12-Nov
5-Mar	12-Nov
6-Mar	12-Nov
7-Mar	12-Nov
8-Mar	12-Nov
9-Mar	13-Nov
10-Mar	13-Nov
11-Mar	13-Nov
12-Mar	13-Nov
13-Mar	13-Nov
14-Mar	13-Nov
15-Mar	13-Nov
16-Mar	13-Nov
17-Mar	13-Nov
18-Mar	14-Nov
19-Mar	14-Nov
20-Mar	14-Nov
21-Mar	14-Nov
22-Mar	14-Nov
23-Mar	14-Nov
24-Mar	14-Nov
25-Mar	14-Nov
26-Mar	14-Nov
27-Mar	14-Nov
28-Mar	15-Nov
29-Mar	15-Nov
30-Mar	15-Nov
31-Mar	15-Nov
1-Apr	15-Nov
2-Apr	15-Nov
3-Apr	15-Nov
4-Apr	15-Nov
5-Apr	15-Nov
6-Apr	15-Nov
7-Apr	16-Nov
8-Apr	16-Nov

9-Apr	16-Nov
10-Apr	16-Nov
11-Apr	16-Nov
12-Apr	16-Nov
13-Apr	16-Nov
14-Apr	16-Nov
15-Apr	16-Nov
16-Apr	16-Nov
17-Apr	16-Nov
18-Apr	16-Nov
19-Apr	16-Nov
20-Apr	16-Nov
21-Apr	16-Nov
22-Apr	16-Nov
23-Apr	16-Nov
24-Apr	16-Nov
25-Apr	16-Nov
26-Apr	16-Nov
27-Apr	16-Nov
28-Apr	16-Nov
29-Apr	16-Nov
30-Apr	16-Nov
1-May	16-Nov
2-May	16-Nov
3-May	16-Nov
4-May	16-Nov
5-May	16-Nov
6-May	16-Nov
7-May	16-Nov
8-May	16-Nov
9-May	16-Nov
10-May	16-Nov
11-May	16-Nov
12-May	16-Nov
13-May	16-Nov
14-May	16-Nov
15-May	16-Nov
16-May	16-Nov
17-May	16-Nov
18-May	16-Nov
19-May	16-Nov
20-May	16-Nov
21-May	16-Nov

22-May	16-Nov
23-May	16-Nov
24-May	16-Nov
25-May	16-Nov
26-May	16-Nov
27-May	16-Nov
28-May	16-Nov
29-May	16-Nov
30-May	16-Nov
31-May	16-Nov
1-Jun	16-Nov
2-Jun	16-Nov
3-Jun	16-Nov
4-Jun	16-Nov
5-Jun	16-Nov
6-Jun	16-Nov
7-Jun	16-Nov
8-Jun	16-Nov
9-Jun	16-Nov
10-Jun	16-Nov
11-Jun	16-Nov
12-Jun	17-Nov
13-Jun	17-Nov
14-Jun	17-Nov
15-Jun	17-Nov
16-Jun	17-Nov
17-Jun	17-Nov
18-Jun	17-Nov
19-Jun	17-Nov
20-Jun	17-Nov
21-Jun	17-Nov
22-Jun	17-Nov
23-Jun	17-Nov
24-Jun	17-Nov
25-Jun	17-Nov
26-Jun	17-Nov
27-Jun	17-Nov
28-Jun	17-Nov
29-Jun	17-Nov
30-Jun	17-Nov
1-Jul	17-Nov
2-Jul	17-Nov
3-Jul	17-Nov

4-Jul	17-Nov
5-Jul	17-Nov
6-Jul	17-Nov
7-Jul	17-Nov
8-Jul	17-Nov
9-Jul	17-Nov
10-Jul	17-Nov
11-Jul	17-Nov
12-Jul	17-Nov
13-Jul	17-Nov
14-Jul	17-Nov
15-Jul	17-Nov
16-Jul	17-Nov
17-Jul	17-Nov
18-Jul	17-Nov
19-Jul	17-Nov
20-Jul	17-Nov
21-Jul	17-Nov
22-Jul	17-Nov
23-Jul	17-Nov
24-Jul	17-Nov
25-Jul	17-Nov
26-Jul	17-Nov
27-Jul	17-Nov
28-Jul	17-Nov
29-Jul	17-Nov
30-Jul	17-Nov
31-Jul	17-Nov
1-Aug	17-Nov
2-Aug	17-Nov
3-Aug	17-Nov
4-Aug	17-Nov
5-Aug	17-Nov
6-Aug	17-Nov
7-Aug	17-Nov
8-Aug	17-Nov
9-Aug	17-Nov
10-Aug	17-Nov
11-Aug	17-Nov
12-Aug	17-Nov
13-Aug	17-Nov
14-Aug	17-Nov
15-Aug	17-Nov

16-Aug	17-Nov
17-Aug	17-Nov
18-Aug	17-Nov
19-Aug	17-Nov
20-Aug	17-Nov
21-Aug	17-Nov
22-Aug	17-Nov
23-Aug	17-Nov
24-Aug	17-Nov
25-Aug	17-Nov
26-Aug	17-Nov
27-Aug	17-Nov
28-Aug	17-Nov
29-Aug	17-Nov
30-Aug	17-Nov
31-Aug	17-Nov
1-Sep	17-Nov
2-Sep	17-Nov
3-Sep	17-Nov
4-Sep	17-Nov
5-Sep	17-Nov
6-Sep	17-Nov
7-Sep	17-Nov
8-Sep	21-Jan
9-Sep	22-Jan
10-Sep	22-Jan
11-Sep	23-Jan
12-Sep	23-Jan
13-Sep	23-Jan
14-Sep	24-Jan
15-Sep	24-Jan
16-Sep	31-Mar
17-Sep	31-Mar
18-Sep	31-Mar
19-Sep	31-Mar
20-Sep	31-Mar
21-Sep	31-Mar
22-Sep	31-Mar
23-Sep	31-Mar
24-Sep	31-Mar
25-Sep	31-Mar
26-Sep	31-Mar
27-Sep	31-Mar

28-Sep	31-Mar
29-Sep	31-Mar
30-Sep	31-Mar
1-Oct	31-Mar
2-Oct	31-Mar
3-Oct	31-Mar
4-Oct	31-Mar
5-Oct	31-Mar
6-Oct	31-Mar
7-Oct	31-Mar
8-Oct	31-Mar
9-Oct	31-Mar
10-Oct	31-Mar
11-Oct	31-Mar
12-Oct	31-Mar
13-Oct	31-Mar
14-Oct	31-Mar
15-Oct	30-Apr
16-Oct	30-Apr
17-Oct	30-Apr
18-Oct	30-Apr
19-Oct	30-Apr
20-Oct	30-Apr